SUGGESTIONS TOWARD A SCIENTIFIC INTER- PRETATION OF PERCEPTION

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Much of the criticism directed toward the results of psychological investigation might serve as a direct challenge to psychologists to clarify their interpretations of psychological phenomena; for a study of those criticisms amply reveals the bizarre views attributed to psychologists. Although this peculiar situation obtains with respect to all psychological descriptions, it is especially striking in the case of perception. Thus, a recent writer¹ finds it necessary to point out that an object is not merely a thing which 'starts a chain of vibrations which eventually results in its own creation.' To the present writer this specific criticism does not really call for a defense of the psychologist's position, since the critic holds substantially the same view as most psychologists, but the very fact that a writer will find much to criticize in any one who supports a similar doctrine is a symptom of a confusing situation which demands at least a restatement of perception.

Naturally enough the confusions mentioned reach deeper than the mere matter of exposition and in fact arise directly from the types of conceptions held concerning the process under discussion. A careful reading of psychological literature on perception creates the suspicion that the descriptions fail to tally with the actual facts in the case. As a striking example we find that perception is described as in some sense a creative process which functions in the organization of the discrete qualities constituting the objects of our reaction. In effect, we find practically all current perceptual doctrines very strongly reminiscent of Berkeley's subjectivism albeit modified somewhat à la Reid; the latter modification results in the view that there exists a percept as well as an object of percep-

¹ J. B. Pratt, *J. of Phil., Psychol., etc.*, 1919, 16, 596 ff.

tion. Psychologists cannot but consider the problem of perception as crucial, since the admission of a non-scientific subjectivism at this point will bring disastrous consequences into the entire science of psychology. In this article the writer attempts to suggest a description of perception, which, so far as it goes, consistently complies with the rigorous canons of natural science.

I.

General Description of Perception.—Perception is the conscious behavior through which are developed the meanings of objects and relations which operate in the adaptation of the individual to his surroundings and in the control of them. It is precisely in the process of perception that the individual, in direct contact with objects, develops reaction patterns enabling him to differentiate and distinguish the various objects affecting him.

At the outset it must be noted that the act of perception¹ is an adjustmental reaction, an actual interaction of one natural object with another. But the precise difference between this kind of interaction and some other is, namely, that one of the interacting objects is a psychophysiological organism to whom the results of the present interaction will become significant in influencing future contacts of this object (person) with the same or a similar object. Consider, that what was formerly a mere interconnection between objects becomes what we might now call a knowledge process because the reaction becomes a means to some other form of reaction; that is to say, the first natural contact with an object is the basis for the development of an anticipatory reaction system. If the person is once burned, the object which produces this effect will upon a future occasion stimulate a touch inhibition reaction rather than a touch response. An empirical fact it is, there-

¹ While the writer is in complete sympathy with Watson in his revolt against subjectivism, and in his assertion that functional psychology is just as guilty in this respect as the structural view, he cannot assent to Watson's implication that perception among other processes is not properly the subject matter of a non-subjectivistic psychology. Nor indeed does Watson omit perception when he is interested in 'integrations and total activities of the individual.' His rejection of the terms is obviously to allow room for a predominantly physiological tone to his discussion.

fore, that all developed¹ perceptual responses operate as knowledge reactions, for in this way only do we learn to discriminate between objects, and to anticipate the specific response we should make to a particular object. But it is of extreme importance to notice that the perceptual reaction is not in its primary occurrence a knowing. To overlook this fact is to fall into the error of finally resolving the objects of our reactions into knowledges of some sort, and the history of psychology stands to witness that on the basis of such premises we invariably land in a mentalistic world in which objects are reduced to sensations, and the world of fact and science disappears in our description.

Only upon the assumption that the perceptual reaction is a natural psychophysiological response, the writer submits, can we achieve a natural science interpretation of the development of discriminative meanings. By thus investigating all the components of an act we may hope to obtain a scientific description of the total response and escape the arbitrary and confusing concept of a mental content, which is an unavoidable consequence of the presupposition that perception is a knowledge process.²

We must, then, look upon the perceptual reaction as a complex adjustment from which is derived the significance of objects through the integration of reaction patterns. This meaning of objects we shall see may be resident in the response pattern, or it may be more remotely connected with it, even to the point at which the act is no longer a perceptual but a conceptual reaction; in the latter case we observe that the meaning is detached from any overt act, and as a matter of fact we find that such detached meanings constitute the implicit functioning of the original reaction which ultimately generated the conceptual meaning.

Primary Perception and Simple Apprehension.—Upon the basis of the specific operation of meanings we may distinguish two definite forms or degrees of perceptual response which we

¹ Note the distinction drawn between perception in development and perception in use on another page of this paper.

² Expressed in the statement that perception is the consciousness (awareness) of an object present to sense.

will call primary perception and simple apprehension. In the former case, the meaning of the object responded to resides within the reactional movement of the person,¹ as illustrated by the perceptual process of an instinctive act. The meaning of a 'danger' object for the person is merely the startled jump which constitutes the operation of a connate reaction pattern. It must be observed that in this situation the neuro-muscular and neuro-glandular factors in the response are very prominent, and as a record of fact, the cognitive component merely consists of a simple appreciation of the presence of the stimulating object.²

In simple apprehension the meaning becomes more and more detached from the immediate condition of response. Instead of the mere presence of an object calling out a specific reaction, the object may serve as a symbol for some action. In consequence, the discriminated significance of the object will be attached not to the direct movement as in primary perception, but to another response which is to follow. Evident it is that a meaning of this type is an implicit response in the form of an anticipatory process similar to that we invariably find as an important factor in all delayed responses, whether simple acts or chains of acts. This capacity to detach meanings gives the person a greater control over the objects of his environment, for, if the meaning of the object is appreciated before an overt response is made, the type of response can be widely varied between limits.³ In contrast to primary perception the meaning in simple apprehension is always correlated with an awareness-attention process.

Implicit perception functions in adaptational situations in which there are more definite appreciations of the surrounding objects. We might take the case of meeting a friend in which there is a complete and definite meaning element. Consequently the overt action which takes place is more conditioned

¹ We might just as well say the meaning is in the object, but it is clear that unless there is an action involved the problem even of the location of meaning does not arise.

² The components spoken of are, of course, abstracted from the actual response by logical analysis.

³ Cf. my brief suggestion concerning the detachment of meanings, *PSYCHOL. REV.*, 1919, 26, 2 ff.

by the meaning component. If he is an American friend, I may merely shake hands with him, but if he is a foreigner, I will probably also raise my hat and bow. Clearly the entire course of my behavior in this situation presupposes my familiarity with the person. It must not be overlooked that we do not exclude from our description of simple apprehension the simpler immediate reactions which occur in primary perception. For the fact is, that since simple apprehension is always the development of an act of primary perception, it involves therefore an integration of the simpler acts. Of prime importance here is the fact that it is precisely through the integration of the simpler acts that a person profits by past experience. For instance, my reaction to this person is conditioned by the numerous integrations of responses representing my previous contacts with him.

Thus through the constant growth of the reaction pattern does the perceptual process undergo a continuous development. Not only does a given response serve at any specific time as an adaptational function, but also as a developing potentiality for some future contact between the person and the object.

Analytic Description of Perception.—Although the perceptual response is a thoroughly organic process, we can nevertheless analyze it into a series of specific stages or act components which we can tabulate as follows:

1. The attention function in correlation with contact media (light rays, for example).
2. Functioning of a reaction pattern which involves
 - (a) Discrimination and appreciation of specific qualities and relations of objects coupled with conative and affective factors.
 - (b) Neuro-musculo-glandular processes.
3. Emergence of meaning (new).
4. Overt adaptation follows.

1. The attention factor is the selective process which serves to prepare the individual for a new reaction. At any moment of time innumerable possibilities for action naturally exist because of the previous acquisition of many reaction systems. The change in the surrounding medium or media of the person,

which occurs when the individual comes into the presence of new objects, or when objects change their positions with respect to the person, puts him into a condition of readiness to react to some new object. It must be observed that the attention processes depend not only upon the stimulating object and its setting, but also upon the condition of the organism at the time, that is to say, the selection process depends very directly upon what the activities of the person were prior to the present contact. Such activities condition also what precise phase of an object we will react to at a given time. Thus, for example, the problem as to why at one time our attention is attracted to a red solid instead of a smooth surface, when both form the phases of a book, is solved by an investigation of the previous activities of the person.

2. Following the selection function, the reaction pattern is brought into activity, and we find thus a highly coordinated series of processes taking place. These may be enumerated separately, although they constitute merely descriptive phases of a unitary process. Here we find the discriminative process which enables the organism to distinguish the various qualities and relations of things. This phase may be thought of as the cognitive aspect of the reaction system, and to a degree we may look upon this phase as conditioning the mode of operation of the entire complex. The conative factor in this complex, being very closely connected with the attention function, may be considered as the aspect which conditions the occurrence of a response at all. Of primary importance are the affective processes, which in part predispose the organism to act. Every reaction pattern involves of course also the elaborate functioning of musculo-neural and neuro-glandular processes, which are so prominent as to convince some observers that they constitute the total reaction pattern.

3. As a result of the operation of the reaction pattern a new effect is or may be produced upon the organism. Should the object or person reacted to, with all the involved relations, remain constant, no new reaction is called out; that is, the previously developed reaction pattern remains unmodified despite the present contact. The object, then, will not take

on any new meaning and the overt act following the appreciation of the identity of the object may be precisely like one that has previously occurred. We can readily determine this to be the case of perception in use. On the other hand, should the previously developed reaction system prove inadequate for the purpose of the present contact, new features may develop. Instead of involving some given system of receptors in connection with certain neural and muscular processes, additional factors may be put into operation. Thus, for example, should the apple previously sound and firm to touch now offer no resistance, it will call out different muscular responses. Similarly, should it now present color surfaces varying in hue, turning from red to brown, the object will take on new meaning, and we will react in a different way to the now deteriorated apple. Thus, indefinitely many modifications are developed in the course of the exercise of so intricate a psychophysiological response pattern.

4. Following upon the operation of the definitively perceptual reaction system, the person performs some sort of overt act. The latter is directly conditioned by the emergence of the meaning brought out through the course of the specified contact with the object. It must be observed that the specific perceptual process is a coördinate process with some other type of reaction system. Thus, we should look upon the perceptual function as a part of a perceptual-instinct, perceptual-emotional, or perceptual-voluntary action, etc. To look upon it in this way obviates the dangerous view that in the actions mentioned we have isolated activities. As a preliminary or partial action the perceptual process represents an evaluation of the object which leads to a definite overt response. It is at this point that the perceptual reaction becomes a knowledge function, since it stands for some actual adjustmental act. Whether the apple of our illustration will be eaten, or thrown away, depends upon the information elicited through the operation of the perceptual reaction system and its modifications. At this point, we must not overlook the fact that the appreciation of an edible or non-edible meaning depends upon the surrounding conditions of the object. Even

if the knowledge elicited from the object itself is favorable to its consumption, that event will not occur unless conditions are otherwise favorable. We mean to point out here that the specific kind of response patterns that will act as a series in any given situation will depend upon that situation. This fact indicates the close interaction between stimuli and responses.

An important reservation to the above description of the perceptual activities must be made in the light of our distinction between primary perception and simple apprehension. It is only in the case of simple apprehension that the distinct series of factors are found; for it is only there that a definite meaning factor is isolated in the total act. In primary perception the overt act is identical with the original system, and the perceptual process itself constitutes not exclusively a definite knowledge factor in an adjustment, but it is the whole adjustment itself.

Perception in Development and Use.—Of primary importance for the understanding of the perceptual reactions is the distinction between perception in development, and in use. In the former type of reaction with objects meanings are developed; that is to say, a definite form of reaction pattern is acquired; so that the future contact with this object will be of a definite and peculiar sort, because the reaction pattern developed will then be put into use. The distinction made indicates the extremely complex and constantly varying character of the perceptual reactions and points to the mechanism of elaboration of such functions.

Since clearly the original perceptual contacts with objects occur in the instinct stage of development, we may date the origin of a meaning or reaction pattern from the first instinct contact of an organism with any given object. The point is, that the hypothetical, original contact of an organism with an object is the result of a direct arousal of a connate reaction pattern through the instrumentality of various physical media such as light rays or air waves. If we dare speak of a meaning possessed by an object at this stage, it is merely that of 'response eliciter.' This contact is as mechanical as a conscious

behavior act can be, and here we find the full significance of the statement that we have innate tendencies to discriminate colors and other physical qualities. The fact is that our connate reaction patterns are brought into function by the stimulation of the specific receptor systems whose activities form a part of them. At this stage the simple psychophysiological response as a whole, symbolizes the meaning of the object. Now, when the action just mentioned occurs, some effect will be produced upon the organism; so that the next contact with this object will involve a modified reaction system, or we might say, the object has taken on a new meaning. The perceptual processes thus represent a constant integration of a reaction pattern depending upon the number of contacts with the same physical object under varying conditions of surrounding auspices. In general, it is clear that the perceptual reactions are entirely genetic in their functioning, hence only by studying them in their development can we hope to understand them.

Another form of integration in the development of perceptual reactions is the establishment of a definite interactional relationship between the stimulating object and the reaction system. Not only must there be a coördination of specific factors of a response system, such as for example, visuo-muscular, visuo-glandular and neuro-muscular processes, but there must also be a connection between this total reaction pattern as a functional representative of the organism at the time and the stimulating object.¹ Just how this intimate relationship between stimuli and response systems, which is the essential factor in perception in use, is established, can be experimentally studied through various types of conditioned reflexes. Excellently is perception in use illustrated by the story of the discharged veteran, quoted by Spencer, who had had the auditory object 'attention' so integrated with a particular response system as to lose his pie when a practical joker uttered the command.² When the integration has been accomplished, the reaction pattern can be stimulated by one or more of a large series of phases of the object, which become

¹ This connection between the response pattern and its stimulating object constitutes the primary and fundamental type of psychological association.

² 'Psychology,' 1, p. 499.

differentiated because of the different media through which the contacts between the organism and the objects are made. Thus, a reaction pattern involving a ball-meaning may be put into action by either a visual, auditory or tactual stimulus. As an illustration of the arousal of a complex system of perceptual responses through the mediation of a simple type of stimulus, we can take the case of the visual contact with ice, which arouses coldness, smoothness and hardness meanings at the same time. The effective adaptation of the organism depends to a considerable degree upon the complexity of the two sorts of integration described.

Because perception in use as just described involves putting a complex reaction pattern into operation by some phase of an object, we find in such adjustments the beginnings of a differentiation between the explicit and the implicit functioning of a reaction system; the latter case gives us the detached meaning. The implicit functioning of a reaction pattern is clearly discerned in the many cases in which the visual contact is the only direct one; and the meaning of the object, which may be very elaborate, though not attached directly to an immediate response, is most certainly acting. A striking example of the implicit functioning of reaction patterns is the situation in which a banker, while otherwise preoccupied, for a moment will begin to respond as though at a director's meeting, when stimulated by the crumpling of a crisp paper. Again, the 'wave of feeling' brought on by the perusal of a literary description indicates the living over of some crucial situation by the incipient operation of reaction systems. It is this implicit functioning of reaction patterns in perception which shows the way toward the development of the conceptual and memorial processes.¹

From our description of perception in development and in use it must appear that these are not two distinct operations, but rather two mutually interrelated processes. Since the perceptual activities are constantly developing we have in practically every new operation of a perceptual reaction system

¹ As a matter of fact, so far as psychophysiological mechanism goes, there is only a difference in degree between perception and thought, but from the standpoint of results effected through these reactions the variation is or may be enormous.

a more complex integration of the component action elements with the stimulating situation. If we consider the perceptual reaction as the use of meanings stimulated by direct contact with objects, we find that the distinction between the development of perception and its use, depends upon the amount of direct stimulation which is required to elicit the response. Perception in development requires a relatively larger series of direct contacts to effect an equally complex response than is true in the case of perception in use, since in the latter case the meaning attaches to an incipient reaction pattern. We repeat, the development of perception is a process of so integrating acts that only a minimum of receptors may be necessary to effect the appropriate response. If we remember that this development never ceases, provided that we have occasion to react to the given stimulating object, then it is clear that perception in use is merely the condition of responding on the basis of a previously acquired reaction system, pending its modification by the present contact with the object in question.

The Specific Mechanisms of Perception.—A more penetrating analysis of perception than we have yet made will yield information as to the specific integrations which operate in the perceptual reactions. To a certain point we can trace the precise organization of the component processes, such as the muscular, cognitive, glandular, neural, etc. Our ability to do this is made possible by the fact that underlying all these modifications is a simple psychological law which may be formulated as follows. *Every integrative modification of a reaction pattern is a direct function of a differential contact with actual things.*

By far the most important problem of perception arises just here, namely, what are the specific means of contact between the organism and objects? The interest in this problem emerges because of the inevitable incorrect inference from the customary psychological premises, namely, that the cognitive qualities are existential processes somehow aroused in 'consciousness' which bring about the movements of the organism. Now as a matter of fact, it is easily seen that in any description of perception the qualities mentioned (odors, colors, etc.) are

abstracted from the objects. The discrimination of these qualities as it occurs in the actual response is in part the perceptual act; that is to say, the discriminative process constitutes part of the perceptual act as distinguished from the overt action which follows it. The discriminative factors are thus seen to be phases of concrete psychophysiological processes, and this means in effect the total extrusion from the perceptual act of any substantial mental or subjectivistic quality.

Responsible for the view of the existence and primary functioning of sensation qualities, is the psychological tradition which makes knowledge the differentia between biological and psychological acts. Taking conscious behavior as our starting point, we may catch a glimpse of the true significance of the perceptual reaction as a knowledge process which brings about adequate, psychological adaptations, and still keep our descriptive analysis of the facts within the range of observational interpretation. The favorable prognosis for the scientific development of psychology depends in large measure upon the rejection of a theory implying that the adjustmental responses of the individual are due to a mystic potency resident in 'consciousness.' In place of such a theory should be substituted a verifiable interactional mechanics of natural things. Upon the basis of such an interactional mechanics it is possible to avoid the assumption that perceptual responses are primarily cognitive operations or that they are 'consciousness,' that is to say, awareness of something, rather than adjustment acts.

Thus, the problem of the contact of the individual with objects is reduced to the description of the precise manner in which a reaction pattern or system is put into operation by the stimulating object. Here we have to assume that the reaction is that of a conscious organism, which has the capacity to react to colors and other qualities. As a matter of fact, the notions we have of such qualities are historically developed through the discriminating evaluations of such conscious beings. Now, although it may be impossible to develop a detailed analysis of all that takes place in a perceptual reaction, we can

isolate series of systems which play their part in such reactions. These systems are logically ordered sequences of events which occur when a perceptual reaction is made. An example of one of these systems is the cycle beginning with the reflection of light rays of definite sorts which set up differential processes in the retina, followed by definite happenings traced out in the neural pathways and in the cortical areas of the brain. The completion of the cycle involves the consideration of changes taking place in the association tracts and the motor localities of the cortex, the happenings in the efferent transmission system and in the effectors located in muscles and glands.¹

Of extremely great consequence is the series of appreciative and feeling processes which are factors in the operation of the total reaction system under discussion. The important point here is that the perceptual reaction must be looked upon as one of the ways in which a psychophysiological machine is operating. Above all, what we wish to avoid is the conception that the physico-neural functions constituting part of the perceptual act, are the causes or the parallels of conscious action. A very simple means to avoid this confusion is to remember that we are dealing here with two phases of a natural happening which for scientific purposes are differently classified, but never separated, and also that no process is any more tangible than another. Physical processes are not tangible physical substances, nor are the physiological factors biological material; neither are both of these functions absolutely distinct from the mental processes which naturally do not reduce themselves to mentality, a substance the existence of which we all join in denying. What we must describe here is a psychophysiological reaction, for it is only such a reaction which can be the object of our observations. While observing

¹ The reader who is interested in a more detailed discussion of the mechanisms of conscious behavior is referred to Watson's recent volume, 'Psychology from the Standpoint of a Behaviorist,' which contains the best description in psychological literature of the behavioristic components of a reaction system. Because of the author's resolute attempt to suppress the mentalistic components of the reaction pattern, the book contains merely suggestions, though frequently very important ones (especially in the chapter on Emotions), concerning those phases of a conscious response.

a psychophysiological organism we can discriminate between acts involving a response pattern of predominantly mental factors and others having the physiological factors more prominent. It is the former type of psychophysiological act which is usually called subjective, and which is in part responsible for the inexcusable separation of the mentalistic and behavioristic phases of a unitary act.

Since we can analyze many of the isolated factors of a perceptual reaction we can describe specific correlations between the qualities of objects and the particular phases of the reaction pattern. Thus colors, sounds, tastes, hardnesses, etc., can be coordinated with specific receptor systems, because during the evolutionary development of the organism the receptor systems became differentiated in sensitivity to particular kinds of stimuli, which objects initiated. For example, the retinae are normally sensitive only to light rays reflected by the colored surfaces of objects, and the cochlea to air vibrations, which emanate from sounding bodies. In passing, we might point out that our analysis has provided no basis for the assumption that 'objects as perceived' are synthesized in some form out of qualities produced in the mind or in the organism by stimuli set up by objects. After many detours this view just mentioned has seeped into current psychology from the Berkeleyan head waters, and for a long time has been effective in preventing the conception of psychological phenomena in a scientific way. In contrast to the Berkeleyan view, we must look upon the stimuli which constitute the middle link between objects and organisms as natural predisposing conditions, mediating changes in the activities of the latter, much after the fashion in which an electric current produces changes in a machine. The undesirable consequences of thinking that in perception there is a synthesis of objects is well illustrated by the conception that space and time are somehow compounded by some additional attribute of the mental 'contents' called sensations.

The Relational Character of Perception.—Observations upon the perceptual interaction with things convince us that not only are all perceptual reactions not merely responses to specific

qualities, but also that they are not confined to isolated objects; they are more than either of these descriptions indicate, namely, responses to a complete object in all its setting. We might generalize this fact by saying that we always perceive situations, not isolated things, and of course our conduct is conditioned accordingly. Thus a chair which ordinarily would be responded to by being sat in, will not call out such a response when it is occupied by some object or when there are individuals present before whom it is impolite to make such a response. In every such case the meaning of the object will depend upon the contextually related objects. When the chair itself is reacted to, we respond to a unified object, and not to simple elements (back, seat, legs, etc.); that is to say, we react to an object to-be-sat-in, and not to isolated fragments which require to be somehow connected. This relational character of perception is excellently illustrated by our responses in which words and not letters are the stimulating objects, and in which the words are directly and inseparably attached to other words.¹

That we can immediately appreciate a complex situation apparently comprising many diverse elements is owing to this relational character of perception. Thus, in looking at a landscape the objects all seem to be in their proper places; distances are correctly located and the lights and shadows properly distributed. The total situation is the customary object of our reactions and is thus the stimulus to a unified primary response or simple apprehension. The meaning of the total situation can be readily and completely confounded by placing ourselves in a position incapacitating us for response, such as looking at the landscape with our head upside down. Much the same effect is produced by looking at an inverted painting. In such situations what happens is that the series of integrated reaction systems are thrown out of their customary harmonic organization and must be reorganized before the object can be correctly perceived. Experiments on space perception have shown that

¹ James points out with his characteristic description the unnatural aspect which a word takes when looked at in protracted isolation. "It stares at him from the paper like a glass eye with no speculation in it. Its body is indeed there, but its soul is fled." 'Princ. of Psychol.,' Vol. II., p. 81.

by practice disorganized response systems can readily be reintegrated.¹

The difference in the responses to objects when they appear in different contextual relations illustrates the extremely subtle interaction between the stimulating object and the reacting person, and also shows the operation of perception as an adjustmental reaction to surrounding objects. Pliableness of the individual in this sense constitutes an important factor of general intelligence and exemplifies the law of integrated modifications of reaction systems mentioned above.

The Interpretative Function of Perception.—Since every psychological phenomenon is a product of two factors, namely, the stimulus and the response, our discussion of the influence of the stimulating circumstances upon our perceptual reactions naturally leads to the consideration of the influence of the individual's stock of reaction patterns upon any given present reaction. An observable fact it is, that the reaction systems which the individual has developed in his constant contact with objects, play a large part in any present reaction; for in a genuine way such reaction patterns constitute the individual at the moment. And since as we have indicated, these response patterns have been developed in the individual's previous experience, every perceptual reaction may be thought of as an interpretative function. In effect, this means that the person will respond to objects much as he has been accustomed to do under previous conditions of contact with similar objects. It is this fact which gives origin to the idea that perception is a kind of habit.² Being equipped with a response system to react to stimulating objects, is fundamental as a condition of every recognition behavior. The element of novelty comes into a response situation precisely at the point at which the person is unable to offer a complete response to the present stimulating object. Since the meaning of the object is not fully comprehended the person can respond in a way which is only a partial reproduction of a previous form of response. The lack of complete recognition means that the person is not

¹ Cf. Stratton, *PSYCHOL. REV.*, 1897, 4, 341-360, 463-481.

² Cf. Angell, 'Psychology,' 1910, p. 157.

supplied with a reaction system to respond immediately to the object in question. In such a case the pressing need for a response to the object results in an incipient trial and error process ending in a clear-cut appreciation of its meaning and a consequent thinking reaction.

The interpretative function of the perceptual reactions is observable in many instances of daily occurrence. In the case of reading and speaking we find that there is very little stimulating material, but the response is not at all interfered with. In listening to a familiar voice, or familiar written material, we can easily demonstrate to ourselves that our response patterns are aroused by no considerable amount of excitation. No doubt the explanation for this lies in the individual's possession of dispositions organized for particular forms of situations and any prominent feature of those situations will set off the reaction patterns. It is here that we find the bases for the incorrect or unexpected responses commonly called illusions. For the same reason a person with a limited experience will be ready upon fewer occasions to respond to objects, and on those occasions will be slower to make the reaction. It has been aptly said,¹ that 'the artist sees details while to other eyes there is a vague and confused mass; the naturalist sees an animal where the ordinary eye sees only a form.' That the child reacts to objects in monotonously similar ways, is true because it has been impossible for him to build up many reaction systems. And so the significance of the pony and what can be done with it are the same as in the case of the dog, with only a variation in size. The classical illustration of the observable facts in this case is found in the name response (big dog) which the child makes to the pony.

The Elaboration of the Perceptual Functions.—The constant development of the perceptual response serves as one of the individual's important means for a growing mastery over his environment. As the reactions to an object multiply, that is, as the number of responses which it calls out increases, the object takes on more and more meaning. It is owing to this

¹ Lewes, 'Problems of Life and Mind,' 3d series, p. 107.

increasing elaboration of the perceptual response systems through the addition of meaning factors that the organism is enabled to make its way with greater facility through the maze of its surrounding objects. This facility is further increased by the fact that this elaboration of the perceptual response systems makes it possible for the person to adapt himself to many situations without invoking a definite problem of adaptation. Because of the absence of such a specific problem, and the consequent exclusion of a thought function, the simple form of the perceptual reaction allows for an immediate response to objects.

As a hypothetical illustration of the growth of the perceptual responses we might consider the reactions of a child to a typewriter. Allowing for a definite development already attained, the machine may be at first merely a thing which can produce a series of sounds when the keys are pressed. The machine, then, as soon as it is seen, has merely the sound-making meaning in the immediate response. With a more extended acquaintance with the machine the child learns that it can stimulate different and additional responses, and it thus has a different meaning when perceived. Finally, the machine takes on the complete set of meanings which are derived from all the responses the child can make to it. The point is, that what sort of perceptual reaction an object will call out at any time, or what it will mean, will depend upon the sum total of the person's contacts with the object in question. The perceptions of persons grow continually, and the growth depends upon the addition of new features to the response patterns and of completely new patterns of response.

The development of perceptions by the growth of responses is well illustrated when we are at the point of substituting an object for another in the face of an immediate need. Thus, a chair becomes a barricade, or step ladder, or typewriter table. As a consequence of the person's being forced to make new and unusual responses to objects, the latter become endowed with a range of new meanings. In the above illustration we also observe the active relating function as it occurs on the perceptual level. The similarity between objects is of course

a fundamental causative factor in the perception building activity, since otherwise the possible reactions to objects would be at such variance as not to admit of any correlation.

II

If the brief description of the perceptual reaction which we have essayed is correct, it obviates some of the most salient errors in current discussions of perception, and places the interpretation of such processes upon a definite natural science level. Let us first observe, then, that the perceptual reaction is always a reaction and not a thing, namely a complex organization of subjective qualities. Moreover, a perceptual reaction is a psychophysiological reaction as all data of psychology are. That is to say, the perceptual act is not in any sense the act of an ego, or mind of whatever description, nor of a nervous system, but a complex reaction system involving all the functions of a conscious being. Notice that the vexing problem of a self, vexing, that is, once it is allowed, plays no part whatever in the interpretation we have made above. For the sum of the reaction systems which adjust the individual constitute the person, and since each person because of his particular interaction with things and persons, has developed definite types of reaction patterns, the problem of character or personality is thereby solved. Since psychology is interested only in such reaction systems there is naturally a perfect co-ordination between psychology and the other sciences of the individual, such as anatomy, for example, which is interested in the structure whose functions form part of the reaction pattern.

That we cannot assume that in the perceptual act we have besides an object stimulating the organism, and the organism (frequently taken to be merely the nervous system) also an object of perception, that is, a sum of mental qualities, we indicate by the statement that there are only two interacting things in a perceptual as in any psychological act, namely, the organism and the physical object. The fact is that the physical object contains all qualities, colors, sounds, tastes, hardnesses which we can ever analyze out of it, and the organ-

ism learns to distinguish these and to name them because of specific psychophysiological effects which contact with objects brings about in organisms.

Our view may be illustrated by the following example. When we perceive a blue object, in no sense is there started up a 'consciousness' of blue by an antecedent or accompanying neural activity. As the matter is stated by practically all psychologists there comes to be at this point a blue consciousness or a blue sense quality. Now we maintain that the only blue involved is a blue object, independent of a perceiver and in no wise modified by the specific perceptual act; any change in the object must be effected by the overt action following the perception. What occurs in the above illustration of a perceptual act, is that the light rays set into function a complex reaction system which involves the specific meaning of this object, in the sense that the immediate effect produced by the object on the person may now result in a specific act, perhaps in the exclamation, 'I see a blue flower.' The effect upon the person, we repeat, is muscular, neural, glandular, cognitional and perhaps affectional. Let us remember that at this stage we must consider the activity as perception in use, which has developed through a series of previous contacts with the object; for otherwise many kinds of direct contacts besides those mediated by light rays would be necessary, in order to arouse so definite a meaning of the object as to be followed by a definite act.

Clearly, the specific perceptual act is an abstraction from an empirical interaction of a person and an object; that is to say, the perception proper is abstracted from the preceding and following acts of the person, while the object is abstracted from its setting which includes many other objects and persons. The description of a perceptual act is always a deliberate rationalization of a complex event, a fact which is at least implicitly recognized by all psychologists; even those who despite their Berkeleian adherence to mental states agree that the perception of blue is an abstraction from a blue object (of perception).¹ This abstracting process can be made out

¹The writer refers here to the statements by psychologists that sensations are always abstractions.

most clearly perhaps by a thoroughgoing analysis of the development of the naming reaction performed in denoting things.

While it is almost impossible to describe so intricate an organic activity as a perceptual act, and at the same time avoid completely falling into a logical instead of a psychological analysis, it is still possible so to guard one's description as to prevent an essential misconception of the behavior. But unfortunately such misconstruction is rarely guarded against, for most analyses of perception merely amount to the isolation of the qualities of an object and the transformation of them into sensations, which in their totality are presumed to constitute the known object as over against the material object, which by hypothesis must remain forever beyond the pale of mental things.¹

At the basis of the current, primarily logical analyses of psychological phenomena which may be taken as symptomatic of the unscientific character of such description, lies the prejudice deep rooted, that psychology is the study of mental states, a kind of stuff (masked by the veil of process)² which is different from physical material. In no matter what form this subjectivistic view is presented it must be looked upon as a vestige of religious thought in psychological dress. Today, it must be rigidly extruded from scientific thinking, since it is a prejudgment of facts to be observed. On the contrary, genuine scientific thinking must start with observable phenomena, and naturally enough when we start in this way, we never meet with mentality or physicality as the psychologist deals with them.

The immediate development from this false dualism is that the domain of psychology is that of knowing, for consciousness is thinking stuff.³ Now thinking or knowing is assumed to be

¹ Sometimes the percept is considered as distinct from sense qualities as in the statement by Stout, "The general possibility of the transition from sense-impression to percept depends upon the existence of the percept as something distinct from the sense-presentation to which it seems as a rallying point and center of connection," 'Analytic Psychology,' Vol. II., p. 31.

² In spite of the veil no other interpretation is possible of a thing which has attributes.

³ The trend of modern thought as influenced by Descartes.

the most intangible and inaccessible stuff or process, and thus has arisen the esoteric psychology of introspection. Clearly there can be no science which has as its subject matter intangible and invisible subjectivistic states, and for this reason the history of psychology mirrors much groping about for some concrete material with which to work. Finally, psychologists seized upon the nervous system as a tangible basis for the intangible consciousness. In our own day the behavioristic movement at least in one of its phases assumes that it is really the nervous system with which psychology has to deal and not at all with consciousness. This behavioristic view, though clearly mistaken in that it is still based upon a dualism one phase of which is rejected, should be credited with much scientific acumen, since it must be taken as a protest against the obviously unscientific character of a mentalistic psychology. For no science can be built upon things or processes which are not observable.¹ When we consider a perceptual act as an adaptational response to some natural object, we find no necessity for the dual interpretation of psychological phenomena such as leads to the problem how a mental state can be made to know or refer to an external object. For the functional psychologist there can be no such problem; what he is concerned with is the way a definite sort of interaction takes place between two natural things, a person and some other object which may or may not be a person. Thus, the functionalist does not create for himself the question as to how a conscious state can be initiated by a previously or simultaneously occurring neural process.

Berkeleyan and Reidean influences in psychology are maintained by the confusion of the products of logical analysis and the concrete facts of conscious behavior. Thus, the relational and interpretative character of a psychophysiological reaction

¹ It is not to the point to argue as Stout ('Manual,' 1915, p. 18) does that 'mental dispositions' must be assumed to exist in the way that 'mass' and 'energy' exist, though not directly observable, for as he himself points out, physical things and processes are inferred from directly observable phenomena. This can not be said for his mental dispositions, which are not descriptive of actual facts. And furthermore, mass and energy are obviously useful categories of physical science, but mental dispositions are only necessary because of an erroneous subjectivistic interpretation of human behavior.

is assumed to be the growth of a mental state which is called a perceptual object. From this standpoint, animals and possibly infants are presumably supposed to have no perception because they cannot possibly have the knowledge which a human adult has. In detail, a perception is assumed to be a complex organization of sensation qualities with meanings attached. Thus meaning is further assumed to be the definite self-conscious interpretation of the sensation qualities, clearly an epistemological view. In contrast to the above view, we have already suggested that what occurs in nature is the building up of a reaction-system, which at first is simple, that is, the object has little meaning, and later further contact with the object complicates and expands the reaction system, which fact is interpreted as giving more meaning to the object by the increased number of possible reactions which can now be made to it.

The consequences of the view that perception is a mental structure, are clearly brought out in the issue raised by James¹ concerning the confusion of the object perceived with sensations or perceptions of the object. James saw clearly the fallacy of Stumpf's analysis of the sensation of oil of peppermint into the sensations of taste and temperature; for James would have it 'that we perceive that objective fact, known to us as the peppermint taste to contain those other objective facts known as aromatic or sapid quality, and coldness respectively.' We cannot sympathize with Stout's² fear that the view of James involves 'the impossibility not merely of the "analysis of presentation" but of all analysis properly so called,' although we do agree with him that the psychologist's interest is in the psychological and not particularly in the physical object. We cannot agree with Stout, however, against James, (1) because for the former the psychological process must be purely mental, and (2) because he assumes that a perception must be a compound of sensations such as can be analyzed. The issue between a functional and a structural view is definitely brought out here. Stout thinks that because he can remember that oil of peppermint has certain definite qualities of taste and

¹ 'Principles,' I., p. 521 ff.

² 'Analytic Psychology,' 1896, p. 56 ff.

temperature he has analyzed a purely mental thing. Now as a matter of fact the memorial behavior is primarily the implicit functioning of a reaction system developed in direct contact with an object and is therefore most certainly a psychophysiological action. It is precisely because Stout does not see that a reaction system, that is to say the system built up in perceptual contact with objects, can be put into function by a substitution stimulus that he means to perpetuate the mentalistic tradition in psychology. If we assume that what is studied in psychology is the development of the complex reaction patterns and the means whereby they are put into complete or incipient function by various types of stimuli, we need never invoke any mysterious or inscrutable entities.

The literature on space perception clearly demonstrates the hopelessness, from a scientific standpoint, of the mentalistic doctrines. For, the problem of space in mentalistic psychology is the problem of building up or constructing space instead of the observation of the specific means whereby a person performs space reactions and adapts himself to objects variously placed. When space reactions and not geometry is made the subject matter of the psychology of space the problem of the genetic or *a priori* character of space drops out of sight. In the observation and interpretation of space reactions there can be no question of innateness or acquisition of knowledge of space, for a space reaction is not essentially knowledge as we have indicated in our description of the perceptual reaction. There is no doubt, however, that our knowledge of space is derived more or less directly from the space reactions, but this is a problem of logic and not of psychology. The study of the literature on space perception shows us clearly how the psychologists persist in forcing into their science epistemological problems which should have no place therein. Curiously enough the epistemological view gains impetus from an attempt to give psychology a scientific setting as is familiarly illustrated by the influence of Helmholtz's ideas of mathematical space upon the development of the psychology of space perception.

The ascription to current psychologists of a subjectivistic

heritage from Berkeley and Reid may call for some explanation. The statement that we are still working and thinking in the Berkeleyan tradition does not exclude the fact that current introspectionism was established and elaborated by the work of the German physiologists. It is of course a matter of common knowledge that the introspective view was made possible and plausible by the physiological experiment which, dealing with isolated physiological functions, had to assume a correlated mental state to complete the description of the reaction observed. It is thus that the work of the German writers from Herbart through Fechner to Wundt, although designed to place psychology upon a sound scientific basis has in reality, because of its maintenance of the subjectivistic tradition, accomplished the opposite.

The proposed interpretation of the perceptual reactions suggests the extrusion of the separation doctrine from psychology and thus makes toward the removal of what is probably the greatest hindrance to the thorough establishment of psychology as a science. For, as long as psychology deals with conscious or mental states of any sort whatsoever it cannot ever attain to the dignity of a science as Kant long ago asserted. This statement holds whether consciousness is taken as an attribute of the psyche or mind, or of the states of consciousness and unconsciousness which are presumed to be the mind.

In conclusion, we might point out that although the organic conception of psychological phenomena appears to some psychologists as widely accepted,¹ the manifest predominance of the mentalistic and behavioristic views would seem to indicate the contrary. The apparent prevalence of the organic conception may be accounted for on the principle that insofar as a psychologist is to describe some actual psychological fact, the description must in some fashion correspond to the fact, regardless of the private view of the writer. Thus, much of current practice may be organic, but the question remains whether psychology can make much progress toward scientific

¹ Cf. Carr, *Psychol. Rev.*, 1917, 24, 182. "The conception is unorthodox only in relation to prevailing definitions of psychology. To my mind it is essentially in harmony with the dominant point of view of the science, and it is not wholly inconsistent with much of current practice."

stability if psychologists do not fully appreciate the character of the materials with which they deal. While it is certainly true that definitions may linger far behind practice, the scientific practice in which this occurs, lacks much in desirable effectiveness. Even if scientists were forced to recognize all the component functions of a reaction, they might still be lacking in a full appreciation of the organic interpretation of such a reaction. That there is little genuine interest in the psychophysiological view among psychologists is evidenced by the general paucity of articles written from that standpoint.¹ Undoubtedly true it is, that the biological influence in psychology has fostered the unitary conception of organisms, but it has not resulted in any complete modification of viewpoint. In fact, the rise of the behavioristic movement urges the belief that there is no general tendency to look upon psychological phenomena as they naturally function but as they are traditionally supposed to operate. A sympathetic acceptance of the objective functional view must result in the description of the complete actual psychophysiological reaction pattern, and the consequent rejection of the exclusively mental or physical interpretation.

¹ Two notable exceptions must be here referred to, namely, Carr, 'The Relation between Emotion and its Expression,' *PSYCHOL. REV.*, 1917, 24, 369, and Peterson, 'The Functioning of Ideas in Social Groups,' *PSYCHOL. REV.*, 1918, 25, 214.