

# Glossary

**acetylcholine** — a chemical neurotransmitter (q.v.) substance that is used both at junctions between nerves and muscles, and widely at synapses (q.v.) between nerve cells throughout the brain

**activity** — a mathematical variable representing the functioning of a unit in an artificial neural network (q.v.). If the unit corresponds to a collection of neurons (q.v.) in the actual brain, activity is usually thought of as analogous to the frequency of electrical impulses in these neurons. If the unit corresponds to a concept, activity is thought of as a rough measure of how much the concept is being thought of or is influencing behavior.

**adaptive resonance theory (ART)** — a class of artificial neural networks (q.v.) designed by Stephen Grossberg and Gail Carpenter for classification of patterns. The patterns can be at many possible levels: visual or auditory stimuli, concepts, beliefs, et cetera. A particular new pattern “resonates” with a stored representation of previously observed patterns. “Adaptive” means that this stored representation changes with experience.

**aggregative** — one of the strategies for dealing with conflicting information in the work of the psychologists Daniel Wegner and Robin Vallacher. “Aggregative” means that the subject expresses awareness of the conflict but no way to resolve it. (See also **integrative, univalent**.)

**amygdala** — an area of the brain’s limbic system (q.v.) that seems to be involved in registering emotional values of sensory events.

**antithesis** — in Georg Hegel’s philosophy, the opposite of a primary concept or thesis (q.v.)

**Apollonian** — (from characteristics ascribed to the Greek god Apollo) an adjective describing a temperament that is calm, rational, ordered, balanced, and distrustful of the wild imagination: the opposite of Dionysian (q.v.).

**artificial neural network** — a network of interconnected units or nodes (q.v.) designed to mimic or reproduce some aspect of brain or cognitive function. Typically, the mathematical variables in such a network are node activities (q.v.) and connection weights (q.v.).

**association areas of cortex** — those parts of the cerebral cortex (q.v.) which encode not stimuli relevant to a single sense (vision, touch, hearing, smell, taste) but complex concepts or associations between senses (such as between the look and sound of the letter “A”). These include most of the frontal, temporal, and parietal lobes.

**associative learning** (see **Hebbian learning**)

**attractor (stable equilibrium)** — a state of a dynamical system (q.v.) that the system goes toward if it is already fairly near that state.

**autonomic nervous system** — the part of the nervous system (some in the brain, some peripheral) that is closely connected to other internal organs of the body. Parts of the autonomic system, for example, regulate heart rate, endocrine gland responses, and digestion.

**axon** — the long main shaft of a neuron (q.v.). Electrical impulses travel down the axon, like a wave, toward the synapse (q.v.). Nerve fibers consist of axons.

**basal ganglia** — a group of interconnected regions of the brain lying below the cerebral cortex (q.v.) toward the front. The basal ganglia are very important in movement, and some movement disorders, such as Parkinson’s disease and Huntington’s chorea, result from loss of neural signals to that area. Their exact function is uncertain but seems to somehow involve emotional and cognitive effects on movement.

**Bayesian solver** — one of three types of human decision maker as described by Sam Leven. Bayesians tend to choose among a known set of alternatives and “play the percentages.” (See also **Dantzig solver**, **Godelian solver**.)

**cell body** — the part of a neuron (q.v.) which contains the cell’s nucleus. Signals from other neurons come in to the cell body via the dendrites (q.v.) and are added before going down the axon (q.v.).

**cerebral cortex** — the outer layer of the brain, containing the cells and nerve fibers that do the most complex processing. As evolution proceeds from reptiles to mammals, the cortex balloons

outward to become six-layered and heavily folded. Its main parts are the frontal, temporal, occipital, and parietal lobes (q.v.).

**chaos** — a word with a variety of meanings. Among the ancient Greeks it meant the gap between heaven and earth, and later came to mean disorder, its most common modern usage. In the theory of mathematical dynamical systems (q.v.), it means a pattern of system behavior that is neither repetitive (periodic) nor going to an equilibrium (q.v.)

**coexistent** — descriptive term for behavior of a neural network (q.v.) whereby more than one node (q.v.) remains active over time: the opposite of winner-take-all (q.v.)

**cognitive dissonance** — a term coined by Leon Festinger for the ability of a person to simultaneously hold at least two opinions or beliefs that are logically inconsistent. In some cases the believer is aware of the contradiction. In other cases he or she is only conscious of the two beliefs separately, in different contexts.

**common nonsense** (coined by the author) — conventional beliefs that are widely held but inaccurate and likely to be harmful.

**commonsense** (as employed by the author) — conventional beliefs that are widely held and accurate and likely to be helpful.

**comparative advantage** — in the 19th century economic theory of David Ricardo, the notion that if two countries trade with each other, it is more efficient for the two to specialize in producing different resources. This was mainly used to justify the industrialized West's efforts to preserve colonies as exploited producers of raw materials.

**Compassionate Revolution** — a term coined by John Calhoun for changes in the future which could result from world-wide information networks. Specifically, people all over the world would become vitally interested in the welfare of other people everywhere else. Life style differences would be tolerated better, and there would be a widespread commitment to reducing population.

**competition** — a device in artificial neural networks (q.v.) whereby simulated neural inhibition (q.v.) is employed to facilitate choice between coded representations of different objects or concepts.

There can be competition at many cognitive levels, such as between percepts, drives, motor plans, or beliefs.

**connection weight** — in an artificial neural network (q.v.), a measure of the strength of a connection between two nodes (q.v.). The stronger the connection weight, the more activity (q.v.) in one node is likely to lead to activity in the other node.

**correlate** — a neurophysiological or neurochemical event that tends to be repeatedly associated with a particular psychological or mental process (e.g., pleasure, memory, binocular vision).

**crackpot realism** — a term coined by C. Wright Mills for the tendency to declare a destructive social policy as “realistic,” and opposition to that policy as “unrealistic,” without solid evidence for this assertion.

**Dantzig solver** — one of three types of human decision maker as described by Sam Leven. Dantzig solvers tend to choose one method and use it reliably and repeatedly. (See also **Bayesian solver**, **Godelian solver**.)

**delayed matching to sample** — a task given in cognitive experiments. The subject first sees a particular object, then it is taken away, then their scene changes to one that includes a copy of the original object. The subjects are trained, using a food reward, to perform some movement toward the object that matches the original one.

**dendrite** — one of the small fiber branches coming off the cell body (q.v.) of a neuron (q.v.). Dendrites receive most of the electrical signals carried by synapses (q.v.) from other neurons, and at times generate electrical impulses themselves.

**depletion** — in either the brain or an artificial neural network (q.v.), a condition whereby activity of the neuron (q.v.) or node (q.v.) leading into a synapse (q.v.) leads to weakening of the synapse. This is the opposite of Hebbian learning (q.v.). The theory is that the chemical neurotransmitter (q.v.) substance is “used up” by the electrical signal going into the synapse.

**dichotomy** — a pair of two concepts that are, or seem to be, opposites.

**Dionysian** (from characteristics ascribed to Dionysius, the Greek god of wine) an adjective describing a temperament that is adventurous and prone to wild flights of fancy: the opposite of Apollonian (q.v.)

**Discordianism** — a playful branch of neo-Paganism (q.v.) devoted to worship of Eris, Greek goddess of chaos or disorder. It promotes the idea that both chaos and order can be good if used properly.

**disinhibition** — a neural process whereby one neuron inhibits (q.v.) another which in turn inhibits a third neuron. Inhibiting inhibition can be used to release stored electrical activity controlled by the third neuron.

**dominator society** — a term by Riane Eisler for a society characterized by hierarchical power relationships and defined sex roles: the opposite of partnership society (q.v.).

**dopamine** — a common neurotransmitter (q.v.) that is particularly associated with the brain's reward system.

**drive induction** — the psychological theory stating that reinforcement (positive or negative) is associated with the *onset* of a drive: for example, a stimulus paired with the onset of electric shock becomes associated with fear, or a stimulus paired with consummating the desire to eat becomes associated with pleasure. This is complementary to drive reduction (q.v.), and now most psychologists believe reinforcement is related to a combination of the two processes.

**drive reduction** — the psychological theory stating that all positive reinforcement or reward is that which reduces drive: for example, food reduces hunger; drink reduces thirst; sex reduces lust. Results on direct electrical stimulation of the brain refuted the strict form of this theory.

**dynamical system** — a mathematical system that describes a set of interacting variables that change over time. The set of values of all these variables, representing the current state of the system, is often described abstractly as a point in space.

**Ecotopia** — a fictional society depicted in a utopian novel of the same name by Ernest Callenbach, located in northern California and the states of Oregon and Washington. In the book, this area secedes from the United States and develops a society based on ecological survival, cooperation, and fun.

**electroencephalogram (EEG)** — an electrical wave recorded from the scalp, discovered by Hans Berger in the 1920s, which reflects electrical activity of some part of the brain. Characteristic EEG patterns are associated with different stages of sleep or waking, and with different stages of orienting toward a novel stimulus in the environment. The cellular basis of EEGs is not completely known, but they are thought to represent electrical potentials (voltage differences across membranes) in dendrites (q.v.) that may or may not lead to actual nerve impulses.

**emergent property** — a property of a complex system that emerges from the architecture and its interactions, not from the properties of individual components. Consciousness, emotions, memory, et cetera, are usually thought to be emergent properties of the brain's network organization.

**energy** (see **Lyapunov function**)

**episodic memory** — memory for specific past happenings (episodes), including when and where they happened and what else was going on at time (e.g., what other people were present).

**equilibrium** — for a dynamical system (q.v.), a state that the system stays at once it reaches that state. The word means that all the interacting influences on any of the variables are in “balance” so the value of that variable doesn't change.

**evaluative inconsistency** — a combination of different pieces of information that could lead to positive and negative evaluations of the same person or the same course of action.

**exemplar** — any single member of a category encoded by the brain or an artificial neural network (q.v.).

**extensional orientation** — a term coined by S. I. Hayakawa for the ability to see events from multiple perspectives.

**exteroception** — perception, or neural processing, of events in the outside world, through the traditional five senses of vision, hearing, touch, smell, and taste.

**frontal lobe** — the part of the cerebral cortex (q.v.) that lies furthest toward the forehead. Of all the major lobes of the brain, the frontal lobes (left and right) are the latest to develop, both in evolution and in individual development. They are also the part of the cerebral cortex with the widest neural connections to parts of the brain below the cortex. This gives the frontal lobes major roles in integrating rational thought and emotion, in organizing cognitive tasks, and in long-term planning.

**frustrative rebound** — an aversive or painful reaction to the absence of an expected pleasant stimulus, or to the removal of a pleasant stimulus that was previously there.

**fuzzy logic** — logic which isn't confined to "black-and-white," "A versus not A" alternatives, but allows for A and not A to both be true to varying degrees.

**GABA** — gamma-amino butyric acid, one of the commonest neurotransmitters (q.v.) in the brain. GABA always is an inhibitory transmitter (see **inhibition**).

**gated dipole** — a class of neural network (q.v.) developed by Stephen Grossberg for encoding pairs of opposite concepts (e.g., light and dark; pain and pleasure; flexion and extension). Ceasing of activity of the part of the network responding to one of a pair activates the part of the network responding to its opposite. The mechanism involves simulated neurotransmitter (q.v.) depletion (q.v.).

**global minimum** — in a dynamical system (q.v.) which has a Lyapunov function (q.v.), the state of the system at which the Lyapunov function has the smallest value. This is an equilibrium (q.v.) which is usually considered to be somehow the optimal state of the system.

**Godelian solver** — one of three types of human decision maker as described by Sam Leven. Godelians tend to explore many possible alternatives and like to act on hunches. See also **Bayesian solver**, **Dantzig solver**.)

**gylanic** — a word coined by Riane Eisler for a state of equal partnership between women and men. She derived the word from the Greek words *gyne* (woman) and *andros* (man).

**Hebbian (associative) learning** — strengthening of the efficacy of a synapse (q.v.) in an actual nervous system, or of a connection weight (q.v.) in an artificial neural network (q.v.) as a result of paired electrical activities of the two neurons on either side of the synapse (which are usually called *pre-synaptic* and *post-synaptic* neurons). Donald Hebb proposed this type of synaptic change to explain psychological data about conditioning, and it was later verified physiologically.

**hedonistic neuron** — in the neural network theory due to Harry Klopf, a neuron (q.v.) that tends to "seek" positive electrical stimulation and avoid negative stimulation. If the neuron transmits an

electrical impulse in response to stimulation from a particular source, in this theory, positive or negative stimulation will make future responses to that same stimulus more or less likely.

**heterostasis** — a term coined by Harry Klopff for seeking to make a particular variable, such as excitement or stimulation, as large as possible: the opposite of homeostasis (q.v.).

**hierarchy of needs** — Abraham Maslow's theory whereby satisfaction of one need leads to consciousness of a “higher” need. The progression from “lower” to “higher” is, approximately, from survival needs (such as safety and food) through sexual needs, needs for love and belonging, curiosity, up to the self-actualization and growth needs.

**hippocampus** — an area of the brain that consists of two-layered cortex just under the temporal lobes (q.v.). The hippocampus is involved somehow in the transition from short-term to long-term memory.

**homeostasis** — regulation of a variable in the body to keep it from being too large or too small. Blood sugar and hormone levels, for example, are regulated in this fashion.

**hypothalamus** — an area deep inside the brain, below the thalamus (q.v.), that is involved in expression of basic drives. Parts of the hypothalamus are closely connected to the endocrine system and other internal organs.

***I Ching*** — The ancient Chinese book of prophecy that preceded both the Taoist and Confucianist religions. The *I Ching* consists of displays in which Yang (q.v.) is represented by continuous lines and Yin (q.v.) by broken lines, forming into every possible group of six “Yins” or “Yangs.” Whatever pattern was randomly encountered on opening the book would help determine what balance between these two principles was needed to guide a person’s actions.

**inhibition** — a neural process whereby a signal from one neuron (q.v.) reduces the probability of electrical impulses in another neuron. This occurs via somehow changing the shape of the second neuron's membrane to alter its ability to conduct specific ions, or electrically charged atoms.

**integrative** — one of the strategies for dealing with conflicting information in the work of the psychologists Daniel Wegner and Robin Vallacher. “Integrative” means that the subject both expresses awareness of the conflict and creates a way to resolve it. (See also **aggregative**, **univalent**.)

**interoception** — perception, or neural processing, of the states of other internal organs such as the heart, digestive system, or endocrine glands.

**Kelly constructs** — mental constructs of individual people, as discussed by George Kelly: mental notions that each of us develop to make sense of the world we live in. These constructs differ widely between individuals. For example, “kindness” or “cruelty” might be particularly important to one person, whereas “bravery” or “cowardice” is more compelling to another. They tend to come in pairs of opposites.

**limbic system** — the large part of the brain, including the amygdala (q.v.), hippocampus (q.v.), septum, and other areas, that lies just below the cortex and forms a border around the brain stem. (“Limbic” comes from the Latin word for “border.”) The limbic system corresponds roughly to Paul MacLean’s old mammalian brain (see **triune brain**). These brain areas tend to be involved in various ways in emotional expression.

**linear system** — a mathematical dynamical system (q.v.) in which response to an input tends to increase gradually in proportional to the strength of the input.

**local minimum** — in a dynamical system (q.v.) which has a Lyapunov function (q.v.), the state of the system at which the Lyapunov function has a smaller value than it does for any nearby states, but not the smallest possible. This is an equilibrium (q.v.) which is usually considered to be less optimal than the global minimum (q.v.).

**locus ceruleus** — a region of the midbrain (q.v.) whose neurons synapse with large parts of the cerebral cortex (q.v.) and limbic system (q.v.) using the neurotransmitter norepinephrine (q.v.).

**Lyapunov function** — in some dynamical systems (q.v.), a mathematical function of all the system variables that steadily decreases along trajectories (q.v.) of the system. If a Lyapunov function exists, it guarantees that the system moves toward an equilibrium (q.v.). In physical systems, such a function often represents an energy that is minimized by the system's paths. In an economic system, such a function may represent a cost that is minimized.

**maladaptive resonance theory (MART)** (coined by the author) — a neural network built partly on a variation of adaptive resonance theory (q.v.) which reproduces the behavior of patients with frontal

lobe damage who can't change their sorting criterion on a card sorting test, even after the experimenter has told them they are making errors. This same class of network may model a variety of other "stuck" phenomena in human psychology, including entrenched bureaucratic rules and social customs, educational malrules (q.v.), and self-fulfilling cynical prophecies.

**malrule** — an incorrect rule that students develop, particularly in mathematics, that is adhered to even out of habit even after it leads to wrong answers.

**medial forebrain bundle** — a nerve pathway in the brain, traveling from parts of the limbic system (q.v.) to the hypothalamus (q.v.), that seems to be involved in reward or positive reinforcement. This is one area whose electrical stimulation is usually found to be pleasurable in experimental animals.

***mens sana in corpore sano*** — in Latin, "a sound mind in a sound body," used as an exhortation for balance between physical and mental activity.

**metagrumble** — a word coined by Abraham Maslow for a high-level complaint by someone who is fairly content with satisfaction of his or her basic needs. Examples include "society is unfair" and "there is too much needless death."

**midbrain** — the middle part of the brain, going from back to front, which is relatively unchanged across all vertebrates. It includes several areas involved in integrating sensory inputs and controlling motor outputs.

**mindfulness** — awareness of what one is doing, feeling, and thinking in the present, as opposed to the larger and longer-term implications and significance of events. One result of mindfulness is that ordinary happenings are observed more closely and often thereby become more pleasurable as well.

**modularity** — the notion that the brain is divided into subsystems or *modules* that process information somewhat independently.

**module** (see **modularity**)

***mu*** — a Japanese word, used to answer some questions in Zen Buddhism. The word means "neither yes nor no" or "not an appropriate question."

**neo-Paganism** — a broad term for a variety of current religious practices characterized by respect for nature and the cycles of the seasons. These include, for example, worship of ancient Goddesses; American Indian rituals; and European “magical” traditions like Wicca and Druidism. Many of these practices are adapted to modern times.

**neural network** — either an artificial neural network (q.v.) or a network of actual neurons (q.v.) and synapses (q.v.) in a biological nervous system.

**neuron** — a cell in the brain or peripheral nervous system. All neurons generate electrical impulses, or action potentials, and transmit them to other neurons.

**neuroscience** — a broad term for the biology of the nervous system. Some neuroscientists are primarily anatomists, some physiologists, some neurochemists, and some clinicians. Many neuroscientists study the relationship of neuron and neuron system responses to sensations, motor behaviors, or performance of cognitive tasks.

**neurotransmitter** — a chemical substance that is present in the synaptic gap (q.v.) between two neurons (q.v.). It mediates the changes that take place at the membrane of the postsynaptic neuron, making that neuron either more or less likely to produce an electrical impulse.

**node** — a functional unit in an artificial neural network (q.v.). Even if the network is meant to explain brain processes, nodes are usually identified not with single neurons (q.v.) but with functional groups, such as a column of neurons or a brain region. Sometimes a node is identified by the concept it encodes (e.g., the color green or the word “cat”), without a definite identification of where and how in the brain that concept is stored.

**nonlinear system** — a dynamical system (q.v.) that is not a linear system (q.v.). This means that under some conditions, small changes in inputs can lead to dramatic changes in system response.

**noogenesis** — (from the Greek *nous* = mind) a word coined by Teilhard de Chardin for the emergence of mental and spiritual processes from the evolution of complex life forms.

**norepinephrine** — A common neurotransmitter (q.v.) substance, believed to be involved in enhancing responses to stimuli that are either emotionally significant or novel.

**nucleus basalis** — a region of the midbrain (q.v.) whose neurons synapse with large parts of the cerebral cortex (q.v.) and limbic system (q.v.) using the neurotransmitter acetylcholine (q.v.).

**optimization** — achievement of, or movement toward, a state whereby some variable in a system is at a level declared to be the most desirable for a particular purpose.

**orbital frontal cortex** — one of the major subdivisions of the frontal lobes (q.v.), located toward the midline between the two hemispheres. This is the part of the frontal lobes most closely connected to the limbic system (q.v.). People with damage to the orbital frontal cortex often have difficulty suppressing inappropriate behavior.

**orienting system** — the system, in the brain or an artificial neural network (q.v.), that is activated by novel stimuli in the environment. Orienting response is characterized by various changes in circulation patterns, skin conductance, and EEG (q.v.) patterns.

**Orphic resurgence** — a synonym, coined by Ralph Abraham, for the periods of gylanic (q.v.) revival throughout history characterized by creativity, freedom of expression, and relative equality of the sexes. The word comes from the ancient Greek mystery religion centered around the myth of Orpheus.

**parietal lobe** — the part of the cerebral cortex (q.v.) closest to the top of the head. It consists association cortex (q.v.) and is involved in many functions including spatial perception and motor learning.

**participatory democracy** — a political ideal of some of the radical groups in the 1960s, whereby voters are direct participants in the process of deciding on issues. It is contrasted often with *representative democracy*, whereby voters elect representatives and largely turn over the political process to those they elect.

**partnership society** — a term by Riane Eisler for a society based on equality and cooperation, particularly between the sexes, and without rigid hierarchies: the opposite of dominator society (q.v.).

**pattern completion** — a tendency to mentally “fill in the gaps” when one perceives part but not all of a familiar pattern (for example, a person’s face or name, or a road sign).

**Pavlovian (classical) conditioning** — training an animal to make a passive response to a particular stimulus based on its repeated association with another stimulus that normally brings out the same response. In Pavlov's original experiment, the sound of a bell was paired with the smell of meat and a dog learned to salivate to the bell alone.

**peak experience** — a transient episode, such as most people have, of functioning at the level of self-actualization (q.v.). Peak experiences tend to be lived more vividly and remembered more accurately than the rest of life.

**perseveration** — maintenance of a response which was at one time appropriate but no longer is. An example occurs on cognitive tasks when the experimenter changes the rules and some subjects (e.g., those with frontal lobe damage) can't make the change.

**personal construct** (see **Kelly construct**)

**phasic** — an adjective describing the response of a neuron (q.v.) which is generating impulses only some of the time; the opposite of tonic (q.v.).

**politics of meaning** — an approach to politics taken by Michael Lerner, editor of the alternative Jewish magazine *Tikkun*. It is characterized by a combination of liberal social programs and a strong concern for ethical relationships, families, communities, and spiritual welfare.

**preemptive construct** — a Kelly construct (q.v.) of a characteristic which assumes such emotional importance that if anything has that characteristic, all its other characteristics are ignored. An example would be seeing a person of another ethnic group as *only* someone of that group.

**prefrontal cortex** (see **frontal lobe**)

**prototype** — A member of a cognitive category that is somehow regarded as "typical" of the category. The prototype might be a commonly perceived instance of the category, or might be formed from averaging actual instances that have been perceived.

**quality** — an abstract philosophical notion for what is desirable, which is primary and undefinable.

**raphé dorsalis** — a region of the midbrain (q.v.) whose neurons synapse with large parts of the cerebral cortex (q.v.) and limbic system (q.v.) using the neurotransmitter serotonin (q.v.).

**reductionism** — the version of philosophical materialism (q.v.) which holds that emotional, mental, and spiritual events can be reduced to “nothing but” the brain biochemistry and physiology that promotes these events.

**reification** — in sociology, the belief that a particular social force is a thing (in Latin, *res*) in itself, a force of nature that can’t be controlled.

**reticular formation** — a large area, partly in the midbrain (q.v.) and partly in the brain stem, consisting of many cell regions and fibers. Parts of this brain area are involved in maintenance of the waking state and of the organism’s basic needs.

**search of search spaces** — a term coined by Douglas Hofstadter for a mental search or scanning process that could involve many different dimensions of perceptual and cognitive experience at once.

**self-actualization** — a term coined by Abraham Maslow for the state of achieving one’s best potential consistently. Its characteristics include spontaneity and the ability to synthesize apparent conflicts.

**semantic memory** — memory for facts or the meanings of things.

**serotonin** — a common neurotransmitter (q.v.) substance, believed to be involved in regulating matching of patterns between the mind and the outside world. LSD produces hallucinations by binding to chemical sites that would otherwise bind to serotonin, thereby decreasing the available amounts of that transmitter.

**shalom** — a Hebrew word with many meanings. The basic meaning is “peace,” but it is also used for both “hello” and “good-bye.” The original meaning was “completeness” or “wholeness.”

**simulated annealing** — a mathematical procedure designed by Scott Kirkpatrick and his colleagues to move a neural network (q.v.) out of a suboptimal attractor (q.v.) and closer to an optimal attractor. The name comes from analogy with the annealing process in metallurgy, whereby a metal is heated to increase flexibility when change in shape is desired, and then cooled when the desired shape has been achieved. In a neural network, “heating” and “cooling” are metaphors for increase and decrease in random network activity. If the network “heats up,” the probability of random

fluctuation out of the current state is increased. If the network “cools down,” this fluctuation probability is decreased.

**speciesism** — (by analogy with racism and sexism) the belief that humans are superior to other animals or to intelligent machines.

**stable equilibrium** (see **attractor**)

**synapse** — the junction between two neurons (q.v.) in the brain or peripheral nervous system. A synapse can be either chemical or electrical, but chemical synapses that use neurotransmitters (q.v.) are the most common.

**synaptic gap** — the separation between two neurons (q.v.) that form the most typical kind of synapse (q.v.). Its width is usually of the order of one to a few millionths of a meter.

**synchronicity** — a term used by Carl Jung for unexpected coincidence or serendipity, particularly when it advances a person's goals.

**synergy** — in anthropology (as developed by Ruth Benedict) and sociology, a situation whereby members of a society, group, or work place tend to act in harmony with each other. Maslow described synergy as the social analog of self-actualization (q.v.).

**synthesis** — see **thesis**

**temporal lobe** — the part of the cerebral cortex nearest the sides of the head (the word comes from the Latin for *temple* and has nothing to do with time!) Part of the temporal lobes is the auditory cortex, relating to hearing. The rest of it is association cortex (q.v.) including some association areas relating to language.

**thalamus** — a large part of the brain that is below the cerebral cortex (q.v.) and above the midbrain (q.v.). Most parts of the thalamus have feedback connections with some parts of the cerebral cortex, and are part of complex circuits that relay to the cortex information from other deeper brain areas such as in the limbic system (q.v.), basal ganglia (q.v.), midbrain, and brain stem.

**thesis** — in the philosophy of George Hegel, an original idea which has an opposite or antithesis (q.v.). Subsequently, the two are resolved into a synthesis.

**thoughtful wishing** (coined by the author) — limiting one’s aspirations to what appears to be possible in the short run.

**tonic** — an adjective describing the response of a neuron (q.v.) which is steadily generating impulses all of the time; the opposite of phasic (q.v.).

**trajectory** — in a dynamical system (q.v.), the state of the system at a given time is often described abstractly as a point in space. The system trajectory is the path of this point through time.

**transcendence** — being grounded in the spiritual rather than material plane of existence, and therefore able to perceive ordinary experience in ways that are outside the limits of ordinary perception.

**triune brain** — a three-part schema developed by Paul MacLean for describing the evolution-based organization of the human brain. The three parts were: “reptilian” responsible for instincts and basic maintenance; “old mammalian” responsible for emotions; “new mammalian” responsible for complex information processing.

**ubility** — a contraction, coined by Robert Hecht-Nielsen, for “universal nobility,” describing a future where everyone is privileged and has the opportunity to develop his or her creative potential.

**Unitarian Universalism (UU)** — a liberal offshoot of Protestant Christianity. The American branch is a fusion of the Unitarians, whose main focus is on the oneness (as opposed to Trinity) of God, and the Universalists, whose main focus is on universal salvation (as opposed to some being saved and some damned).

**univalent** — one of the strategies for dealing with conflicting information in the work of the psychologists Daniel Wegner and Robin Vallacher (see **aggregative**). The univalent strategy is accepting one side of the conflict and ignoring the other side.

**vagus nerve** — a nerve in the autonomic nervous system (q.v.), originating in the brain stem, which serves to slow down the heart.

**winner-take-all** — descriptive term for behavior of a neural network (q.v.) whereby only one node (q.v.) remains active over time: the opposite of coexistent (q.v.).

*Woman on the Edge of Time* — a utopian novel written in 1983 by Marge Piercy. The woman is a patient in a mental hospital who can mentally transport herself to a communal, cooperative society of the Twenty-Second Century.

**yang** and **yin** — the two opposite principles in Chinese philosophy and religion. Yang and yin originally meant the sunny and shady sides of a mountain but then became broadened to represent other polarities: male-female, light-dark, intrusive-receptive, heaven-earth, et cetera.