

One can think about how to define learning functionally, or in adaptive terms, either by beginning with instances of phenotypic plasticity that are not easily seen as learning and moving step by step toward those that would unequivocally be termed learning, or else by starting with some life function such as communication, in an organism that apparently does not do anything easily seen as learning, and then moving step by step toward others that obviously modify their behavior (signaling or responding) by learning. I tried to do the first of these things in my 1990 paper in *Ethology and Sociobiology*, but don't claim I succeeded. Maybe someone who is really clever can do both at the same time.

A field cricket gives one (major class of) signal (sings one song) for each state of the appropriate conspecific listeners: (1) the "calling pattern" for sexually responsive females out of range of all senses except hearing; (2) the courtship pattern for a female within both acoustical and tactual range; (3) the aggressive pattern for a male within both acoustical and tactual range. Correlating with the absence of evidence of state changes in the listener in the first of these three major situations (especially any that are transmissible to the signaller), calling is always the same, except as males take greater risks or use calories faster by calling with fewer interruptions (when they are older or have more secure retreats available in case predators or parasites approach). In contrast, the changing nature of courting and aggressive situations has evidently led to those signals evolving to be graded. This means that there are constant adjustments in positions of the two individuals' bodies, or what they are doing with respect to one another, causing one or another variant of the courtship or aggressive signals to be more effective at different times or in different situations. The apparent absence of any learning in these two situations (we don't know for sure, of course, partly because we haven't a definition yet and partly because we don't know what really happens) might imply that there actually are a finite number of changes in the aggressive and courtship situations (rather than a continuous change) which correlate with a finite number of changes in the signals. The only thing needed is the ability to respond appropriately to each of the different stages in each case. But graded signals like this must represent a substrate from which learning sometimes proceeds.

Honeybees produce dances in patterns that are apparently preset (without known learning) for responders to the dances which themselves probably do not learn (in any "usual" fashion, at least) how to respond to the dances. That is, the dancing bees probably respond without learning (at least from similar kinds of stimuli) to the distances and directions of foodsites from the hive and give an appropriate dance. Similarly, the responding bees apparently have a "preset" (misleading term) tendency to respond and a preset response to the dances. Following a dance, however, changes the responding bee in a way that lasts a while, and apparently can be called learning. The change causes the bee to go to a place it may never have gone before, in a direction it may never have gone before, and to search for a particular kind of food source whose odor it probably picked up from the dancing bee (but, then, so might some other set of stimuli that wouldn't impress us quite so much). This temporary change in the responding bee, as well as the temporary change in the dancing bee that caused it to dance in the way it did -- nearly always a novel way for the dancer -- are both changes that most would term learning. But should it be called learning? There is a transfer of information, but what kind of change has taken place that we think ought to be termed learning? Is any modification of behavior as a result of sensory input learning? Maybe the cricket "learns" too, as it changes its response to another cricket that is touching it in different ways -- or do we restrict that term to changes in the cricket's behavior that cause its subsequent behavior in the same situation to be different? That, it would seem, we could call the "correction of adaptive errors."

John Locke wrote as follows about human language (Locke, J. 1909. *Locke on Human Understanding*. London: Routledge and Sons, pp. 324-325):

But though words, as they are used by men, can properly and immediately signify nothing but the ideas that are in the mind of the speaker, yet they in their thoughts give them a secret reference to two other things.

First, To the ideas in other men's minds. -- First, they suppose their words to be marks of the ideas in the

minds also of other men, with whom they communicate: for else they should talk in vain, and could not be understood, if the sounds they applied to one idea were such as by the hearer were applied to another, usually to examine whether the idea they and those they discourse with have in their minds to be the same: but think it enough that they use the word, as they imagine, in the common acceptance of that language; which they suppose, that the idea they make it a sign of is precisely the same to which the understanding of men of that country apply that name.

Secondly, To the reality of things. -- Secondly, because men would not be thought to talk barely of their own imaginations, but of things as really they are; therefore they often suppose their words to stand also for the reality of things.

How significant is it, in understanding communication in general (and maybe learning too), that he referred first "to the ideas in other men's minds" (we can ignore for the moment that he ignored women . . .) and only second to the "reality of things" outside the mind? The cricket and the honeybee also are both communicating about, or changing, what is in the "mind" of the other individual. Did all communication start in that way? Is the "interpreting" of what is in the "minds" of others (how they are about to behave) the context of evolution of complexity in communicative signaling and of brain function? To what extent is it that because interests differ and deception is possible?

What is the difference in the way humans respond to changes in other individuals and the way crickets and honeybees do? What causes other kinds of animals to seem to us to lie between these two examples? In what respects do they and in what respects not?

Darwin wrote this in *The Descent of Man* (p. 54 ff.):

Articulate language is . . . peculiar to man; but he uses in common with the lower animals inarticulate cries to express his meaning, aided by gestures and the movements of the muscles of the face. This especially holds good with the more simple and vivid feelings, which are but little connected with our higher intelligence. Our cries of pain, fear, surprise, anger, together with their appropriate actions, and the murmur of a mother to her beloved child, are more expressive than any words. It is not the mere power of articulation that distinguishes man from other animals, for as every one knows, parrots can talk; but it is his large power of connecting definite sounds with definite ideas; and this obviously depends on the development of his mental faculties.

. . . language is an art, like brewing or baking, but writing would have been a much more appropriate simile. It certainly is not a true instinct, however, as every language has to be learnt. It differs, however, widely from all ordinary arts, for man has an instinctive tendency to speak, as we see in the babble of our young children; whilst no child has an instinctive tendency to brew, bake, or write. Moreover, no philologist now supposes that any language has been deliberately invented; each has been slowly and unconsciously developed by many steps. The sounds uttered by birds offer in several respects the nearest analogy to language, for all the members of the same species utter the same instinctive cries expressive of their emotions; and all the kinds that have the power of singing exert this power instinctively; but the actual song, and even the call-notes, are learnt from their parents or foster-parents. . . . Nestlings which have learnt the song of a distinct species, as with the canary-birds educated in the Tyrol, teach and transmit their new song to their offspring. The slight natural differences of song in the same species inhabiting different districts may be appositely compared . . . 'to provincial dialects;' and the songs of allied, though distinct species may be compared with the languages of distinct races of man. I have given the foregoing details to shew that an instinctive tendency to acquire an art is not a peculiarity confined to man.

. . . I cannot doubt that language owes its origin to the imitation and modification, aided by signs and gestures, of various natural sounds, the voices of other animals, and man's own instinctive cries. When we treat of sexual selection we shall see that primeval man, or rather some early progenitor of man, probably used his voice largely, as does one of the gibbon-apes at the present day, in producing true musical cadences, that is in singing. . .

The mental powers in some early progenitor of man must have been more highly developed than in any existing ape, before even the most imperfect form of speech could have come into use; but we may confidently believe that the continued use and advancement of this power would have reacted on the mind by enabling and

encouraging it to carry on long trains of thought. A long and complex train of thought can no more be carried on without the aid of words, whether spoken or silent, than a long calculation without the use of figures or algebra. It appears, also, that even ordinary trains of thought almost require some form of language, for the dumb, deaf, and blind girl, Laura Bridgman, was observed to use her fingers whilst dreaming. Nevertheless a long succession of vivid and connected ideas, may pass through the mind without the aid of any form of language, as we may infer from the prolonged dreams of dogs. . . .

The fact of the higher apes not using their vocal organs for speech, no doubt depends on their intelligence not having been sufficiently advanced. The possession by them of organs, which with long-continued practice might have been used for speech, although not thus used, is paralleled by the case of many birds which possess organs fitted for singing, though they never sing. Thus, the nightingale and crow have vocal organs similarly constructed, these being used by the former for diversified song, and by the latter merely for croaking.

Great place to stop! Got parrots and crows in there. Too bad I can't quote Locke or Darwin on dolphins.

Perhaps the runaway "chase" in learning that results in big brains and complex social behavior begins when the individuals of a species not only learn signals but also learn responses to learned signals.

If you are interested in how we humans have distorted all of this while thinking about our own efforts to talk about what is in one another's minds (and the effects of knowing there is deception involved) and what is reality outside the minds of our species, consider these excerpts from a 1993 paper by the philosopher John Searle in the current issue of *Daedulus*, which is entirely about problems in the research universities of today:

Searle (1993), in a discussion of "truth" and "fact" as an aspect of "Western Rationalistic Tradition" in the university, and in considering basic tenets of the "Western Rationalistic Tradition," says that "In general, statements are true to the extent that they accurately represent some feature of reality that exists independently of the statement." (p. 65) "Because the content of what is known is always a true proposition, and because truth is in general a matter of accurate representation of an independently existing reality, knowledge does not depend on nor derive from the subjective attitudes and feelings of particular investigators. All representation is, as I said earlier, from a point of view and under certain aspects and not others. Furthermore, representations are made by particular investigators, subject to all the usual limitations of prejudice, ignorance, stupidity, venality, and dishonesty; they are made for all sorts of motives on the parts of the makers, some benign, some reprehensible, including desires to get rich, to oppress the oppressed, or even to get tenure. But if the theories put forward accurately describe an independently existing reality, none of this matters in the least. The point is that the objective truth or falsity of the claims made is totally independent of the motives, the morality, or even the gender, the race, or the ethnicity of the maker." (p. 66) Searle goes on to argue that to those who "hold the traditional conception of rationality," ad hominem challenges and challenges based on "reprehensible origin" of a theory or fact are invalid challenges. "If someone makes a claim to truth and can give that claim the right kind of support, and if that claim is indeed true, then that person genuinely knows something. The fact that the whole enterprise of claiming and validating may have been carried out by someone who is racist or sexist is just irrelevant to the truth of the claim. That is part of what is meant by saying that knowledge is objective. It is less obvious, but I hope still apparent, why anyone who denies the possibility of objective truth and knowledge might find these sorts of arguments appealing. If there is no such thing as objective truth, then the criteria for assessing claims have no essential connection with truth or falsity, and may as well be concerned with the maker of the argument, his or her motives, the consequences of making the claim, or other such issues (p. 66-67).

Searle then goes on to note that it is ". . . an essential part of the Western conception of rationality, reason, logic, evidence, and proof that they do not by themselves tell you what to believe or what to do. According to the Western conception, rationality provides one with a set of procedures, methods, standards, and canons that enables one to assess various claims in light of competing claims. Central to this view is the Western conception of logic. Logic does not by itself tell you what to believe. It only

tells you what must be the case, given that your assumptions are true, and hence what you are committed to believing, given that you believe those assumptions. (p. 67).

"Given a real world, a public language for talking about it, and the conceptions of truth, knowledge, and rationality that are implicit in the Western Rationalistic Tradition, there will be a complex, but not arbitrary, set of criteria for judging the relative merits of statements, theories, explanations, interpretations, and other sorts of accounts. Some of these criteria are 'objective' in the sense that they are independent of the sensibilities of the people applying the criteria; others are 'intersubjective' in the sense that they appeal to widely shared features of human sensibility. An example of objectivity in this sense is the criterion for assessing validity in propositional calculus. An example of intersubjectivity is the sort of criteria appealed to in debating rival historical interpretations of the American Civil War. There is no sharp dividing line between the two, and in those disciplines where interpretation is crucial, such as history and literary criticism, intersubjectivity is correspondingly central to the intellectual enterprise." (p. 68)

"There are endless debates in the history of Western philosophy about these issues. In my own view, even objectivity only functions relative to a shared 'background' of cognitive capacities and hence is, in a sense, a form of intersubjectivity. However, for the present discussion what matters is that according to the Western Rationalistic Tradition there are rational standards for assessing intellectual quality. Except in a few areas, there is no algorithm that determines the standards and they are not algorithmic in their application. But all the same they are neither arbitrarily selected nor arbitrarily applied. Some disputes may be unresolvable -- but that does not mean that anything goes." (p. 68)

"For the traditional conception of the university this principle is crucial. For example, in the traditional university, the professor assigns Shakespeare and not randomly selected comic strips, and she does so in the belief that she could demonstrate that Shakespeare is better. No principle of the Western Rationalistic Tradition is more repulsive to the culture of postmodernism than this one. . ."

"Knowledge is typically of a mind-independent reality. It is expressed in a public language, it contains true propositions -- these propositions are true because they accurately represent that reality -- and knowledge is arrived at by applying, and is subject to, constraints of rationality and logic. The merits and demerits of theories are largely a matter of meeting or failing to meet the criteria implicit in this conception." (p. 69)

Searle goes on to say that the principles of the Western Rationalistic Tradition are under attack. The ideal under attack, he says, is that "The scholarly ideal of the tradition is that of the *disinterested* inquirer engaged in the quest for *objective* knowledge that will have *universal* validity.

Such claims have been characterized as "not to be trusted" and "usually disguised forms of power seeking."

"In most academic disciplines it is fairly obvious how acceptance of the Western Rationalistic Tradition shapes both the content and the methods of higher education. As professors in research universities, we traditionally take ourselves as trying to advance and disseminate human knowledge and understanding, whether it be in physical chemistry, microeconomics, or medieval history. It is less obvious, but still intelligible, how standards of rationality, knowledge, and truth are supposed to apply to the study of fictional literature or the visual arts. Even in these areas the traditional assumptions by which they were studied and taught were of a piece with the rest of the Western Rationalistic Tradition. There were supposed to be intersubjective standards by which one could judge the quality of literary and artistic works, and the study of these works was supposed to give us knowledge not only of the history of literature and art but of the reality beyond to which they refer, if only indirectly. Thus, for example, it was commonly believed, at least until quite recently, that the study of the great classics of literature gave the reader insights into human nature and the human condition in general. It was, in short, something of a cliché that you could learn more about human

beings from reading great novels than you could from most psychology courses. Nowadays, one does not hear much talk about 'great classics of literature,' and the idea of intersubjective standards of aesthetic quality is very much in dispute."

Searle goes on to relate the rejection of the Western Rationalistic Tradition to the desire to achieve social objectives. ". . . if you think that the purpose of teaching the history of the past is to achieve social and political transformation of the present, then the traditional canons of historical scholarship -- the canons of objectivity, evidence, close attention to the facts, and above all, truth -- can sometimes seem an unnecessary and oppressive regime that stands in the way of achieving more important social objectives. . . . For example, the remarkable interest in the work of Thomas Kuhn on the part of literary critics did not derive from a sudden passion in English departments to understand the transition from Newtonian Mechanics to Relativity Theory. Rather, Kuhn was seen as discrediting the idea that there is any such reality. If all of 'reality' is just a text anyway, then the role of the textual specialist, the literary critic, is totally transformed. And if, as Nietzsche says, 'There are not fact, but only transformation,' then what makes one interpretation better than another cannot be that one is true and the other false, but, for example, that one interpretation might help overcome existing hegemonic, patriarchal structures and empower previously underrepresented minorities."

". . . in some disciplines, primarily those humanities disciplines concerned with literary studies -- English, French, and Comparative Literature especially -- the existing academic norms were fragile, and the way was opened intellectually for a new academic agenda by the liberating impact of the works of authors such as Jacques Derrida, Thomas Kuhn, and Richard Rorty, and to a lesser extent by Michel Foucault and the rediscovery of Nietzsche. . . . the postmodernist-cultural Left . . . makes no claims to being 'scientific.' Indeed it is, if anything, antiscientific. . . . If one abandons the commitment to truth and intellectual excellence that is the very core of the Western Rationalistic Tradition, then it seems arbitrary and elitist to think that some books are intellectually superior to others, that some theories are simply true and others false, and that some cultures have produced more important cultural products than others. On the contrary, it seems natural and inevitable to think that all cultures are created intellectually equal. In literary studies some of these features are indicated by a change in the vocabulary. One does not hear much about 'the classics,' 'great works of literature,' or even 'works'; rather the talk nowadays is usually of 'texts' with its leveling implication that one text is as much of a text as any other text."

". . . some philosophers . . . think that we should stop thinking of sciences as corresponding to an independently existing reality. Rather, we should think that science in particular, and language in general, just gives us a set of devices for 'coping,' as opposed to 'matching' or 'corresponding.' Thus according to Richard Rorty, the pragmatist 'drops the notion of truth as correspondence with reality altogether, and says that modern science does not enable us to cope because it corresponds, it just plain enables us to cope.'"

"In 'defense' of realism, the only thing that one can say is that it forms the presupposition of our linguistic and other sorts of practices. You cannot coherently deny realism and engage in ordinary linguistic practices, because realism is a condition of the normal intelligibility of those practices. . . . The normal presuppositions behind our practical everyday communications and a fortiori, behind our theoretical communications, require the presupposition of a preexisting reality for their normal intelligibility. Give me the assumption that these sorts of communication are even possible between human beings and you will see that you require the assumption of an independently existing reality. A public language presupposes a public world. . . . Berkeley . . . tries to explain how it is possible that we can communicate with each other, given that on his view there are no independently existing material objects, but only ideas in minds. His answer is that God intervenes to guarantee the possibility of human communication. One interesting thing about the present theorists who claim to have shown that reality is a social construct, or that there is no independently existing reality, or that everything is really a text, is that they have denied one of the conditions of intelligibility of our ordinary linguistic practices without providing an alternative conception of that intelligibility.(p.81)