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COMMON SENSE: ITS SCOPE AND LIMITS

Philonous: *I am content, Hylas, to appeal to the common sense of the world for the truth of my notion. Ask the gardener, why he thinks yonder cherry-tree exists in the garden, and he shall tell you, because he sees and feels it; in a word, because he perceives it by his senses.*

(Bishop George Berkeley, *Third Dialogue Between Hylas and Philonous*, 1713)

INTRODUCTION

Ever since Plato, many philosophers have held common sense in poor esteem. This is particularly notable in scientific circles, which tend to dismiss the popular assumption that people do know most of what they ordinarily think they know as a vestige of "Stone Age metaphysics". Science, it appears, is the only trustworthy claimant to a true comprehension of the world, whereas common sense is but faithworthy for savages, children and the uneducated rabble. It is unfortunate that philosophers and historians of science have sold common sense so short. For once its proper scope and limits are understood, much that seems obscure in the development of science becomes plain.

True, there is much in quantum mechanics and relativity theory, as in evolutionary theory and molecular biology, that is counter-intuitive, or at least has no precedent in everyday thought. But a comprehension of the basic conceptual frameworks of, say, classical mechanics and classical systematics was instrumental in the critical formulation of the corresponding modern scientific theories. Manipulation of these frameworks, in turn, pivoted on awareness of the scope and limits of common sense.

Common sense is used here with systematic ambiguity to refer both to the results and processes of certain special kinds of ordinary thinking: to what in all societies is considered, and is cognitively responsible for the consideration of, manifestly perceivable empirical fact – like the fact that grass is green (when it really is perceived to be green). Interpreted in this way, common sense also includes statements pertaining to what is plausibly an innately grounded, and species-specific, apprehension of the spatio-temporal, geometrical, chromatic,

chemical and organic world in which we, and all other human beings, live our usual lives.

G. E. Moore puts the matter in this light:[1]

> The "Common Sense view of the world" . . . is "in certain fundamental features" wholly true. What is meant by saying that so-and-so is a feature or item in "the Common Sense view of the world"? Something like this: That it is a thing which every or very nearly every sane adult, who has the use of all his senses (e.g. was not born blind or deaf), believes or knows (where "believes" and "knows" are used dispositionally). Does one need to add: And of which, for many centuries, it would have been true to say this? (1962:280)

Common-sense beliefs are beyond dispute not because they happen to accurately describe the facts, but because that is just the way humans are constitutionally disposed to think of things. Of course, this does not define the term "common sense" precisely nor expressly say what are the common-sense beliefs. "Common sense" itself is not likely a natural-kind predicate of the science of cognitive psychology – a piece of cerebral architecture that functions in behavior with lawful regularity. But, as we shall see, cognitive psychology and anthropology can illustrate common sense, for instance plain thinking about the world in terms of universal color schemata, rigid bodies, biological taxa and so forth.

The actual realization of these cognitive universals depends upon the fragmented and limited experience available to us. But such experience does not so much shape our beliefs as activate our native dispositions to extend particular encounters to generalized sets of complexly related cases: to be able to divide the world into cats and dogs, one must experience cats and dogs; but it is our prior cognitive disposition to categorize animals with animals and species members with species members that allows us to distinguish such experiences *qua* cats and dogs.

As such, common sense is not to be confounded with "good sense" (or the *sensus communis* of the Roman orators). That is the mental capacity for exemplifying proper judgment, as when we say of a wise or handy man that he shows good common sense in his choices.[2] The willful (or pragmatic) kind of judgment implied is unequally shared within a culture and its criteria may vary across cultures. But what concerns us here is equally accessible to the sage and the ignoramus, the skillful and the clumsy, no matter what the culture. It is very plausibly a part of our evolutionary heritage, like the human disposition to categorically distinguish an artifact from a living kind. No speculation can possibly confute the grounds for this common-sense view of things because all speculation must start from it. There just is no other place to begin to think about the world.

Speculative reason (Cartesian *bon sens*) is thus unable to cut the umbilical cord that binds it to common sense, and so undermine it. Still, one can go beyond our ordinary ways of thinking about things. Speculation can reveal the bounds of

such thinking and thereby prevent common sense from exceeding its proper authority – for common sense remains valid only so long as it is restricted to the manifestly visible dimensions of the everyday world, that is, to *phenomenal* reality. Studied reflection and measured experimentation, however, can lead to knowledge of another world – a nonphenomenal world of astronomical, microscopic and evolutionary dimensions – that can only be vaguely perceived, if at all, with the apparatus of self-evident intuitions that belongs to common sense.

Common sense, then, is an indubitable source of truth for knowledge of the readily experienced local world, but fallible as a means of insight into the scientific universe. This, opines Peirce (1935), is what the eighteenth-century Scottish common-sense philosophers did not fully appreciate:[3]

> The Scotch failed to recognize . . . that the original beliefs only remain indubitable in their application to affairs that resemble the primitive mode of life . . . Modern science, with its microscopes and telescopes, with its chemistry and electricity, and with its entirely new appliances of life, has put us in quite another world; almost as much so as if it had transported our race to another planet. Some of the old beliefs have no application excepted in extended senses, and in such extended senses they are sometimes dubitable and subject to criticism. (5.445, 5.513)

Thus, while the Scots may have overrated the validity of common sense, others have certainly underrated it. This book is an effort to restore the balance of knowledge between common sense and science by reinterpreting their relationship in light of new evidence and recent research in anthropology and psychology. It approaches its subject, not from the more traditional philosophical, historical or sociological perspectives, but from a vantage that I think is more basic and necessary to all of these: that of cognition. By "cognition," I mean quite simply the internal structure of ideas by which the world is conceptualized.

Everyone who has ever done or thought about science has entertained cognitive claims about how the world can or should be thought of. But curiously little attention has been paid to the conceptual origin and structure of those claims – to what it is about the human mind that makes our species capable of thinking scientifically. I should like to apply this "cognitive" perspective with a view toward explaining the successive scientific incarnations, transformations and mutations of what Hume called "that original stock of ideas," which human imagination may indeed exceed but never be altogether free of.

In this scenario, common sense does not preclude, but neither does it include, any magical, mythico-religious, metaphorical or other "symbolic" elaboration of the empirical world. Any symbolic utterance is nonpropositional, however one chooses to look at it: logically, no fixed meaning (not even a context-relative one) can be assigned that would permit a coherent evaluation of entailments;

empirically, no determinate factual content can be attributed whose consequences experience might definitely confirm or disconfirm; and psychologically, no specific mnemonic structure can be accorded for consistent storage and recall of information. In multiplying senses and metaphors, symbolism leaves the interpretation of any utterance significantly "open-ended."

To go beyond the "bare" facts of common sense and into the world of science, then, one must first of all recognize that symbolic reconstruals of the world do not constitute explanations of the facts. Because symbolism cannot systematically pattern old facts, *a fortiori* it cannot consistently project patterns to new facts. It is this insight, suggests G. E. R. Lloyd, that distinguishes the Greek *physiologoi* from the *magoi*, and the Hippocratic doctors from the purifiers (*kathartai*):

> Mythological "aetiologies" are explanations only in a quite restricted sense. To attribute earthquakes to Poseidon is, from the point of view of an understanding of the nature of earthquakes, not to reduce the unknown to the known, but to exchange one unknown for another. While Poseidon's motives can be imagined in human terms . . . *how* an earthquake occurs is not thereby explained nor indeed at issue. If there is no question of assigning a historical origin to an interest in causal explanations of *some* kind, the deliberate investigation of how particular kinds of natural phenomena occur only begins with the philosophers: it was they who first attempted to explain what thunder, lightning, eclipses and the like are in terms of more familiar phenomena and processes. (1979: 52–53)

But in order to explain new or unfamiliar phenomena, the familiar phenomena of common sense would have to be codified and theoretically construed. Without such standardized referents there could be no judgment of progress achieved. That is why, as Kirk (1960) cogently points out, "gross departures from common sense were carefully avoided by the Presocratics."

For example, the resolution of problems connected with the spatio-temporal position of the heavenly bodies depends upon a correct appreciation of the scope and limits of common sense. The shape of the earth, the position of the sun and the like are determined by calculation; however, such calculations (which were partly developed as aids to navigation) are based on the assumption that various other objects *are* how and where they commonsensically appear to be. It is only because we start by equating the physical positions of the things around us with the observed positions of standardized referents that our more sophisticated methods of locating objects like the sun and projecting the curvature of the earth can lead to confirmable results. Such standardized referents, taken together with their apparant spatio-temporal position, are precisely those things around us with which we are most intuitively familiar.

In this respect, what happened in natural history is not unlike what occurred in natural philosophy. A series of biological types emerged to provide a taxonomic system of reference for the comparative study of organisms.[4] It is by

developing notions of species, genera, families and classes that natural historians managed to progressively standardize what was already – at least to some extent – common to the viewpoints of ordinary folk everywhere. Ultimately, this framework would provide a practical basis for the comprehensive survey of beings the world over, and a conceptual foundation for the theoretical elaboration of their interrelations. How this transition in our apprehension of the living world from setting to subject came about, all herein aspires to show.

This inquiry has four parts, which are broadly as follows:

Part I, "Folkbiology," looks at some of the principal features of the common-sense background to natural history, focusing on how people the world over ordinarily classify locally perceived living kinds. The perspective is that of ethnobiology, a branch of cognitive anthropology concerned with studying the ways members of a culture apprehend and utilize the local flora and fauna. A significant contrast comes to light both in regard to the ordinary categorization of artifacts and the extraordinary scientific classification of living kinds.

Two decades of intensive empirical and theoretical cross-cultural work seem to reveal that folkbiological classification is taxonomic, being composed of a rigid hierarchy of inclusive classes of organisms, or taxa. At each level of the hierarchy the taxa, which are mutually exclusive, exhaustively partition the locally perceived biota. Lay taxonomy, it appears, is universally and primarily composed of three absolutely distinct hierarchichal levels, or ranks: the levels of *unique beginner*, *generic-specieme* and *life-form* (cf. Berlin *et al.* 1973).[5]

A unique beginner refers to the ontological category of plants or that of animals excluding humans. Some cultures have single words to denote the botanical or zoological realm, like "beast" for nonhuman animals. Other cultures employ descriptive phrases, like "hairs of the earth" (*muk gubul nor*) for the plant kingdom of the Bunaq of Timor (cf. Friedberg 1984). Some societies use a special marker for the unique beginner, like the numerical classifier *tehk* for plants, as with the Tzeltal Maya (Berlin *et al.* 1974). Still others forego the use of any specific words, phrases or markers, although it seems that from an early age all humans conceptually distinguish the class of plants and the class of animals, as indicated by studies of young Mayan (Stross 1973) and American children (Dougherty 1979; Macnamara 1982), New Guinea highlanders (Hays 1983), Indonesian natives (Taylor 1984): thus, although some English speakers ordinarily contrast "tree" with "plant", both are covered by an unamed category of THINGS WHICH GROW OUT OF THE GROUND (Wierzbicka 1985).

The basic level is logically subordinate, but psychologically prior, to the life-form level. Ideally it is constituted as a *fundamentum relationis*, that is, an exhaustive and mutually exclusive partitioning of the local flora and fauna into well-bounded morpho-behavioral gestalts (which visual aspect is readily perceptible at a glance). For the most part, taxa at this level correspond, within predictable limits, to those species of the field biologist that are spatially sympatric (i.e. coexisting in the same locality) and temporally nondimensional

(i.e. perceived over at most a few generations). At least this is the case for those organisms that are readily apparent, including most vertebrates and flowering plants. Because the frontiers of a cultural group do not always coincide with the boundaries of a set of sympatric species, partitioning can fall short of the ideal: for instance, migrating birds may be only intermittently or vaguely perceived. But this basic folk kind also largely conforms to the modern genus, being immediately recognizable both ecologically and morphologically. As we shall see, the species-genus distinction is largely irrelevant to the common-sense vision of the world. In the local world of most folk, species usually lack congeners so that species and genus are habitually coextensive. That is why I have designated the basic folkbiological kind "generic-specieme."

The life-form level further assembles generic-speciemes into larger exclusive groups (tree, grass, moss, quadruped, bird, fish, insect, etc.). A salient characteristic of folkbiological life-forms is that they partition the plant and animal categories into contrastive lexical fields. The system of lexical markings thus constitutes a pretheoretical *fundamentum divisionis* of features that are positive and opposed. The opposition may be along a single perceptible dimension (size, stem habit, mode of locomotion, skin covering, etc.) or simultaneously along several dimensions. By and large, plant life-forms do not correspond to scientific taxa, whereas animal life-forms more or less conform to modern classes, save the phenomenally "residual" categories of "bug," "worm," "insect" and the like. These popular invertebrate groupings are exceptions because human perception of them is not as evident.

Such uniform taxonomic knowledge, under socio-cultural learning conditions so diverse, likely results from certain regular and domain-specific processes of human cognition, although local circumstances undoubtedly trigger and condition the stable forms of knowledge attained. Meaning for living-kind terms can thus be analyzed in a fundamentally distinct way from the semantics of other object domains, such as the domain of artifacts and perhaps that of chemical and physical substances as well. All and only living kinds are conceived as physical sorts whose intrinsic "natures" are presumed, even if unknown. Consequently, the semantically typical properties that the definition of a living-kind term describes may be considered necessary – not merely likely – in virtue of the presumed underlying nature of that kind. For instance, we can say that a dog born legless is missing "its" legs because we presume that all dogs are quadrupeds "by nature"; but we cannot justifiably say that a legless beanbag chair is missing "its" legs simply because chairs normally have legs. It is this presumption of underlying nature that underpins the taxonomic stability of organic phenomenal types despite obvious variation among individual exemplars.

The scientific conception of living kinds differs from the folk conception by allowing that any of the typical properties of a kind may prove to be incidental to its real nature. Bats, for example, have many of the typical properties of birds and ostriches have many of the typical properties of mammals; nevertheless, bats are mammals and ostriches are birds. But even today common-sense meaning is

not directly tied to scientific reference. If laypeople accept modification of a folk taxon, it is because the scientific taxon proves compatible with everyday common-sense realism; if not, the scientific concept can usually be set aside, and the lay notion persists as a "natural kind" regardless. Thus, owing to their singular morphologies and ecological roles, bats and ostriches are fairly easy to conceptually isolate and taxonomically realign. By contrast, tree and sparrow remain American folk kinds with presumed natures, although they do not conform to scientific (phyletic) lines.

Despite the relative autonomy of common sense implied in the fact that folkbiological taxa are not demarcated like scientific taxa, folk and scientific classifications have tended to share a basic presumption. The idea is that living kinds naturally fall into "groups within groups" by virtue of a systematic embedding of their existence-determining physical properties. Only, while folk suppose that patternings in morphological aspect and ecological proclivity are determined, science has come to focus on the determination of genetic affiliations. Throughout history, people have assumed that the primary locus of underlying properties responsible for the regularities of living kinds occurs at roughly the level of the nondimensional species.

Part II, "Aristotelian Essentials," is concerned with rethinking Aristotle's much maligned essentialist doctrine by highlighting its folkbiological foundations. From this vantage, his biological works seem largely geared to providing a principled understanding of the differences and similarities between folk taxa according to the distribution of vital functions through the ranks. It turns out that Aristotle did not apparently entertain many of the notions traditionally attributed to essentialism, such as the idea of eternally fixed species and the belief that variation within species does not constitute a legitimate object of study.

For Aristotle, individuals belong to a species as a joint function of parentage and environment. Thus, the examination of deviation from type can factor out the various contributions of heritage and milieu that are responsible for how organisms "come to be" essentially like others, that is, for their *genesis*. Moreover, because species are integrally bound to their respective environments, and because environments may change, species are neither necessarily constant nor everlasting.

To the query "What is nature?" the philosophically inclined might respond: "what there is" or "the totality of things." But there is a prephilosophical sense in which "nature" differs from the artificial, on the one hand, and the supernatural, on the other. From a pretheoretical standpoint, natural things, like a robin or Robert, differ from robots and the Redeemer by reason of immanent causality: that is, in virtue of those causal factors that are peculiar to the type of thing and make it whatever it is – a bird or a man. What separates Aristotle's idea of "nature" (*physis*) from, say, the notion of "nature" (*unuq*) entertained by the Bunaq of Timor (Friedberg 1984:1350) is simply this: whereas humans the world over ordinarily presume each distinct living kind has its proper nature, Aristotle further assumes that all the distinct natures of folktaxonomic living

kinds (as well as those nonliving sorts modeled on the living) are causally connected. That is why Aristotle's *physis* has the dual meaning of "a given kind" and of "Nature" in general.

Aristotle's primary task was to find a principle of unity underlying the diversity of ordinary phenomenal types. In practice, this meant systematically deriving each basic-level generic-specieme (*atomon eidos*) from a life-form (*megiston genos*). It further implied combining the various life-forms by "analogy" (*analogian*) into an integrated conception of life.

Aristotelian life-forms are distinguished and related through possession of analogous organs of the same essential functions (locomotion, digestion, reproduction, respiration); for example, bird wings, quadruped feet and fish fins constitute analogous organs of locomotion. The generic-speciemes of each life-form are then differentiated by degrees of "more or less" with respect to essential organs. Because these organs are essential, and naturally "for the better," they are necessarily adapted to the special requirements of each species' habitual environment (*bios*). Thus, all birds have wings for moving about and beaks for obtaining nutriments. But, whereas the predatory eagle is partially diagnosed by long and narrow wings and a sharply hooked beak, the goose – owing to its different mode of life – is partially diagnosed by a lesser and broader wing span and a flatter bill. The principled classification of folkbiological taxa "by division and assembly" (*diaresis* and *synagoge*) ends when all taxa are defined, that is, when each generic-specieme is completely diagnosed with respect to every essential organ. Such definition, however, does not pertain to a species in the abstract, but to a community of organisms-in-their-environment.

This first sustained scientific research program differed from modern science in its preoccupation with explaining the familiar and known, rather than with exploring the unknown for its own sake. The program failed owing to a fundamental antagonism between what were effectively nonphenomenal means and the phenomenal end sought. To explain the visible order of things Aristotle had recourse to internal functions. But such functions cannot be properly understood if, as with Aristotle, they are referred primarily to their morphological manifestations. Moreover, as any folk naturalist, he recognized no more than five or six hundred species. He knew that there were kinds not present in his own familiar environment, but he had no idea that there were orders of magnitude of difference between what was locally apparent and what existed world-wide. Given the (wrong) assumption that a phenomenal survey of naturally occurring kinds was practically complete, Aristotle hoped to find a true and consistent system of character selection by the trial and error method. Nevertheless, by inquiring into how the apparently diverse natures of commonly apprehended species may be causally related to the Nature of life, Aristotle established the theoretical program of natural history.

Part III, "Herbals to Systems," examines the developments that led from herbalism to systematic botany and analyzes the attempt of science to overcome the limits of common sense with the aid of rational intuition. Two stages in this

advance of natural history are especially noteworthy: the elaboration of the taxonomic species as a perpetually self-reproducing unit from a common seed, and the codification of the genus as a perceptually and mnemonically privileged rank immediately superordinate to the species.

After Aristotle, the practice of copying descriptions and illustrations of living kinds from previous sources superseded actual field experience in the schools of late antiquity. Well into the Renaissance, scholastic "naturalists" took it for granted that the local flora and fauna of northern and central Europe could be fully categorized under the Mediterranean plant and animal types found in ancient works. Herbals and bestiaries of the time were far removed from any empirical base.

Only when German, Dutch and Italian herbalists of the sixteenth and seventeenth centuries returned to customary intuitions of nature did progress become possible. But they persisted in using a Latin (or latinized Greek) nomenclatural type whenever a similar local species could be attached to it. This fostered the comparison of ancient and foreign types to local forms. In addition, a series of technological innovations allowed a permanent record of the knowledge gained: the preservation of dried specimens in herbaria, the establishment of botanical and zoological gardens, advances in the art of woodcut and the invention of movable type.

Folk knowledge was thus recovered, set against standards for comparison and fixed for communication across local boundaries of time and place. Information was exchanged among different communities without loss of specificity and accumulated, and a worldwide catalogue of species could be envisaged. The problem, then, would be to systematize the welter of new forms into an overarching taxonomy that would be as psychologically convenient as folk-taxonomy in providing an intellectual map of the readily visible organic world.

The first step towards a systematic global classification involved fixing the species as an eternally self-perpetuating entity. Although ecological and reproductive criteria are usually covariant indicators of local species status, only the latter would provide cross-community status to morphological groupings: the most commonly perceived features of local species would also be those that usually happened to breed ever true. The permanent filiation of locally visible types would yield sempiternal forms, and thus sanction the principle of systematic comparison and placement within higher groups extending in scope to the world at large. Species now fixed reproductively and eternally, rather than ecologically and locally, could be abstracted from context and fit into a universal morphological scheme.

Together with the introduction of specific breeding criteria, the emergence of the genus concept was initially motivated by historical difficulties that exploration had posed for common sense. The genus was originally designed to allow the reduction of species by an order of magnitude to equivalence classes whose number and quality the mind could easily manage again (from over 6,000 known species to some 600 genera). The place of a new species in the natural order of genera would be initially determined in either of two ways: (i) By

empirical intuition, that is, readily visible morphological agreement with a European representative or some other preferred type-species of the genus, or (ii) by intellectual intuition, that is, analytic agreement with the generic fructification according to the number, topological disposition, geometrical configuration and magnitude of its constituent elements. But the one would ultimately be commensurate with the other, thus allowing a mathematical reduction of the new species to its associated type by reason of their common fructification. As a result, the customary surety of the folk naturalist might be rationally extended to a world-wide scale. This was the gist of the "natural system."

Part IV, "The Scientific Breakaway," explores the intellectual dissociation of natural history from folkbiology during the late eighteenth and early nineteenth centuries, which paved the way for the birth of modern systematics. Motivating the theoretical break were both practical and more speculative agendas. Practical concerns led from a rational system of genera to an empirical method centering on families and classes. The genus lost its role as the chief taxonomic rank and there was a dynamic reassessment of the relation between species and higher-order taxa in terms of biological functions, anatomical structures and historical processes. At the same time, the speculative program that sought to unify the visible forms of life in a "great chain of being" (*scala naturae*) reached its culmination through the theory-forming "Analogy of Nature." With the realization of this program, a global patterning of visible plant and animal forms was found inadequate for understanding the underlying order of life. As a result, natural history's common-sense preoccupation with comprehending phenomenal reality gave way to biology's quest to explain the unforeseen.

The genus's defining character – the fructification – was crucially a rational notion, although metaphysically sanctioned as the seat of life. It required conceptual isolation of those analytically prized characters of the visible fruit and flower that could be apodictically arranged into a preset combinatory system. The detachability and reducibility of visible parts to computable characters was, however, *prima facie* less warranted in the case of animals; the parts of animals immediately lend themselves to consideration as functionally interjoined organs rather than as visibly juxtaposed features.

Moreover, conservation of animal life-forms blocked attempts to dissolve animal (and therefore ultimately plant) kinds into a single table of rational characters. A set of generic characters proposed for one animal life-form would fail to apply to the others. Even if functionally analogous, the essential organs of each great class of animals hardly manifest similarity in their external features: no logical expression of the means for acquiring nutriment would link, say, the conformation of a mammal's teeth to the structure of a bird's beak.

The system was able to dispense with plant life-forms. They are fundamentally provincial indicators of ecological status tied up with our understanding of the way local kinds interrelate and appear to us. Devoid of local context, however, plant life-forms represent only what Linnaeus would qualify as