Intuitive knowledge and its development

From the original article in 2009. Author: Ray Peat.

Understanding consciousness is necessary for understanding life. Variations of consciousness, such as dementia, depression, delusion, or insight, originality, curiosity have to be understood biologically.

To understand our ability to know and discover, I think it's valuable to consider foolishness along with wisdom, since "knowledge" consists of both. Scientists have been notorious for opposing new discoveries, but the mental rigidity of old age is so general, and well known, that many people have believed that it was caused by the death of brain cells. Individual cells do tend to become less adaptive with aging, and metabolism generally slows down with aging, but even relatively young and mentally quick people are susceptible to losing their ability to understand new ideas.

I think our use of language is both the means by which understanding can be preserved, encapsulated, and disseminated, and a great impediment to understanding. At first, words are continuous with the intuitive framework in which they are learned, but they gradually become relatively independent and abstract. Things can be learned without directly experiencing them. Even though words gradually change through use, the simple fact that they have a degree of dependability allows them to function even when there is no active thought. Uncritical listening is possible, and if a person can say something, it seems to be easy to believe that it's true. By the age of 25, our language has usually given us many assumptions about the nature of the world.

Verbal formulations of one sort are given up for new verbal formulations, in the process called education. Sometimes graduate students seem to have lost all common sense. It's as if their hard-drive had been reformatted to allow their professors to download onto it. But common sense, usually, is just what Einstein called it, an accumulation of prejudices.

Children learn language so easily that many people have seriously believed that a certain language was inherited by people of each ethnic group. Bilingual people were thought to be intellectually inferior (though it turned out that bilingualism actually increases a person's mental abilities--possibly because of the brain development known to be produced by learning1.) Eventually, people learned that the children of immigrants were as capable of learning the language of the new country as the native children were.

Then, explaining the mystery of language learning took a new form, that didn't seem foolish to most professional anthropologists and linguists. The first and most important step in the new theory was to declare that simple learning theory was inadequate to explain the development of language. Language developed, just as the silly racial theory had thought, out of our genetic endowment, except that what we inherited was now said to be a Universal Language, with its Universal Rules embedded in our chromosomes. Then, the speed with which children learn language was to be explained as the "innateness" of all of the complex stuff of language, with only a few things needing to be actually learned--those minor details that distinguish English from Eskimo or Zapotec.

Although the phrase "genetic epistemology" was coined by Jean Piaget, a major philosophical and scientific theme of the 20th century has been the idea that the "forms" of knowledge, for perceiving space, or logical relations, or language patterns, are derived from our genes, and that they are somehow built into the arrangement of our brain cells so that we spontaneously think in certain ways, and don't have the capacity to transcend the nature of our inherited brain. In that view, children have their own pre-logical way of thinking, and their thought (and language development) must proceed through certain stages, each governed by some "structural" process in the nervous system. The only thing wrong with the idea of innate knowledge is that people use it to tell us what we can't know, in other words, to rationalize stupidity. Of course, they wouldn't like to phrase it that way, because they consider their "genetic epistemology of symbolic forms" to be the essence and the totality of intelligence, and that people who allow their thoughts to be structured entirely by experience are just confused.

Years ago, I had been criticizing Noam Chomsky's theory of language so much, that I thought I might have misjudged or inappropriately depreciated his general attitude toward consciousness, so I asked him some questions about the intelligence of animals. His response confirmed my view that he subscribed to the most extreme form of "genetic epistemology":

"I don't know whether there is a common animal ability to manipulate images and generalize. In fact, I doubt it very much. Thus the kind of "generalization" that leads to knowledge of lanugage from sensory experience seems to me to involve principles such as those of universal grammar as an innate property, for reasons I have explained elsewhere, and I see no reason to believe that these principles underlie generalization in other animals. Nor do I think that the kinds of generalization that lead a bird to gain knowledge of how to build a nest, or to sing its song, or to orient itself spatially, are necessarily part of the human ability to generalize."

All of the textbooks that I have seen that discuss the issue of animal intelligence have taken a position like that of Chomsky--that any knowledge animals have is either rigidly instinctual, or else is just a set of movements that have been mechanically learned. In other words, there isn't anything intelligent about the complex things that animals may do. Konrad Lorenz and the ethologists explained animal behavior in terms of chains of reflexes that are "triggered" by certain sensations or perceptions. This claim that animals' behavior just consists of mechanical chains of reflexes strictly follows Descartes' doctrine, and Chomsky has consistently acknowledged that his theory is Cartesian. The claim that children have their own non-logical way of understanding things is very similar to the doctrine about animals, in the way it limits real rational understanding to adult human beings.

The awareness of young animals is particularly impressive to me, because we know the short time they have had in which to learn about the world. Any instance in which a young animal understands a completely novel situation, in a way that is fully adequate and workable, demonstrates that it is capable of intellectual generalization.

Beyond that, I think animal inventiveness can teach us about our own capacity for inventiveness, which both the genetic and the behaviorist theories of knowledge totally fail to explain.

Spiders that build architecturally beautiful webs have been favorite subjects for theorizing about the instinctive mechanisms of behavior. When spiders were sent up on an orbiting satellite, they were in a situation that spiders had never experienced before. Spiders have always taken advantage of gravity for building their webs, and at first, the orbiting spiders made strange little muddled arrangements of filaments, but after just a few attempts, they were able to build exactly the same sort of elegant structures that spiders normally build. (My interpretation of that was that spiders may be more intelligent than most neurobiologists.)

Nesting birds often swoop at people or animals who get too close to their nest. Early last summer, I had noticed some blue jays that seemed to be acting defensive whenever I went into one part of the yard. On a very hot day at the end of summer, a couple of plump jays were squawking and apparently trying to get my attention while I was watering the front yard, and I idly wondered why they would be acting that way so late in the year. I had gone around the house to water things in the back yard, and the birds came over the house, and were still squawking, and trying to get my attention. I realized that their excitement didn't have anything to do with their nest, and looking more carefully, I saw that they were young birds. As it dawned on me that they were interested in the water squirting out of the hose, I aimed the stream up towards them, and they got as close to it as they could. Since the force of the stream might have hurt them, I put on a nozzle that made a finer spray, and the birds immediately came down to the lowest tip of the branch, where they could get the full force of the mist, holding out their wings, and leaning into the spray so that it ruffled their breast feathers. Their persistence had finally paid off when they got me to understand what they wanted, and they were enjoying the cool water. As new young birds, I don't know how they understood hoses and squirting water, but it was clear that they recognized me as a potentially intelligent being with whom they could communicate.

For a person, that wouldn't have seemed like a tremendously inventive response to the hot weather, but for young birds that hadn't been out of the nest for long, it made it clear to me that there is more inventive intelligence in the world than is apparent to most academic psychologists and ethologists.

Early porpoise researchers were surprised when a porpoise understood a sequence in which one tone was followed by two, and then by three, and answered by producing a series of four tones. The porpoise had discovered that people knew how to count.

Experiments with bees show the same sort of understanding of numbers and intentions. An experimenter set out dishes of honey in a sequence, doubling the distance each time. After the first three dishes had been found by scouts, the bees showed up at the fourth location before the honey arrived, extrapolating from the experimenter's previous behavior and inferring his intentions.

Once I noticed that an ant seemed to be dozing at the base of every maple leaf, and that there were several aphids on each leaf. I was getting very close, trying to understand why the ant was sitting so quietly. Apparently my odor gave the ant a start, and he leaped into activity, racing up the leaf, and giving each aphid a tap as he passed. When he had reached the end of the leaf and had touched every aphid, his agitation suddenly disappeared, and he returned to his spot at the base of the leaf. Although I knew that ants could count very well, as demonstrated by experiments in which an ant had to describe a complex route to a dish of honey, it was the apparent emotion that interested me. It reminded me of the hostess who counted her dishes before the guests left.

When the brains of such different kinds of animal work in such similar ways, in situations that contain many new components, I don't think it's possible to conclude anything except that intelligence is a common property of animals, and that it comprises "generalization" and much more. It's obvious that they grasp the situation in a realistic way. The situation has structured their awareness. Some people might say that they have "modeled the situation in their mind," but it's enough to say that they understand what's going on. With that understanding, motivations and intentions form part of the perception, since the situation is a developing process. Ordinarily, we say that we "infer" motivations and intentions and "deduce" probable outcomes, but that implies that the situation is static, rather than continuous with its origin and outcome. In reality, these understandings and expectations are part of the direct perception. It isn't a matter of "intelligence" operating upon "sensations," but of intelligence inhering in the grasping of the situation. (In Latin, ***intelligo*** meant "I perceive." I suspect that a Roman might have perceived the word ***intelligens*** as being derived from roots such as ***tele***--from Greek, or **tela,** web, warp thread--and ***ligo or lego***, connoting the binding in or gathering of what is distant or extended.)

This view of a generalized animal intelligence wouldn't seem strange, except that the history of official western philosophy, the doctrine of genetic determinism in biology, and the habits that form with the rigid uses of language, have offered another way of looking at it. The simple intelligence of an animal would disrupt all of that important stuff, so it has become mandatory to dismiss all examples of intelligent behavior by animals as "mere anthropomorphizing." Sadly, this has also meant that most intelligent behavior by humans has also been dismissed.

The cellular development of an organism used to be described as a process in which everything is predetermined by the genes, but the interactions between an embryo and its environment are now known to be crucial in shaping the process of maturation, so that the real organism (the phenotype) doesn't necessarily reflect its genetic make-up (genotype); the term "phenocopy" acknowledges this process.

London taxi drivers were recently found to have an enlargement of part of the hippocampus, compared to the brains of other people, and the difference was greater, in proportion to the time they had been driving taxis. Their brains have been shaped by their activities.

If the brain's cellular anatomy is so radically affected by activity even in adulthood, then the concept of awareness as a

process in which consciousness takes its form from the situation shouldn't be problematic. If a bee and a porpoise can draw similar conclusions from similar experiences, then the world is being grasped by both in an objective way.

The environment shapes the organism's response, and the momentary response contributes to the development of the supporting processes and apparatuses. So the ability to respond is the basic question. If the richly grasped situation contains its own implications, there is no need for explaining the ability to perceive those implications in terms of some prearranged neurological code, except for the ability to respond complexly and appropriately. Any specific interpretation or behavior which is predetermined is going to function as an impediment to understanding. Verbal formulations often have the function of creating a stereotyped and inappropriate response.

The "genetic epistemologists" confuse their own verbal interpretations with the real ways that understanding develops, and when a child doesn't yet know all of the connotations of a specific word, the psychologist ascribes a pre-logical brain function to the child.3 The similar failure to perceive and to communicate accounts for the foolish things ethologists have said about animal intelligence.

The process in which an organism responds to a situation is continuous with the process of communication. The organism understands that in certain situations a response can be elicited, and so it acts accordingly.

Communication is a response that is directed toward eliciting a response from another. The idea that an animal might have an intention, or a desire to communicate or respond, has been obsessively denied by most official western philosophers, who see that as a uniquely human quality, but some philosophers have even denied that quality to humans. For them, consciousness is a passive receptacle for units of meaning and logic, like a mail bin at the post-office, where letters are received, sorted, and distributed. Maybe computers work that way, but there is nothing in living substance that works like that.

Consciousness is participation, in the sense that there is a response of an organism to events. Even dreams and hallucinations have their implied reference to something real.

If a violin has been soaked in water, it will sound very odd when it's played. Its various parts won't resonate properly. Similarly, the living substance has to be in a particular state to resonate properly with its environment.

People have proposed that visual experience involves the luminescence of nerves in the optical system. Presumably, similar analogs of events could occur in various tissues when we are conscious of sounds, tastes, smells, etc. But whether or not our auditory nerves are singing when we experience music, no one questions the existence of some sort of responsive activity when we are being conscious of something. Activating certain brain areas will make us conscious of certain things, and that activation can be a response to sensory nerve impulses, or to brain chemicals produced in dreaming or drug-induced hallucinations, or to electrical stimulation, or to the act of remembering.

The history of the prefrontal leukotomy or lobotomy, in which undesirable behaviors were surgically removed, was closely associated with the development of surgical treatments for epilepsy.

Natalya Bekhtereva was exploring alternative treatments for epilepsy, implanting fine wire electrodes into the abnormal parts of the brain, and surrounding areas, to discover the nature of the electrical events that were associated with the seizures. In the process, she discovered that meanings and intentions corresponded to particular electrical patterns. She found that giving certain kinds of stimulation to healthy parts of the brain could stimulate the development of ways of functioning that by-passed the seizure-prone parts of the brain. Extending this, seeing that creating new patterns of nervous activity could overcome sickness, she proposed that creativity, the activation of the brain in new ways, would itself be therapeutic. Some people, such as Stanislav Grof, advocated the therapeutic use of LSD with a rationale that seems similar, for example to overcome chronic pain by changing its meaning, putting it into a different relation to the rest of experience. "In general, psychedelic therapy seems to be most effective in the treatment of alcoholics, narcotic-drug addicts, depressed patients, and individuals dying of cancer." 2 Since LSD shifts the balance away from serotonin dominance toward dopamine dominance, its effect can be to erase the habits of learned helplessness. Stress and pain also leave their residue in the endorphin system, and the anti-opiates such as naloxone can relieve depression, improve memory, and restore disturbed pituitary functions, for example leading to the restoration of menstrual rhythms interrupted by stress or aging. The amazing speed with which young animals can solve problems is undoubtedly a reflection of their metabolic vigor, and it is probably partly because they haven't yet experienced the paralysis that can result from repeated or prolonged and inescapable stress. Many of the factors responsible for the metabolic intensity of youth can be used therapeutically, even after dullness has developed. The right balance of amino acids and carbohydrates, and the avoidance of the antimetabolic unsaturated fatty acids, can make a great difference in mental functioning, even though we still don't know what the ideal formulas are.

While chemical -- nutritional -- hormonal approaches can help to restore creativity, the work of people like Bekhtereva shows that the exercise of creativity can help to restore biochemical and physiological systems to more normal functioning. Learning new general principles or new languages can be creatively restorative.

References

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2. ("History of LSD Therapy," Stanislav Grof, M.D. Chapter 1 of LSD Psychotherapy, ©1980, 1994 by Stanislav Grof. Hunter House Publishers, Alameda, California, ISBN 0-89793-158-0).

3. There is an example of this argument about the nature of reasoning in New Scientist magazine, December 9, 2000. P. Johnson-Laird found that more than 99% of Princeton University students were unable to solve a logical puzzle correctly. Ira Noveck of the Claude Bernard University in Lyon believes this may result simply from people's difficulty interpreting the language of the puzzles.

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Fiziol Zh SSSR Im I M Sechenova 1984 Aug;70(8):1092-9 [Neurochemical aspects of therapeutic electric stimulation]. Bekhtereva NP, Dambinova SA, Gurchin FA, Smirnov VM, Korol'kov AV. Comparative analysis of the CSF and blood protein-peptide composition in Parkinsonian patients performed with the aid of indwelled electrodes prior to and after therapeutic electrical stimulation (TES) of the brain subcortical structures, revealed a therapeutic effect in the form of reduced muscular rigidity and a mental activation with a positive emotional response. After the TES the protein content in the biological fluids tended to become normalized and the the range of low-molecular protein-peptide fractions changed. A high-performance liquid chromatography, bidimensional electrophoresis and thin-layer chromatography revealed about 5-6 factors of peptide nature with the molecular mass less than 5000 daltons in the CSF and blood after the TES. These factors were shown to exert a biological effect upon muscle preparation of the leech.

Fiziol Zh SSSR Im I M Sechenova 1984 Jul;70(7):892-903 [Relationships of distantly located neuronal populations in the human brain in the realization of the thinking process]. Bekhtereva NP, Medvedev SV, Krol' EM The time characteristics of the interneuronal connections as well as interrelationships among distant neuronal populations of the human brain deep structures were studied during monotonous mental activity. It was shown that stable interrelationships could be considered as a correlate of mental activity though the connections themselves were not of the correlative nature. These connections, being the elements of the activity--maintaining system, could be of various degree of rigidity.

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From a biography by the Archives Jean Piaget: "His researches in developmental psychology and genetic epistemology had one unique goal: how does knowledge grow? His answer is that the growth of knowledge is a progressive construction of logically embedded structures superseding one another by a process of inclusion of lower less powerful logical means into higher and more powerful ones up to adulthood. Therefore, children's logic and modes of thinking are initially entirely different from those of adults."
