

might be identified with **forming** an image, whilst **having** an image would be identified with **entertaining** a hypothesis or having a "module" in some way '**activated**'. However, to make this move in fact amounts to an abandonment of 'perceptual activity' theory altogether, and a return to some form of **descriptive** theory. After all, any account given by descriptive theorists must involve some initial act of selection or activation, usually conceptualized as bringing the relevant description from the long term memory (LTM) into the short term, conscious, memory store (STM). 'Having' or experiencing the image, however, is just a matter of having the description in STM. This is hardly an action, and it is only the choice of metaphor which distinguishes it from the notions of entertaining a perceptual hypothesis or having a "module" activated. To escape the problems of descriptive theories we need a richer concept of perceptual activity, which goes beyond the bare mental act of instantiation.

§II.D.4. James Gibson's Account of Perception.

Perhaps a more useful notion of perceptual activity can be arrived at if we consider the theoretical approach of the late J.J. Gibson {1*}, which, as we suggested at the beginning of the previous section, embodies a conception of activity which can be seen as complementary to that found in the work of Gregory. It is also particularly appropriate

to do this because Gibson claims that his theory implies a version of epistemological realism {2*}, whereas Gregory admits that theories like his imply "an extreme form of relativity of belief" {3*}. Gibson's theory of perception is highly controversial and we can do no more than scratch the surface of the issues which it raises here. There is no question, I believe, that Gibson's work marks a radical new departure in perceptual theory, for he completely rejects the representational account of perception - the notion that perceptual experience is actually experience of mental representations produced by the stimulation of the sense organs - which has dominated Western thinking since Berkeley, or perhaps even since Democritus.

Perception for Gibson is "direct", it is not a matter of forming and processing representations, but of "picking up" information from the environment, and this "picking up" does not involve the passive reception of stimuli, but an active process of exploration. This notion is perhaps most easily understood with regard to our sense of touch. If one's hand simply comes into contact with an unseen object then it is not usually possible to tell very much about it. But one can discover a great deal if one feels around the thing, measuring its width between ones fingers, feeling for corners or edges, stroking it to detect the texture, hefting it to feel the weight, and so on. Note that Gibson does not regard such exploratory movements as merely providing a greater variety of sensations to then be internally processed to form a mental

representation of the object (in fact he denies that sensations play any rôle in ordinary perception {4}). For Gibson the movements are part of the perceptual process itself, and perception provides not sensations or data towards the formation of internal representations, but information about properties of the object. Gibson further believes that such an account holds good for all the senses, including vision. We do not see internal representations. Neither do we see retinal images - arrays of visual sensations {5*}. What we do is directly pick up information about our environment by exploring the structure which the ambient light has acquired by being reflected from the environmental objects:

Direct perception is what one gets from seeing Niagra Falls, say, as distinguished from seeing a picture of it. The latter kind of perception is **mediated**. So when I assert that perception of the environment is direct, I mean that it is not mediated by **retinal** pictures, **neural** pictures, or **mental** pictures. **Direct perception** is the activity of getting information from the ambient array of light. I call this a process of **information pickup** that involves the exploratory activity of looking around, getting around, and looking at things. This is quite different from the supposed activity of getting information from the inputs of the optic nerves, whatever they may prove to be. {6}.

The last sentence refers to the **mental** notion of perceptual activity which is found in 'information processing' theories, and theories like that of Gregory. Gibson wants to stress that **his** conception of perceptual activity is quite different.

Reactions to Gibson's ideas are diverse and often

very polarized {7*}. Some claim to have learned much from him, but produce theories fundamentally opposed to the spirit of his work {8*}. More often his approach to perception has been greeted open incredulity. There are many, generally people committed to representational theories of the mind, who think and argue that Gibson's theory is utter nonsense {9*}. On the other hand, there are those who are ready to leap to defend it not only from such out-and-out attacks {10}, but also from the much more friendly and constructive critics who dare to suggest that Gibson does not provide us with all the theoretical tools which we need for a full understanding of perception {11*}. Gibsonian partisans tend to claim that both types of critic have seriously misunderstood the profundities of the theory. My own sympathies in fact lie with the more 'friendly' critics, but there can be no question that the debates around Gibson have generated much mutual misunderstanding. I can hardly be confident that I understand all the issues myself, but I think I can pinpoint a couple of the areas in which unnecessary confusion has arisen.

One of these areas, according to Bickhard & Richie {12}, results from an inconsistency in Gibson's own writings, an inconsistency between what they call his "theory" and his "metatheory". Gibson's dissatisfaction with the prevailing perceptual theories seems to have originated when he was involved in the training of pilots during the Second World War. He became convinced that the

traditional approach was entirely inadequate to explain the performances of which these airmen were clearly capable. Perception, he reasoned, must be somehow more direct than allowed by the traditional theories, which stressed internal mental or neural processing. Gibson's actual theory of perception then developed, on the basis of these insights, over many years {13*}. The conviction that perception is somehow direct and does not involve mediating mental representations is essentially what Bickhard & Richie call Gibson's "metatheory". In practice he has maintained a consistently hostile stance towards all talk of mental representation, and has passed on this hostility to his followers. Bickhard & Richie {14}, however, argue that one can conceive of two possible types of mental representation, which they call "encodings" and "interactive representations" respectively. "Encodings" embraces all representations which represent things through structural resemblance {15*}, which would seem to cover both quasi-pictorial and quasi-linguistic representations (should they exist). Bickhard & Richie would agree with our conclusions, drawn in the previous two chapters, that any representational power which such "encoding" representations might possess must be derivative from something else. That something else, they suggest, are the "interactive" representations which are implicit in the (perhaps modifiable) structure of organisms as they interact appropriately with their environment:

The point is that encodings are never representationally sufficient unto themselves; they always require an agent as an interpreter. Encodings are not only

representations with respect to such interpreters, but also relative to interpreters and their interpretations. It is quite possible for a particular encoding to receive differing interpretations.

Thus, encodings are necessarily contextualized within interactive agents as interpreters. Encodings function as representations only insofar as they influence the flow of processing inside such an interactive system. But any such influence on system processing could in principle be constituted in the organization of the system. Encoding influences on system processing are composed of selections at various points among alternative paths of processing. If, at those points, the system were already differentiated in accordance with the alternatives available, and if the system were already in the appropriate differentiated condition to flow directly into the 'alternative' that would otherwise be selected by 'interpreting' the encoding, then the encoding would be superfluous. Such a condition would be obtained if, instead of developing (or being constructed with) the ability to set up and interpret such encodings in the first place, the system differentiated its organization in accordance with the possible selections of such encodings, and, instead of setting up one of those encodings in any particular instance, it simply entered the appropriate differentiated condition. The representational influences of encodings, thus, can in principle be incorporated into the organization of the system that would otherwise be the interpreter.

Such state splitting in lieu of encodings can quickly become combinatorially very complex, but it is always possible in principle. Thus, the differentiation of explicit encodings in a system may be desirable, perhaps for reasons of efficiency, but it is never logically necessary. Encodings, then, though perhaps desirable, are always logically eliminatable and, therefore, they cannot be logically independent forms of representation. Encodings are always subordinate to, and in principle eliminatable within, an appropriate interpreter. {16}.

As I understand it, something like a simple thermostat could legitimately be said to have such an 'interactive'

representation of the temperature of its environment. The simplicity of a thermostat may make it look implausible as a model of knowledge representation. However, Dennett {17} has argued that by successively enriching such a control device's interaction with the world it becomes more and more intuitive (and predictively useful) to ascribe beliefs to it, until, with systems as complex as human beings, such ascription becomes positively compelling. Ascribing belief entails ascribing internal representations (the thermostat 'believes' "that it is too cold"), but we are not compelled to regard these as explicit, as "encodings". The thermostat's 'belief' is implicit in the state of curvature of the bi-metal strip and its proximity to the contact which will cause the boiler to light (not in the curvature alone), so its representation of temperature is "interactive" rather than being an "encoding". I shall later try to show how mental images can be understood as interactive representations in this sense.

Gibson is right, Bickhard & Richie argue, to reject 'encodings' from his theory of perception. Although encodings certainly exist (natural language representations are, I take it, encodings in the relevant sense) they cannot be fundamental, they cannot form the essential bridge between the organism and its environment. Since the theories against which he originally reacted, plus contemporary 'information processing' and computational theories, deal exclusively with 'encodings', Gibson is well justified in rejecting them. However, Gibson and most of

his followers seem to share with these opponents the mistaken belief that 'encodings' are the only type of representation that exist. Gibson's metatheoretical rhetoric of "direct" perception, and his indiscriminate hostility to notions of mental representation, thus prevents him and his more loyal disciples from the explicit realization that a notion of 'interactive' representation is actually implicit in the theory proper, and that we can only make proper sense of Gibsonian theory when we see this {18}. Anti-Gibsonians, on the other hand, are generally misled into taking the talk of "direct perception" and the hostility to "processing" to be implying a direct causative link between the sensory presence of a complex object and the formation of an appropriate encoding. For instance, a house before our eyes would directly give rise to a symbol meaning "house" in our brains, without any neural processing (beyond mere transmission) taking place {19}. Such a theory is clearly as absurd as the anti-Gibsonians think, but although it is perhaps possible to read Gibson's **The Perception of the Visual World** {20} in this way, it is certainly a gross misreading of his more recent work. Unfortunately, these confusions have not only led the 'information processing' school to misread Gibson and misunderstand his challenge to their position, they have also led Gibsonians to reject the work of those, such as Neisser {21} and Heil {22}, who have sought to develop a conception of 'interactive' mental representation which will complement Gibson's theory of perception. Unless it allows some place for a notion of mental representation

Gibson's theory is clearly not going to be of any help to us in constructing a viable theory of imagery.

The confusion which has arisen between Gibson and his critics over the existence of mental representations can perhaps be largely be blamed on Gibson himself. He failed to notice the widening gap between the implications of his developing theory and the polemical rhetoric of his 'metatheory'. There is, however, a second locus of confusion for which he should not be held to account by anyone who has conscientiously read his later works. This concerns the **purposes** of perception, what it is **for**. Traditional theories of perception and, following them, computational theories, consider its purpose to be to recognize objects or patterns, and to determine their locations {23}. Perception tells us what things are around us and where they are. We can then decide by means of further cognitive processes (thinking) what, if anything, we should do about them. It does not always seem to be recognized that for Gibson the primary job of perception is not to tell us what is where, but what we can **do** in the prevailing circumstances, what the possibilities for action are {24}. We do not, in the first place, so much perceive what and where things **are** as what they are currently **good for** (or what dangers they present). In Gibson's terminology, an organism perceives what its environment "affords". Perception of these "affordances" (positive or negative) of the things around us is surely more fundamental (and, from an evolutionary point of view,

surely more urgently necessary) than knowing what sort of things they are {25}:

The **affordances** of the environment are what it **offers** the animal, what it **provides** or **furnishes**, either for good or ill. The verb **to afford** is found in the dictionary, but the noun **affordance** is not. I have made it up. I mean by it something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment. (...)

If a terrestrial surface is nearly horizontal (instead of slanted), nearly flat (instead of convex or concave), and sufficiently extended (relative to the size of the animal) and if its substance is rigid (relative to the weight of the animal), then the surface **affords support**. It is a surface of support and we call it a substratum, ground or floor. It is stand-on-able, permitting an upright posture for quadrupeds. It is therefore walk-on-able and run-over-able. It is not sink-into-able like a surface of water or a swamp, that is, not for heavy terrestrial animals. Support for water bugs is different. {26*}.

Likewise, for example, edible substances "afford" eating {27}. Most perceptual theorists have concentrated on human perception, where it is possible, and indeed, particularly easy, to obtain verbal reports as to the type of thing being seen. However, when we consider the general biological function of perception, then it is surely plain that Gibson is right to suggest that the detecting of affordances is what perception is primarily for. It is one of the principal aspects of Gibson's originality to suggest that affordance detection may not only be functionally but also causally prior to object recognition {28}. It is the affordances, and not object types, which Gibson believes to be perceived directly, and when we realize this it becomes much more easy to see why he believes that he can give an

account of perception without using any notion of perceptual representation. Although he might not have thanked me for saying so, in a way what he gives us is very like a reformulation of Behaviorist 'stimulus-response' psychology {29*}.

There are, I think, two basic differences between Gibsonian and stimulus-response theory. First of all, Gibson does not seem to think that the utilization of an affordance is automatic, reflexive, in the way that response to a stimulus was supposed to be. He seems to want to leave some space for the animal to make up its own mind what to do about the affordances it perceives - indeed, the very term "affordance" seems to imply this. I am somewhat doubtful as to whether an account which allows such a degree of 'free will' can be coherently given within the limitations which Gibson's 'metatheory' imposes (i.e. without introducing some notion of mental representation {30*}). Certainly some of the examples of direct perception of affordances which are given by some of Gibson's apologists do seem to be entirely automatic responses to stimuli. For example, Turvey, Shaw, Reed & Mace tell us of the electrical sense by which a shark is able to detect the presence of a prey fish, and of how it can be fooled into digging into the sand of the sea bed by a suitable, artificially induced electric field {31}. They also tell us of a plant, a vine, which, after germinating in the ground, grows towards the darkest sector of its horizon until it finds a tree to climb up {32}. These and other examples are

supposed to be (and perhaps are) simple examples of what Gibson means by the direct perception of affordances. However, they do not appear to differ in any way from standard examples of unconditioned responses to stimuli, and surely allow little or no space for making free choices. It is for this reason that I feel that Gibson, in contrast to Gregory or Sarbin, pays insufficient heed to the mental, volitional, aspect of the concept of activity.

But be that as it may, Gibson's main departure from traditional stimulus-response psychology, and, indeed, his principal theoretical contribution, can be construed as a thoroughgoing reconceptualization of the notion of a stimulus {33}. As he points out, the original Latin meaning of "stimulus" was a "goad" or "sting", and the word thus implies something inflicted on a passive organism {34}. Gibson prefers to think of an animal as actively obtaining stimulation for itself. We do not, normally, keep still and wait for stimuli to impinge upon our sensory receptors, we move our eyes and head to look about us, we run our hands over surfaces to feel the texture, we sniff the air for smells. Even when a stimulus is unexpectedly imposed upon us we normally begin to actively modify the inflow of energies immediately after the initial moment: we turn our eyes towards something noticed in peripheral vision, we look towards the apparent source of a sound (by the same movement turning our ears towards it), we sniff at a suddenly noticed odour, and so on {35}. It is in this sense that Gibson sees perception as activity, in contrast to the

purely mental conception of activity which we find in theorists like Gregory. Gibson notes that in physiology "stimulus" has a precise and unexceptionable meaning. It means energies applied to a sensory receptor cell sufficient to cause excitation of that cell. But in psychology the term has come to be used very loosely. It is used to mean pretty much anything (energies or objects) which may be presented to an animal and which is capable of producing a response. However, it has tended to retain the connotation of something happening at an instant {36}. Stimuli in the physiological sense may be presumed to produce sensations - momentary, punctate sensations - when applied to the receptors of an intact, alive organism. Psychologists have tended to assume that what a stimulus in **their** sense initially gives rise to is a whole complex of such sensations, arising from all the different receptor cells which get excited. They have traditionally taken it that perception of 'stimulus objects' somehow arises through processes which are performed internally on the complex of sensations which is being experienced at any one time. Contemporary visual theorists are perhaps more likely to speak of "features" rather than sensations. However, when these features are taken (as they generally seem to be) as features which appear in the two-dimensional retinal image {37}, then these are no more than sensation complexes and thus make no relevant difference to the argument. Leaving out the subjective side: speaking merely of complexes of excitations, and of neural rather than mental processes, is not going to help much either. The

