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Primitive Agency and Natural Norms*

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My main objective in this paper is to rough out a notion of primitive agency. A secondary objective is to connect primitive agency to natural norms, and to make some remarks on how natural norms apply once primitive agency is linked with an agent's perceptually identified goals. Both of these objectives bear on primitive antecedents of the higher-level types of agency that we as philosophers tend to be most interested in—intentional agency, norm-guided agency, deliberative agency, morally responsible agency, intellectual agency, and so on.

I believe that by setting these higher levels of agency in a broader, more generic framework, we gain insight into them. For present purposes, I will not defend this belief.

What I have to say here in action theory is closely connected to parallel but more extensive work that I have done on perception.[1] One of the main points of the work on perception is to distinguish between mere sensory capacities and *sensory-perceptual* capacities. Broadly speaking, this distinction marks where representational mind begins. The distinction hinges on perception's having representational content with accuracy conditions and with perception's involving a certain type of objectification, exhibited paradigmatically in perceptual constancies.

Perceptual constancies are capacities systematically to represent a given particular entity or specific property, relation, or kind as the

* The present article is extracted from a book, *Origins of Objectivity*, forthcoming, Oxford University Press. I have benefited from giving the paper at Cornell University, New York University and UCLA. I am particularly indebted to Gavin Lawrence for a penetrating question.

1 For a fairly full account of my views on perception and on the empirical science of visual perception, see "Disjunctivism and Perceptual Psychology," *Philosophical Topics* 33 (2005), pp. 1-78. The present paper derives from *Origins of Objectivity*, where there is much fuller discussion of perception.

same despite significant variations in registration of proximal stimulation. It is understood that these capacities cannot be explained merely as simple weightings or even mathematically complex manipulations of registration of proximal stimulation. They must be best-explainable in terms of formation of representation as of specific environmental particulars or attributes. The intuitive idea of the constancies is that under different perspectives on the same attribute, a perceiver can perceptually represent a given attribute as the same. Since perceptual constancy is a theoretical notion, this is not a definition. The constancies are structured abilities to take account *in perception* of differences in registration of proximal stimulations that correspond to differences in perception of the same entity. Differences in registrations of proximal stimulation that correspond to adaptation or desensitization do not count. Certain processings of proximal stimulation that are explainable in complex mathematical terms, but that do not involve specifically perceptual capacities do not count. Perceptual constancies are the primary mark of perceptual objectification.[2, 3]

Registration of light arrays on the retina involves no such constancies. The proximal light arrays cannot alone, even taken sequentially, suffice to determine any one among many types of possible distal causes. They cannot alone indicate a single objective attribute under different conditions. If a sensory system simply registers proximal stimulation, there is no perception.

Perceptual constancies are commonly evinced by an individual's responding to a particular or to an attribute in the same way under a wide range stimulations stemming from the particular or the attribute. Perceptually tracking the attribute involves coordinating different ways of perceptually attributing the attribute *as* that attribute.

A wide variety of constancies are present in the visual perceptual systems of animals. *Size constancy* in a visual system is the capacity to represent an object's size as the same even while the stimulus from the object affects a smaller or larger proportion of the visual field—for example, while it moves closer to or farther away from the viewer. *Shape constancy* is a capacity to represent a given shape under a variety of stimulus and perspectival conditions. For example, a circular plate

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2 Ernst Cassirer, "The Concept of Group and the Theory of Perception," *Philosophy and Phenomenological Research* 5 (1944), pp. 1-35–a translation of an article published in French in 1938–advocates the importance of perceptual constancies in understanding perception.

3 I propose perceptual constancies as a mark of perception in "Perceptual Entitlement," *Philosophy and Phenomenological Research* 67 (2003), section II; and in "Perception," *International Journal of Psychoanalysis* 84 (2003), pp. 157-167. The notion has been common in psychology for over a century.

can be seen as circular whether it is viewed head on or at an angle. There is distance constancy, motion constancy, lightness constancy, color constancy, and so on.

The constancies enable an animal to respond to environmental conditions that are crucial to its welfare in a more specific, fine-grained way than non-perceptual sensory capacities do. As noted, the constancies are marks of objectification.

I believe that perception lies at the lower border of genuine representation. Representation is to be distinguished from mere registration of information, even assuming that the registration has a function. A sign of a state's being a representational state is that non-trivial appeal to veridicality conditions enters into empirical explanations of formations of the state. With respect to sensory states and actional states, such appeals are commonly associated with explanations of perceptual constancies. Non-perceptual sensory states that merely register information correlate causally with environmental conditions and function to do so. But no non-trivial appeal to veridicality conditions enters into explanations of such states. And perceptual constancies are not in evidence. An amoeba or mollusc's distinctive sensitivity and response to light, at different intensities, registers information about light, and has the function of doing so. But these animals lack any perceptual capacity.

It is part of my view, which I will not argue for here, that a constitutive condition on having a perceptual state is that it be associated, at least in a very indirect way, with functions of individuals in realizing their needs or activities. The most important type of realization of individuals' functions is agency. I will not try to specify this indirect way. I will say this much. The indirect way allows an animal or species to lose its capacity to realize a function without losing its perceptual capacity. The indirect way requires that somewhere in the constitutive conditions for having the representational capacities involved in the perceptual states, there must be some connection between those perceptual capacities and capacities to realize individual functions, typically biological functions. The idea is that what classes of things in the environment are candidates for perceptual discrimination hinges partly on relations to individuals' functions. Perceptual explanation must be constitutively and empirically connected to explanation of activities, or other realizations of individual function. Perceptual kinds are what they are partly through meshing with attributes in the environment that figure in animals' needs and activities when they interact with their environment.

The range of appropriate objects of perceptual discrimination, and the environmental grounds for explaining constitutive conditions for a state's having the perceptual content it has, are constrained by factors

beyond the animal's discriminative capacity (which covers too wide a range to constitutively fix what an animal perceives). The range is also constrained by the functional activities and needs of whole individuals. In its empirical methodology, perceptual psychology leans on animal needs and activities—particularly activities—in discovering kinds of perceptual states. The relevant kind of activities are eating, predating, mating, navigating, fleeing, parenting, nesting, and so on.

The kinds of activities that figure in determining perceptual content (hence kinds of perceptual states) are understood within zoology as biologically functional for the animal. The relevant types of function are functions of individuals. Biological functions of *individuals* are a distinct sub-case of biological functions, a sub-case that contrasts with the function of an organ or a sensory system—the cases of biological function most frequently discussed in philosophy. The notion of whole animal, or organismic, function seems to me to stand near the basis for understanding the most primitive form of action. Primitive animal action is a main source of background conditions that frame and place pre-representational constraints on animal perception.

As noted, whole animal function is exemplified by basic biological activities—eating, navigating, mating, parenting, and so on. These activities are functional according to the most commonly cited sense of "biological function." Roughly, their existence is explained by their contribution to the individual's fitness, or survival for mating.[4] They are distinctive in being functions of the whole individual—not the individual's sub-systems. Fulfilling these functions—successfully pursuing these activities—contributes to the individual's or species's fitness, or survival for mating.

There are, I think, further natural functions, other than the narrowly biological ones, that can be associated with whole organisms. There is a notion of a naturally flourishing life in which (beyond surviving long enough for mating) an animal lives out a life that is a realization of its natural biological capabilities, with relatively little misfortune. Such a notion of flourishing would be the counterpart of a decent standard of living. Early death and exceptional deprivation, hardship, or disease

[4] Cf. Larry Wright, "Functions," *Philosophical Review* 82 (1973), pp. 139-168. There are other notions of function that figure in biology. Cf. Robert Cummings, "Functional Analysis," *The Journal of Philosophy* 72 (1975), pp. 741-765; Paul E. Griffiths, "Functional Analysis and Proper Functions," *British Journal of the Philosophy of Science* 44 (1993), pp. 409-422; Peter Godfrey-Smith, "Functions: Consensus without Unity," *American Philosophical Quarterly* 74 (1993), pp. 196-208. For present purposes, it seems to me unnecessary to discuss various conceptions of biological function. I use the standard Wright-like notion, which is associated with teleology in biology, as a foil to compare and contrast with the notion of a representational function.

would lower the level of flourishing, and count as limiting fulfillment of the sort of animal function that consists in full or normal realization of the animal's life course and natural biological capacities. Lower levels of flourishing would count as relative failure of the animal to live a life that is normal and natural for that animal.

Such a conception of animal function is naturally derivable from reflection on biological facts about species and individuals. I focus here on the standard notion of biological function, as applied to whole animals, rather than this broader notion of flourishing, because I understand it better in its relation to animal agency. A fuller account would encompass both notions of function.

Non-representational relations of an animal to its environment in the fulfillment of animal needs and activities play a definite role in the determination of the natures of its perceptual representational contents.[5] Such relations ground the explanatory methodology of perceptual psychology—motivating it to relate its explanations to biological explanations, particularly explanations in zoology and ethology. Those relations figure in the constitutive determination of perceptual content. So the relations ground both the epistemology of perceptual psychology and the ontology of perceptual kinds. What range of attributes a type of animal *perceptually* discriminates is partly constrained by what its needs and activities are—or what the needs and activities of its evolutionary ancestors were. In this mix of needs and activities, activities are surely primary in setting the pre-conditions for determination (epistemic and constitutive) of perceptual kinds. In actual fact, the agency involved in predating, eating, navigating, mating, parenting, and so on, forms the primary ground for constraining the attributes whose discrimination is central to perceptual content and perceptual kinds. Primitive agency forms a background for understanding both representation and representation-as in perceptual systems—hence for understanding perceptual kinds. Primitive organismic agency is phylogenetically more basic than perception. It occurs in organisms that demonstrably lack perception in the sense that I have elaborated.

All the preceding is a rather breathlessly sketched background for what will be the main topic here. I have sketched a broad connection between perception and primitive agency. I will now discuss primitive

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[5] As always, these relations might go back through the formation of the animal's capacities through its evolutionary pre-history. They might thus depend on the needs and activities of previous animals that figured in this formation. I believe that the constitutive relations between individual functions and perceptual content, and the explanatory relations between zoology and perceptual psychology, which I am indicating here bear on why Quine's claims of referential indeterminacy are mistaken. I discuss these issues more fully in *Origins of Objectivity*.

agency, and norms that are associated with it, before returning to its connection with perception.

Primitive agency is a large topic. Again I just sketch a general orientation. This sketch will, however, be a bit more detailed.

Action theory in philosophy, over the last half-century, has been almost as hyper-intellectualized as perception theory. Usually discussion begins with cases involving desire, intention, will, and then focuses on sub-cases of intentional action. There is nothing in itself wrong with this focus, of course. But often it is assumed that such approaches encompass all action.[6]

Animal action begins earlier. Much of it is pre-intentional, even pre-representational. Even *representational* agency precedes intention and belief.

We distinguish firmly between an animal's actions, on one hand, and both things that happen to the animal and processes that occur within the animal, on the other. Although there are surely conceptual difficulties here, and borderline cases, the distinction invites and rewards reflection.[7]

A spider pursues, jumps on, bites, and eats its prey, approaches and inseminates its mate, navigates past an obstacle, or runs across a web. These actions are distinguished from processes occurring only within the spider. The spider ingests; its stomach digests. Only sub-systems operate in the circulation of fluids, and production of protein, semen, or wastes.

Lower animals, and even some simple organisms that are not animals, engage in action in a broad sense. An amoeba's ingesting its food is action. Digesting its food is not. A paramecium's swimming forward or backward is action. The plasmolysis that causes shrinking of the paramecium in highly concentrated solutions is not. The crawling of a tick toward a heat source is active and attributable to the whole organism. Protein transfer through its membranes is not.

Amoebae, paramecia, ticks, and more complex organisms lack perception. Since they cannot perceive a goal or objective, their actions are not engendered by perceptual representation. They simply act in response to sensory stimulus. The most primitive whole-organism agency is pre-perceptual.

The ethological literature has developed a complex taxonomy of *orientation*. Both the concept of orientation and the taxonomy are

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6 Cf. Donald Davidson, "Psychology as Philosophy" in *Essays on Actions and Events* (Clarendon Press, Oxford, 2001, 2nd edition), p. 229; cf. also Davidson, "Agency" in ibid, p. 46.

7 Some work in this direction can be found in Martha Nussbaum, *Aristotle's De Motu Animalium* (Princeton, Princeton Univ. Press, 1978), and Brian O'Shaughnessy, *The Will* vols. I-II (Cambridge, Cambridge University Press, 1980). Cf. especially the chapter "The Sub-Intentional Act" in volume II of the first edition.

sources for philosophical reflection in understanding primitive agency. I want to say a few words about the matter here.

Orientation is taking, or movement into, a position by an organism in relation to its surroundings. Orientation places an organism in its characteristic bodily positions (right-side up for a starfish, four feet on the ground for a dog), or in areas of its habitat in which it can thrive.[8]

Not all orientations are actions. But some are. Growth toward the light is an orientation that is not an action. A fish's swimming toward its prey is an orientation that is an action.

Active orientations constitute a large sub-class of primitive actions. Active orientations are actions that have specifically to do with locomotion (as opposed to eating, mating, and so on).

Orientations that are directional reactions by freely motile organisms are called *taxes*. I will return to taxes. First, I want to rough out a contrast sub-class within orientation. The nomenclature for non-tactic orientation is somewhat varied. One common one is as follows.

Bending movements by plants and sessile animals are *tropisms*. In many cases, tropisms are nothing more than oriented growth. I lay tropisms aside. They are mostly either non-active movement or at best borderline cases of active movement.

Another sub-class of non-tactic orientation is kinesis. *Kineses* are non-directed, non-directional locomotory movements by organisms, in which speed and frequency of turning depend only on the intensity of the stimulation. Kineses occur when organisms are incapable of detecting the direction of a stimulus gradient, and when response to the stimulus produces a reaction whose direction is not determined by the direction of the stimulus. The organism responds to change in intensity of the stimulus by changed rate of locomotion (orthokinesis) or turning (klinokinesis). These changes tend to lead towards or away from the source of the stimulus, even though the organism is incapable of movements whose direction is directed with respect to the stimulus. There is a random, non-directional character to the individual movements.

For example, simple organisms, such as paramecia, move by the beating of their cilia in a liquid. When they are stimulated by heat or contact, the beatings reverse. At a fixed distance of reversal, the swimming turns in a new forward direction. The direction of *turning* is not related to the direction of the stimulus. Relative to the stimulus, it is random—except that it is not directly back toward the stimulus. With sufficient turnings, such movement tends to put the paramecium in a more advantageous position. Yet the turning movement is undirected

[8] Gottfried S. Fraenkel and Donald L. Gunn, *The Orientation of Animals* (Oxford, Clarendon Press, 1940), p. 1.

in the sense just indicated.[9] Such turnings after reversals are not taxes. They are a type of kinesis.

Let us return to taxes. Taxes occur when an organism is oriented with respect to the stimulus source and travels in a direction that depends on the direction of the stimulus source. *Taxes* are directional movements with respect to stimulations in the environment. They require sensory capacities that are directional. Usually determining direction depends on there being two or more locations of sensory receptors on the body of the organism. Directional movement is usually achieved by some mechanism in the animal for simultaneous differentiation of intensities of stimulus registration in different bodily sensors.[10] For example, the animal might turn toward or away from the direction perpendicular to the side of its body that receives the most intense stimulus registration.

True taxes are widespread in flagellate, *single cell* eukaryotic organisms.[11] Such organisms are capable of steering toward or away from a stimulus source, subsequent to internal differentiations between stimulus intensities in different areas of the body. There are signs of simple specialization which allow a distinction between sensory and response regulators, even in these very simple organisms.[12] The responses in

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9 The case derives from the classic work of H.S. Jennings, *Behavior of the Lower Organisms* (1906) (Bloomington, Indiana University Press, 1962 edition), pp. 44-54. I have oversimplified the paramecium's behavior. With respect to chemical stimulants, its turning behavior is less random than with respect to contact. Similar descriptions apply to planarians and to bacteria, whose rate of movement and frequency of turning depends on the intensity of light, and whose direction of turning is random, relative to the stimulus. Cf. also Fraenkel and Gunn, *The Orientation of Animals*, op. cit., pp. 43ff. For further discussion of the distinction between taxes and kineses, see M.J. Carlile,"Taxes and Tropisms: Diversity, Biological Significance and Evolution," and J. Adler, "Chemotaxis in Bacteria" in *Primitive Sensory and Communication Systems*, M.J. Carlile ed. (London, Academic Press, 1975); R. Campan, "Tactic Components in Orientation" in *Orientation and Communication in Arthropods*, M. Lehrer ed. (Basel, Birkhauser Verlag, 1997).

10 M.J. Carlile, "Taxes and Tropisms: Diversity, Biological Significance and Evolution," op. cit., pp. 14ff. Positive phototaxis steering can be achieved through the response of a single receptor responding to shading by the cell body. Reorientation occurs until the receptor, located at the front of the cell, receives maximum stimulation. This sort of capacity occurs in Euglena. The basis of positive phototaxis is differentiation between intensities at a single receptor at successive times. Here, direction is derived from temporal rather than spatial diversity of stimulations.

11 True taxes in prokaryotes are rare or absent, because the small size of the prokaryotic cells does not admit of much diversity on the cell body or of sufficient capacity to register the small differences that must be differentiated. M.J. Carlile, "Taxes and Tropisms: Diversity, Biological Significance and Evolution," op. cit., p. 23.

12 Judith van Houten, "Chemoreception in Microorganisms" in *The Neurobiology of Taste and Smell* 2nd ed. Thomas E. Finger, Wayne L. Silver, Diego Restrepo, eds. (New York, John Wiley & Sons, 2000).

these unicellular organisms are not the direct physical or chemical effects of the stimuli. They depend on the condition of the organism and are produced by the release of forces characteristic of the organism.

Each of the primary physical parameters is used by some organism in orienting within its environment. Each major physical parameter is used by some *unicellular* organism. There are sensory capacities associated with light, magnetic fields, chemical mixes, heat, electricity, mechanical contact, gravity, and sound. One dimension of classification of taxes is the type of sensory stimulant that leads to a relevant orientation. There is photo-taxis, geo-taxis, chemo-taxis, thermo-taxis, and so on. The taxes are further classified by the aspect of movement that is affected by the stimulus, and its relation to the stimulus.[13]

What does all this have to do with primitive agency? I think that some of these types of taxis, even in very simple organisms, are instances of primitive agency. The paramecium's swimming through the beating of its cilia, in a coordinated way, and perhaps its initial reversal of direction, count as agency.[14] I will discuss, conjecturally, what drives and grounds the judgment that agency is to be found at this very primitive level.

It is natural, and in a sense correct, to regard primitive agency as "just reaction." Certainly, primitive agency does not involve "will" or intention. It is not intelligent. Much of it is not very flexible. In fact,

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[13] For discussion of different taxes, see Fraenkel and Gunn, *The Orientation of Animals*, op. cit. and N. Tinbergen, *The Study of Instinct* (New York, Oxford University Press, 1969, with new introduction; originally published 1951). For one of the early descriptions of various taxes, see H.S. Jennings, *Behavior of the Lower Organisms*, op. cit. (There are studies of taxes that go back yet earlier.) The point that unicellular organisms are responsive to all stimuli that higher animals are responsive to is made on p. 261. For a classic account of two basic types of taxis, see Gottfried Fraenkel, "Beiträge zur Geotaxis and Phototaxis von Littorina," *Zeitschrift für wissenschaftliche Biologie*, vol. 5 (1927), pp. 585-597–translated in C.R. Gallistel, *The Organization of Action: A New Synthesis* (Hillsdale, New Jersey; Lawrence Erlbaum Associates, 1980). Gallistel gives a rich discussion of various mechanisms involved in animal action. He seems to take a hierarchy of simpler mechanisms to underlie all action. This picture is surely accurate for relatively complex animals. I believe, however, that even unicellular organisms have a primitive type of agency. There is no evident hierarchy of mechanisms in these cases, but there is a minimal specialization for certain capacities such as self-propulsion, reversal, and eating. This specialization allows some scope to the idea that there is a type of coordination in the active behavior of the whole organism.

[14] The klino-kinetic turning contrasts with its default swimming in that it is the immediate result of outside stimulation, and contrasts with the reversal in that its direction is unrelated to the direction of the stimulus. The turning seems to be more like a random body jerk in response to external stimulation than an internally caused behavior or a piece of steering. At any rate, I think it at best unclear whether this aspect of the paramecium's behavior is action.

even among birds and lower mammals, inflexible, automatic, instinctive agency is probably the most common type of whole-animal agency. Instinct-based action depends on a chain of reflexes and is certainly not intelligent or flexible.

In the case of unicellular organisms, like paramecia and amoebae, it is easy to declare such cases to be borderline, or below the level of any reasonable conception of agency. Even in eukaryotic, uni-cellular organisms, however, there is some specialization of sensory and response mechanisms, and some co-ordinated whole-animal responses that issue from capacities characteristic of the organism.[15]

The notion of primitive individual action is, I think, fundamentally driven by examples. The swimming of a fish or paramecium, carried out by the thrashing of a tail or the beating of cilia in still water, is, I think, an example of an organism's acting. The paramecium is not just being moved around by its environment. The movement is broadly functional. A significant contribution to the movement comes from within. And the movement often involves whole-organism coordination between central capabilities and peripheral systems. Similar points can be made about organisms' eating, mating, and so on.

I think that the relevant notion of action is grounded in *functioning, coordinated behavior* by the *whole organism,* issuing from the individual's *central behavioral capacities*, not purely from sub-systems. Coordination is meant to imply that the behavior must issue from central capacities, in effect coordinating sub-systems, or coordinating central capacities with their peripheral realizations. The schematic account in this paragraph is not a definition. It nevertheless guides my conception and helps unify the examples.

The notion of *behavior* here is vague, and would reward more development. I take it as primitive. Plants are usually not construed as exhibiting behavior. Animals and certain other very simple organisms are.[16]

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15 Judith van Houten, "Chemoreception in Microorganisms," op. cit..

16 Perhaps Venus Fly Traps are borderline cases, or even special exhibitors of behavior. For a description of bacterial "swimming" that provides some basis for seeing bacteria as agents, see Judith van Houten, "Chemoreception in Microorganisms," ibid. For a useful discussion of the generic kind *behavior*, see Ruth Garrett Millikan, "What is Behavior? A Philosophical Essay on Ethology and Individualism in Psychology" in *White Queen Psychology and Other Essays for Alice*, op. cit. Millikan's emphasis on function in individuating behavior is valuable, at least insofar as one is concerned with primitive organismic behavior. The main drawback in her account is that it is too inclusive. It includes maturation and growth. It also includes peripheral changes such as sweating and protein transfer that are not imputable to the individual. There are loose uses of "behavior" that include such peripheral changes perhaps. But I think that such uses do not figure in the life sciences. No serious science includes maturation or growth in behavior.

Behavior is not merely movement caused by physical forces on the organism. It is not merely the occurrence of processes in the cells or other subsystems of the organism. It is to be distinguished from growth, maturation, and certain peripheral reflexive responses to stimulation. At the lower levels of agency, it is always related, in ways that I shall discuss, to whole-organism biological functions.

I believe that notions of behavior and primitive agency apply beyond whole, individual organisms. Very close analogs of the notion of individual primitive agency, the notion that I will develop here, are applicable to the agency of groups. Behavior and agency are necessarily imputable either to individuals or to groups of individuals acting in concert. I discuss individual *organisms*, and groups of individual organisms, leaving aside issues about robots and such.

The behavior and agency of a group of organisms are often vivid and evident. The operations of a swarm of bees, or an army of ants, or herd of water buffalo, or pack of wolves or orcas, are often functioning, coordinated, and the product of the whole group. Cooperative interaction is part of the nature of the group activity. A conception of group primitive agency is just as important to understanding primitive agency in nature as is a conception of individual primitive agency. I think that sketching the latter notion, however, will give us enough to do. So I focus on *individual* organism behavior, and ultimately on *individual* organism agency.

A lot of behavior is active. Yet not all broadly purposive behavior is active or action.

Reflexive stress or *shreck* reactions are behavior but not actions. They constitute passive behavior. The shock responses of small organisms are not active. A deer's helpless freezing in headlights or out of fright of a predator need not be active. Helpless writhing in pain is behavior that is not agency.

Such non-active behavioral reactions can be functional. They typically serve the animal's needs. These sorts of behavior function to shut down all other behavioral systems. In active behavior, sometimes an action will inhibit other types of behavior; but its function is not to arrest or shut down the individual's central behavioral capacities. So *schreck* reactions and helpless writhing are not coordinated behavior that issue from the individual's central behavioral capabilities. They involve a shutting down of central behavioral capacities.

An animal's shivering in the cold, or its coughing or sneezing, are perhaps instances of behavior. But they are not instances of active behavior. The events can be functional. Shivering engenders heat. Coughing and sneezing have expectorant functions. They are functional, but they are operations of peripheral systems that are not

normally products of coordination with central behavioral capacities. They are reflexive, peripheral processes. Ordinarily, they are not instances of agency—although, of course, they can be. If they are types of behavior, they are normally not active behavior.

It is unclear to me why these passive types of behavior count as behavior—and hence are imputable to the whole individual. I conjecture that the explanation has to do with the fact that either the process engages the individual's whole body—as *schreck* reactions, writhing, and in a sense shivering do—or the process is the product of a subsystem that is closely associated with the animal's anatomical center—as coughing and sneezing are, and knee jerks are not.[17]

Not all behavior fulfills whole animal functions. Although most behavior in the simpler organisms fulfills some function, not all *instances* of primitive agency fulfill functions. In a rage or under the influence of some disease, an animal can run in circles or off a cliff. An animal can eat a poisonous plant. Running and eating remain acts by the whole animal. Normally, the point of a *type* of activity, in non-pathological cases (as in the case of eating poison), is explicable by reference to purpose or function.

There are *types* of non-pathological primitive agency that do not obviously fulfill larger biological functions. Idly, non-intentionally, drumming one's fingers, or the unconscious coordinated swaying to rhythmic sound by an animal, can be active. It is not evident what function it performs. Certainly it need not realize any of the basic biological functions. These cases seem, however, to be instances of more generic types of agency that do fulfill biological functions—moving one's fingers, moving one's body. Most primitive agency, even specifically described, has obvious functions. All primitive agency, generically enough described, has a whole individual function. It is in this broad sense that primitive agency is *functioning*.

All behavior is imputable to individuals, as distinct from merely their sub-systems. As I have indicated, not all behavior is active. Yet the distinction between what is imputable to the whole organism, perhaps as well as to certain sub-systems, and what is imputable *merely* to subsystems is a key element in the active-passive distinction. Action must be a whole-organismic affair: it issues from central capabilities of the individual. (Again, I lay aside action by groups of individual organisms.) Active behavior is distinguished from the reflexive responses of

[17] In understanding the ordinary language involved in attributing processes to individuals rather than their sub-systems, it is perhaps important that these processes involve animals' heads.

muscle twitch and the classical reflex arc. In these cases, movement is imputable purely to the organism's sub-systems.

In relatively complex animals, the classical reflex arc does not even go through the central nervous system. It is not available to central coordinating agency. Similar points can be made about muscle spasms, the firing of neurons, saccades by the eyes. Such events are normally not imputed to individuals. But even shivering, coughing, sneezing—processes that are normally imputed to individuals (sometimes as well as sub-systems)—are distinguished from active behavior because, normally, the processes are not a product of coordination with central behavioral capabilities of the individual.

In the cases of larger animals, there is usually a fairly clear distinction between central and peripheral processes that correlates roughly with an anatomical distinction between processes that are controlled by the central nervous system and processes that are not. One can make a start at analogous points even for simple organisms like paramecia that lack a central nervous system. Eating involves a unitary process that involves the whole organism (eating itself, and rotation of the animal body so that the side that has the gullet opening faces the food), as well as operations that are imputable purely to its subsystems (expansion of the gullet). By contrast, protein transfer through the membranes of the paramecium is not a process that engages the unified behavior of the whole animal.

The role of specialized anatomical structures in distinguishing active and passive processes probably goes beyond that of the central nervous system. For example, eating is often distinguishable from photosynthesis—also a source of energy production—by the existence of certain specialized anatomical structures. The paramecium has a gullet, a chamber in which digestion occurs. No plant has a gullet. Protein transfer through cell membranes and absorption of light or other sources of energy occur in all cells. There is no coordination among structures within the organism in these cases.

Still, I doubt that the contrast can be made plausibly on a strictly anatomical basis. The fact that the whole paramecium is eating probably carries more weight than any view of eating as being a coordination of anatomical sub-systems. The centrality of the capabilities is often signaled by some sort of coordination. But one cannot read off the relevant type of whole-organism coordination from physiology and anatomy.

I am not convinced that anatomical specialization is even necessary, much less sufficient: The amoeba's anatomical specializations for feeding are minimal. What is necessary is functional behavior that issues in a coordinated way in the realization of central capabilities of the

individual. Photosynthesis lacks such coordination. It is carried out equally in individual cells across the plant. The amoeba's eating exhibits relevant coordination, even though there may be no relevant anatomical or physiological *sub-systems* to be coordinated, as there are in the paramecium.

I doubt that there is an independent criterion for whole-individual agency. Again, the fact that the amoeba is eating seems to carry as much weight in the judgment that the eating is active rather than passive behavior as the fact that there is coordination with the individual's central capabilities. Anatomy and physiology can often guide what counts as a central capability, but not always. As I indicated earlier, I think that our understanding of these matters is probably partly guided by an antecedent list of whole-individual functions that already embody conceptions of activity by the whole individual organism—eating, navigating, mating, and so on.

Functioning, coordinated behavior by the whole organism, issuing from the individual's central behavioral capacities need not engage—coordinate—all an individual's capacities, of course. Ordinary absent-minded, non-reflexive, unintentional scratching by humans does not. Eating does not. The requirement is that the process be imputable to the individual and that it involve some behavior that is the natural product of the individual's central capabilities.

There are always borderline cases. Still, the notions of whole-organism organization of behavior issuing from central behavioral capacities and whole-organism function, together with a list of paradigm cases, seem to me to provide a beginning at understanding the relevant notion of primitive agency. Let me add a few comments to what I have already said.

Primitive whole-organism agency often involves whole-organism *control*, but does not require it. Ducking an approaching missile can be an action even if it is against one's own attempt to inhibit the ducking. I assume that the ducking is not a peripheral reflex in the classical sense. It is guided by perception.[18] Such ducking seems intuitively not to be under the individual's control. The individual would naturally say that he or she could not help but duck despite trying not to. At the very least, the notion of control would need refinement to deal with the case.

A more fundamental reason against taking control to be central to primitive agency is that with respect to the simplest organisms, the notion of control has little grip.

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[18] If one is on a wheel and one knows that a knife thrower will accurately miss one's head if one remains stationary, one still might move one's head at the approaching knife—to one's own peril. The example is Sean Foran's.

Primitive whole-organism agency also does not require a capacity *to shape or guide whole-organism movement* past the point where the stimulus is registered.[19] Various types of instinctive behavior are inflexible and chain-reflexive, but still count as action. The male grouse will copulate with a stuffed grouse, male grouse, or dead grouse, if it sees any of these as assuming the relevant female mating position. The male grouse's copulation activity is released by a single stimulus or single perception. The instinctive behavior does not derive from an inability to distinguish visually between the sexes, or between live and dead grouses. It is just that the instinctive behavior overrides these distinctions, once the key stimulus is received.[20]

The grouse is guided by visual perception. This capacity is inessential, however. Whole-organism instinctive behavior that counts as agency need not be guided, or capable of being guided, by perception at all. Nestling thrushes, which are initially blind, strenuously gape to be fed when the nest is jarred. The direction of gaping is not influenced by the jarring. They stretch their necks vertically upward, oriented by a proprioceptive sense of gravity. The activity is initiated by the jarring, but is not shaped by or oriented to the jarring in any way. Yet the behavior is whole-animal and active.[21] Of course, the examples from

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19 I have long been indebted to a remark by Harry Frankfurt for my interest in primitive animal action. Cf. Harry G. Frankfurt, "The Problem of Action" (1978) in *The Importance of What We Care About* (Cambridge, Cambridge University Press, 1988). Frankfurt remarked that a spider acts when it walks, but does not act when its legs are moved (in anatomically the same way) by an external agent. I think, however, that Frankfurt's own account of action is incorrect. Frankfurt explicates the notion of action in terms of guidance of behavior by the individual during the behavior. He does not develop his notion of guidance. But his view seems vulnerable to both the ducking example and the examples of instinctive behavior, such as the grouse's, that I am about to discuss. Action does not seem to require guidance by the individual during the act (or even before the act). Intuitively the grouse's action and the ducking are guided by the individual's perception. But the action is not under the control or guidance of the individual in the sense that the individual need not endorse the behavior and could not monitor or adjust it, given the initial perceptual input. These are, of course, matters that need development. I have invoked, tentatively, the more liberal notion of coordination, with allowances for questions as to whether the notion applies straightforwardly to action by very simple organisms. The key notion is issuance from central behavioral capabilities of the individual.

20 N. Tinbergen, *The Study of Instinct*, op. cit., p. 36. Tinbergen's tentative definition of "instinct" is "a hierarchically organized nervous mechanism which is susceptible to certain priming, releasing, and directing impulses of internal as well as of external origin, and which responds to these impulses by coordinate movements that contribute to the maintenance of the individual and the species," p. 112.

21 N. Tinbergen, *The Study of Instinct*, op. cit., pp. 85-87. I doubt that the proprioceptive sense that yields the orientation to gravity here counts as perception. Whether or not this is correct, there is clearly no perception of any objective (the food) of the activity of gaping.

very simple organisms, like the paramecium and tick, make the same point.

Some accounts of agency center on the animal's use of perceptual stimulation. Not all primitive action is direct response to stimulation, let alone perception. Swimming is the normal condition of paramecia, eels, and fish. They do not need present stimulation to keep them going. Activity may change without external stimulation. Action even by very simple organisms does not require occurrent stimulation. A hydra's periodic movement tends not to be in response to present stimulation. A hydra can be resting attached to a water plant or side of a glass container. After a few minutes, it contracts, bends into a new position, sets its top on a surface, and extends its bottom upward (head over heals, so to speak). It moves in a slow cartwheel-like motion about its environment, increasing its chance of finding food. Rates of movement depend on hunger.[22]

Some instinct-based action derives from release of pent-up energy and has no further purpose for the animal. Many animals act out without exogenous stimulation. For example, famously, Lorenz's hand-reared starling periodically performed an elaborate fly-catching routine in the absence of flies, having never trapped a fly in its life.[23] The periodic movement of hydra seems also to be endogenously driven.

Examples of more hierarchical endogenous behavior production illustrate ramifications of the same point. Hungry cats have been observed to catch, kill, and eat a half dozen mice, then kill a few more without eating them, then catch more without killing, then sit in the attitude of lying in ambush with head lowered, not attacking but intently watching mice, some of which crawl over their paws.[24]

Neither the function nor the environmental object of an animal's agency need be represented by the organism. The cyst that the amoeba ingests is not represented by the amoeba. Nothing is. Much animal agency is pre-perceptual, and pre-representational. Lorenz's starling

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22 Jennings, *Behavior of the Lower Organisms*, op. cit., pp. 189ff, 261, 285ff.

23 "It would fly up to an elevated look-out position..., perch there and gaze upwards continuously as if searching the sky for flying insects. Suddenly, the bird's entire behaviour would indicate that it had spotted an insect. The starling would extend its body, flatten its feathers, aim upwards, take off, snap at something, return to its perch and finally perform swallowing motions....there were really no insects to be seen." Konrad Lorenz, "A Consideration of Methods of Identification of Species-specific Instinctive Behaviour Patterns in Birds" (1932) in *Studies in Animal and Human Behaviour*, volume I, R. Martin trans. (Cambridge, Massachusetts; Harvard University Press, 1970).

24 Cf. Konrad Z. Lorenz (who cites work of Paul Leyhausen), *The Foundations of Ethology* (1978), K. Z. Lorenz and R.W. Kickert trans. (New York, Springer-Verlag, 1981), pp. 135-135.

was presumably capable of visual perception of prey, but the action is not shaped by perception of anything. Whether the starling hallucinates prey, when it engages in its endogenously driven fly-catching behavior, is an open question. There are also active routines that are not the result of *unusual* damming up of motivational energy (as was the case with Lorenz's starling), but simply of ordinary endogenously driven instinctual behavior. The nearly perpetual swimming of fish and the nearly constant flapping of the wings of small birds are examples.

All activity of the simpler organisms and much activity of more complex animals is not guided by perception. Where such activity is a response to sensory stimulation, it is backed by non-perceptual sensory capacities that register information. All the active behavior of amoebae, paramecia, hydra, ticks, and molluscs, most of the active behavior of moths, spiders, shrimp, fish, and snakes, and some of the active behavior of birds and mammals is not guided by perception.

Much exogeneously stimulated animal action derives not from perception but from sensory registration of information—from sensory discrimination that can be adequately explained as responses to surface stimulation. The animal's sensory discriminations are linked to the biologically important aspects of the environment purely in a causal, information-theoretic way that has functional value for the life of the organism. Although the organism acts, both the environmental stimulants and environmental objectives are outside its purview. It acts blindly in the fullest sense. Blindly, but functionally and often efficiently.

When perception sets an object for animal action, agency reaches a new level of sophistication. The action is suited to a goal that the animal itself perceptually represents.[25]

If an animal can perceive, it has some perspective on its objectives. Much agency by animals with perception, like copulation by the grouse, remains dominated by instinctual patterns that are not intelligent or shaped by the animal, let alone reasoned. Nevertheless, since perceptual representation is constitutively the whole animal's representation,

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[25] Sean Foran, "Animal Movement," read in manuscript, highlights the role of perception in animal movement. I think that he is on to the more sophisticated animal agency that is guided by perception. I believe, however, that his notion of animal movement either blurs the distinction between pre-perceptual agency and perception-guided agency, which I think so important; or it simply applies to the more sophisticated type. The case of the nestling thrushes and the case of endogenously engendered action seem to me to pose problems for applying his account to all animal agency. Similarly, for the cases of activity in very simple organisms. Despite these differences, I have found Foran's very original paper a source of stimulation. I read the paper in draft several years ago, and have returned to it, in later drafts, several times since.

and since perception enables an animal to fix its goal, action guided by perception derives from a perspective in a way that action in response to mere sensory registration does not.

With animal agency guided by perception, a primitive type of *psychological* agency is commonly in place for the first time. Acting on a perception requires distinguishing elements of the perceptual representation to act upon. Perception *per se* is not normally an act. But the direction of perceptual attention is an act. In fact, it is a primitive type of *psychological* act. Selective orientation of the whole individual to aspects of what it perceptually represents is empirically demonstrable at relatively low levels of animal activity.[26] Such selective perceptual orientation, or perceptual attention, is, I think, the most primitive sort of psychological agency.

Perhaps another type of psychological act that emerges at this stage is the setting of a goal. The direction of attention serves setting a goal of which the actional system forms an action representation. Perhaps some goals are set passively, but those set pursuant to directing attention can, I think, be set actively.

Psychological agency need not *be* a piece of coordination. But it is one of the well-springs of centrally coordinated behavior. Attention and setting a goal are psychological acts that are active partly because they function in initiating or coordinating active bodily behavior.

A new aspect of agency that emerges when agency is associated with perception is a primitive type of objectification. This type of objectification in action derives from the objectification that is constitutive of perception. The animal perceives its goals, and the action is directed toward a goal represented through the animal's perception. Such goal objectification is missing from action engendered by registration of information based on response to mere bodily stimulation.

To develop how this element relates to norms, let us return to the notion of function. I noted that at least under relatively generic descriptions, primitive agency has biological functions. The agency is biologically functional roughly in the sense that the existence of the activity is explained by its contribution to the individual's, or the individual's group's, fitness.

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[26] The attention need not be conscious. For a development of the point that attention need not be tied to consciousness, see A. David Milner and Melvyn A. Goodale, *The Visual Brain in Action* (Oxford, Oxford University Press, 1995), pp. 181ff.; also D. Ingle, "Selective Visual Attention in Frogs," *Science*, vol. 188 (1975), pp. 1033-1035. On the other hand, there are delicate issues here involved in distinguishing the individual's directing attention and the grabbing of attention by a stimulus. I am just gesturing toward an area that needs exploration.

Success in fulfilling a function is a *good* for the system or for the agent of the activity, *relative to the function*. The heart's beating efficiently is a good relative to the heart's function of pumping blood. The amoeba's ingesting the cyst is a good for the amoeba, relative to the relevant function.

There is, of course, nothing moral about such goodness. The goodness lies merely in success in fulfilling function.

The application of the notion of goodness here is not a comparative application like applications of assessing a level of quality. Thus a knife is a good knife not merely through fulfilling its function, or through being adequate with respect to its function.[27] It must fulfill its function in a better than minimal way. The use of "good" as applied to the knife is comparative. In the present non-comparative use of the notion of goodness, *any* fulfillment of function is a good, or a success, relative to the function, in our generic sense.

Where there are functions, I think that it is apriori that there are *standards* for fulfilling them. Here "standard" applies to a level of fulfillment, as it does in the phrase "standard of living." A standard need not be set, imposed, required. A standard of living need not depend on anyone's setting it or recognizing it.

Some levels of fulfillment are standards that are also *norms*. A *norm* is a standard or level of possible performance that is in some way adequate for fulfillment of a function or purpose.[28]

Some norms are *natural norms*. By "natural norm" I do not mean naturalistically reducible norm. I mean a level of performance that is adequate to fulfill a function or a purposiveness, and that constitutes an explanatorily relevant kind, independently of any individual's having a positive or negative attitude toward the function or the norm. Specifically, the applicability of natural norms is independent of any individual's setting or acceding to them—accepting them as applicable. Usually, they are also independent of any individual's appreciating them—or having them as the representational content of any state, however dimly or implicitly. I think that it is apriori that for every function there are natural norms in this sense.

It seems to me that here we have a momentous structural feature of the world. Wherever there is teleology—that is, wherever there is

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27 As Judy Thomson has pointed out. Cf. her *Normativity* (Chicago, Open Court, 2008).

28 From the Oxford English Dictionary: "Norm 12. a. A definite level of excellence, attainment, wealth, or the like, or a definite degree of any quality, viewed as a prescribed object of endeavour or as the measure of what is adequate for some purpose." I think that the level of measure of adequacy does not have to be viewed in order to be in place, or in order to be a norm.

function or purposiveness—there are standards for realizing the function or the end state of the purposiveness. One level of fulfillment is, of course, full realization. But there are, I think, always other natural levels of fulfillment, relative to the nature, capacities, and circumstances of those things that have the function. I believe that this basic scheme applies to a wide range of phenomena—to all biological organisms and their sub-systems, to artifacts, to animal agency, to perception and belief, to inference, to knowledge, and to morality. Some basic norms or standards associated with an enterprise—natural norms—are set by the nature of the enterprise itself, not by choice or convention.

Some natural norms concern primitive agency, pre-representational agency. The tick's crawling fulfills biological functions, and fulfills or fails to fulfill standards of adequacy in performance for fulfilling those functions. The efficiency of a tick's navigation to a blood source occurs at a given level of performance relative to various standards—ideal standards like straight line walking, realistic standards like straightest route available given the terrain and given a tick's best navigational capacities. The tick's action is associated purely with biological functions and biological norms.

Biological functions and biological norms are not the only sorts of functions and norms that are relevant to explaining the capacities and behavior of some animals. Given that veridicality and non-veridicality cannot be reduced to success and failure (respectively) in fulfilling biological function, we must recognize a type of function that is not a biological function. I call such a type of function a *representational function*. A representational function is one constitutively associated with representational success—veridicality, truth, making veridical, preserving truth, and so on.

Once primitive agency is supplemented and guided by perceptual representation, primitive agency is associated with representational functions as well as biological functions. Correspondingly, biological natural norms associated with agency are supplemented with representational natural norms, when agency is guided by perceptual representation. Biological natural norms attaching to agency are supplemented with natural norms associated with agency that hinge on relations between action and standards partly involving *perceptual representational content*. An action can be evaluated regarding how well it fulfills the representational content that specifies its goal and action. Representational functions and representational natural norms come into play.

It is a narrow and perverse vision of the science to assume that explanations in representational terms (or in terms of veridicality conditions) must, on pain of mystery or miracle, be reduced or reconstrued

in biological terms.[29] Representational functions are not biological functions.

The roles for both biological and representational functions are constitutively associated with explanations of success. Biological function is constitutively associated with explanations of fitness, or successful survival for mating. Representational function is constitutively associated with explanations of veridical perception of the environment, and attainment of perceived goals. The types of explanation are different but complementary.

The fundamental mode of explanation in perceptual psychology of vision is to explain ways that veridical representations of the environment are formed from and distinguished from registration of proximal stimulation. Veridicality, fulfillment of representational function, is the central *explanandum* of visual psychology. It is approximate veridicality—perception!—that is primarily explained. Illusions are explained as lapses from normal representational operation or as the product of special environmental conditions.[30] Visual psychology explains visual perception. It explains *seeing*. Seeing is fundamentally veridical visual representation.

Explanations in visual psychology take specifications of perceptual states with veridicality conditions as primitives. Thus explanations make basic reference to perceptual states by way of reference to conditions on successful representation—representational content. So representational function is associated with both *explanans* and *explanandum* in the empirical science of visual perception.

There are natural norms that are constitutively associated with representational functions as well as natural norms constitutively

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[29] One can see this sort of error not only among philosophers but among some of the more generalized characterizations of psychology by popularizers. Cf. Steven Pinker, ''So How Does the Mind Work?'' *Mind and Language* 20 (2005), p. 19: ''The subject matter of psychology is the functioning of the brain.'' Pinker does not connect his apparent view that biological function is the only notion of function relevant to psychology with actual explanations in vision science, for example. As I have been emphasizing, biological function has several roles to play in the explanatory methods of the science of psychology. The central mode of explanation in vision science–at the representational, as opposed to explicitly neural level–gives veridicality a central position that his account does not account for, and in fact does not even seriously address. I believe that the same point applies to any other account that takes biological function to be the only relevant conception of function in psychology. Psychology must, of course, be compatible with accounts of biological function. But psychology is not biology in disguise.

[30] For further discussion of the role of veridicality in explanation of perception see ''Disjunctivism and Perceptual Psychology,'' op. cit. and ''Five Theses on De Re States and Attitudes'' in *The Philosophy of David Kaplan*, Joseph Almog and Paolo Leonardi eds. (Oxford, Oxford University Press, 2009).

associated with biological functions. The primary natural representational norm that is constitutively associated with perceptual capacity is to perceive—to form *veridical* perceptual representation. Veridical perception fulfills perception's primary constitutive representational function. A second natural representational norm constitutively associated with perception is to perceive as well as the perceptual system can, given its natural limitations, its input, and its environmental circumstances. A third such norm for perception is to be reliably veridical. A fourth is to be both reliably veridical and to perceptually represent as well as possible given the perceptual system's natural limitations, its input, and its environmental circumstances. The first norm, that of perceiving veridically, constitutes a baseline against which the other natural representational norms for perception are constituted.

Perception is not knowledge. None of these perceptual norms are epistemic norms.

But the fourth of these norms is an ancestor of the primary epistemic norm for belief—epistemic warrant. In fact, it is an aspect of epistemic warrant (epistemic entitlement) for perceptual belief.

The same basic considerations that indicate norms for fulfillment of the primary constitutive representational function for *perception* also indicate norms for fulfillment of the primary constitutive representational function for *belief*—production of *veridical* propositional representation. There are also representational natural norms for belief and belief-formation that are analogous to other just-cited representational norms that are associated with perception. Such norms are associated with believers whether or not they know or care about them. They are norms constitutively associated with the nature and basic function of belief.

The second norm that I mentioned—that of performing as veridically as possible given the system's natural limitations, input, and environmental context—is relevant to explaining one type of psychological well-functioning. Not all psychological well-functioning is a matter of biological efficiency. There is psychological well-functioning that is to be explained in terms of meeting representational norms.[31]

Here let me emphasize again that some standards for fulfilling the representational function of perception, natural norms, are set by the nature of the kind or enterprise (in this case, *perception)* itself. Some of these natural norms—veridical representation and the capacity-

[31] Cf. "Perceptual Entitlement," *Philosophy and Phenomenological Research*, op. cit. for some development of the notions of representational function and representational norm. For the distinction between representational norms for perception that do and do not require reliability, see p. 533.

and-circumstance-relative norms—are, I think, apriori knowable from knowing what perception is.

In this respect, natural norms for perception are analogous to natural norms for deductive inference, and some natural norms for belief. In none of these cases are the relevant norms prescribed by social authority or by any human or other agency. Nor need the norms be appreciated by anyone if an individual is to fall under them.

Basic natural representational norms of deductive inference, norms of perception formation, and norms of belief formation are constitutively associated with the representational function of the respective enterprises. Each of these enterprises fails if certain standards regarding veridicality or truth are not met. Each has a representational function that is distinct from whatever biological functions the enterprise also has. The basic representational function of deductive inference is or includes not violating certain formal procedures that necessarily preserve truth. The basic representational function of perception is veridical presentation of subject matters that are presently sensed. The basic representational function of belief is true propositional representation. As noted, at least perception and belief are subject to representational norms that are constitutively associated with this basic function—norms for representational well-functioning, given the natural limitations and circumstances of the individual.

In philosophy, norms are frequently associated with moral matters, or with intentional or intellectual or social action. The notion of norm that is apriori associated with representational function is more generic. Not all norms concern fulfillment of an agent's aim or purpose, much less intention.

Norms of deductive inference are not primarily concerned with fulfillment of agent aim or purpose. They are standards for fulfilling the representational function of deductive inference—preservation of truth by drawing inferences that are explainable as according with certain formal rules. These standards hold regardless of the individual's aims, purposes, or intentions, as long as the individual engages in deductive inference.

Norms of truth and epistemic warrant, which are constitutively associated with belief, constitute a further case of norms that are apriori associated with representational function, but which do not primarily concern agent aim or purpose. All these norms are representational natural norms. I believe that neither the psychology of perception, belief, and inference, nor the epistemology of any kind of belief or inference can be understood without reference to representational natural norms. None of these norms depends on being set, or acceded to, as goals or standards by individuals.

The tendency to associate norms primarily with moral or other intentional action has the consequence that norms are usually assumed to be associated with some ability, on the part of individuals who fall under them, to appreciate or be guided by the norms. Such internal replication is often taken to be a condition of falling under norms. The idea is that falling under a norm does not make sense unless the individual can represent, appreciate, sense, or be at least subliminally guided by the norm—internally. The idea is an extreme hyper-intellectualization of the normative.

Norms that constitutively involve some capacity to appreciate the norms—for example, moral norms—are, I think, special cases. Moral norms are crucially important norms for human beings. But they are not typical norms.[32] Most types of norms need not be representable, or sensed—much less set or acceded to—by individuals that fall under norms. Most norms need not be the representational content of any state of a system or individual that falls under the norms.

An individual's perception falls under representational norms for successful formation of perceptual states, given the individual's perceptual capacities. The perceiver need not have a representational appreciation of the norms. Natural norms apply even if an individual cannot understand or be guided by them.

Similarly, an individual's beliefs fall under the norm of veridicality or truth, and norms of epistemic warrant, whether or not the individual knows or cares about the norms. Similarly, for norms for deductive inferences. Natural norms apply even if an individual cannot understand or be guided by them, as long as the individual has the relevant *kinds* of capacities—perceptual capacities, capacities for belief, capacities for deductive inference.

The notion of a natural norm is not purely descriptive. It is not the statistically normal. It is a level of performance that constitutes adequacy in fulfilling a function or a type of purposiveness, where the level and function constitute explanatorily relevant kinds. The notion need

[32] The conditions of applicability of moral norms are, of course, controversial. In my view, moral norms are, strictly speaking, natural norms: Their applicability does not depend on any individual's setting them or acceding to them. An important respect in which moral norms differ from the biological and representational norms that I have been discussing is that, at least at some level of abstraction, they must be representable by individuals to whom they are applicable. They require some meta-representational capacities. An individual who does not understand the difference between right and wrong does not fall under moral norms, in the sense that moral failures and successes are not possible for that individual. Nevertheless, I think that moral norms are similar to biological and representational natural norms in that the applicability of the norms to an individual depends on the individual's having certain capacities or being of a certain kind. Applicability does not depend on prescription of the norm, or acceptance of the norm, by any individual.

not be associated with prescription, responsibility, or sanction. It need not be associated with appreciation of the norm or guidance by it. A generic notion of "should" nevertheless applies to functioning well, within the limits of the individual's, or system's, capacities.

The heart should beat efficiently relative to its biological function. A perceptual system should form veridical perceptual states, and a perceptual state should be veridical, relative to its representational function. A perceptual system should also form perceptual states that are as nearly and as frequently veridical as its natural limitations and its environmental circumstances allow, relative to its representational function. Performances of the system that do not meet these norms are failures of one sort or another.

In primitive agency, indeed in all agency, an agent should act so as to maximize fitness (where the "should" is relative to a biological norm). Action that does not maximize fitness constitutes a failure to realize biological norms associated with biological function. Some agency falls under representational norms as well as biological norms. In agency guided by perceptual representation, an agent should act so as to meet its represented goals, as they are represented (where the "should" is relative to a representational norm). Performance that does not meet such norms—does not satisfy the representations of acts and goals—constitutes a type of failure or malfunction, relative to that representational norm constitutively associated with representational agency.

Natural norms for perception, deductive reasoning, perceptual belief, primitive agency, and agency guided by perception or simple first-order belief do not depend on any individual's setting, appreciating, or acceding to the norms. Such norms do not depend on intention, convention, or rational agency. The norms apply whether or not anyone recognizes them. Many natural norms that are applicable to representational states are constitutively associated with representational function.

If one eschews associations with "prescriptive" or "guiding" norms, one can distinguish a generic notion of norm that is important for understanding not only perception, perceptual belief, and epistemic warrant, but also much action.

I noted that biological functions and natural biological norms are associated with primitive pre-representational agency. The tick's crawling fulfills biological functions, and fulfills or fails to fulfill explanatorily relevant standards of adequacy in performance for fulfilling those functions.

Once primitive agency is supplemented and guided by perceptual representation, agency is associated with representational functions as well as biological functions. Correspondingly, biological natural norms

associated with agency are supplemented with representational natural norms. The representational natural norms concern relations between action and *perceptual representational content*. An action can be more or less successful in fulfilling the representational content that specifies the action and its goal. Representational functions and representational natural norms come into play.

Any agency guided by perception has, in additional to biological functions, functions associated with representation. The biological function of action is to do something that contributes, however indirectly, to fitness or survival for mating. Perception's basic, baseline representational function is to represent veridically: perception undergoes a type of failure if it is inaccurate. The simplest representational function of action guided by perception is to make veridical the actional representation that maps out the action and sets its perceived goal.

Representational agency can meet or fail to meet various levels of adequacy of performance relative to fulfilling its representational function. It may meet or fail to meet various natural representational norms. An individual falls under such norms as a consequence of engaging in representational agency, agency with a representational function. The simplest natural norm associated with representationally successful agency is fulfilling the action's representational function—meeting the action's representational goal by making the action's representational content veridical. There are less demanding norms associated with agency that are specializations of this simplest norm. I have in mind such norms as acting as well as possible, relative to the action's representational function, given interfering factors in the circumstances and given the agent's capabilities. Both the primary simple norm and the less demanding specializations are natural representational norms attaching to agency guided by perception.[33]

An individual need not understand or be *guided* by the norms, or by any other general principles, even though general principles help explain the individual's actions. Basic natural norms apply to such

[33] What I am calling the simplest norm is essentially an instrumental norm. An act that falls under this norm always falls under more global norms that concern the same act and its goal. For example, an act that fulfills the agent's representational content can be evaluated under biological or other practical norms, such as whether it contributed to the individual's evolutionary fitness, or the individual's flourishing. Similarly, the goal set in the act can be evaluated as to whether it contributes to fitness or flourishing. Of course, when more sophisticated global practical norms—such as moral norms—are in place, an instrumentally successful act and its goal may or may not meet those more sophisticated norms. But all these issues arise only once agency is supplemented by representation—initially, perceptual representation—and thus becomes constitutively associated with representational functions and representational norms.

agency even if an individual cannot understand or be guided by them. An action can be evaluated regarding how well it fulfills the representational content that specifies its goal and action. The norms, standards for success, *are set by the kind of enterprise or capacity involved*: agency guided by perception.

Let us look at a low-level example of representational agency and its relation to natural norms. A spider may perceive another spider as prey of such and such a shape and size, and at such and such distance. The spider and its actional system may set the prey (represented as such) as goal. It does so only if it has perceptual capacities to perceive the goal. The actional system may represent the target as the objective of a jump with a certain distance and direction. There are norms regarding how well the spider succeeds given its objective *as represented by the spider*. What counts as success in the action is determined by the actional system's specification of the action and the action's relation to the objective.

The norms that figure in such explanations are low-level natural representational norms that concern efficiency. As with actions that are not associated with representational content, the natural norms for representational agency are set by the function of the enterprise. There are two interrelated differences between representational agency and the most primitive, pre-representational agency. One is that one function of the action, its representational function, is to meet conditions partly set by *representational content*. Success in fulfilling *this* function is success in meeting a standard set by a representational enterprise of the animal, not merely by norms associated with biological functions.

The other difference is that natural norms for successful action work off of objectives set by the agent itself. The agent does not act blindly. Its goals are represented, and set internally, by itself. The *agent* perceives, and acts to fulfill goals that it represents. Action coordinates with perception.

Of course, at low levels of representational agency, the notions of function, good, and norm are not parts of the representational content. The animal does not represent functions or norms. It does not set its goals *as* good, or *as* good for it. It does not reason about its goals. It lacks propositional intentions. Still, just as some norms for perceptual success are antecedents of norms for epistemic warrant, norms for representational agency are antecedents of norms for practical rationality.

As with perception, so with representational agency: veridicality is part of the basis of the system. The notion of goodness, or success, in fulfilling function and the notion of a norm for fulfilling a function are evolutionarily more primitive than notions of representation and veridicality. Teleology is more primitive than representation. But once functions of agency and norms for agency become associated with

perception and *representational* agency, veridicality joins goodness in being central to the practical domain. Representational functions and norms associated with such functions become constitutively associated with actional psychological kinds. Here, I think, is the most primitive level at which ancestors of two members—truth and goodness—of the traditional philosophical trinity join forces as explanatory kinds. The basic type of representational success for perception is veridicality. The basic type of representational success for agency is doing what one sets out to do. Doing what one sets out to do is making an actional representational content veridical through one's action. Individuals' being guided to goals through appreciation of norms, evaluating goals, and evaluating norms themselves, comes later.