

## CHAPTER III THE WORK OF THE WURZBURG GROUP

### THE MECHANISM OF THINKING

#### *The First Experimental Attack on Association as producing Thought*

(1) Watt, H. J., 1905: *Experimentelle Beitrage zu einer Theorie des Denkens*. An English abstract, "Experimental Contribution to a Theory of Thinking", is in the *J. Anat. and Physiol.*, 1905-6, Vol. 40, pp. 257-66. This summary by Watt is the only piece of the Wurzburg literature originally written in English.

*Method*: Partially constrained association, e.g. name a whole to which an object signified belongs, name a part, etc. Introspections. Hipp chronoscope. *Object*: To describe the effect of the task, as contrasted with that of the "stimulus" and the "reproductive tendencies" belonging to it. *Results*: Using different tasks with the same stimuli:

(a) Imagery may change.

(b) Reaction time may change.

(c) On the principle that the quickest response for any one subject was most often repeated, and that this was likely to be the commonest response in a group of people (Marbe's "law"), Watt grouped together reproductive tendencies of the same intrinsic speed. Within these groups he found variation of task accompanied variation of reaction time.

(d) Hence we can distinguish *Association*, reproductive tendencies, from *Motive*, task.

(e) The task *ordinarily works unconsciously* (confirmed by Messer).

(f) *Both task and association* are necessary for thinking. (2) Ach: *Method*, see last chapter. Also hypnosis. *Results*: The determining tendencies must be postulated, which (a) work unconsciously, (A) proceed from the "aim-presentation", (c) relate it to the "presentation of stimulus". That is, Ach has related Watt's task intimately with "presentational" psychology. He has foreshadowed Selz's *Gesamtaufgabe*. (d) Application to Abstraction. (3) *Difficulty of Ach's Scheme*: He has interposed an unnecessary *ter-tium quid* between "purpose" or "motive" and thought or action. This he was forced to because he had to think in terms of presentations. (4) *Difficulty of Watt's Scheme*: He has proposed the hypothesis that reproductive tendencies cannot function unless there is a motive present, and that both are necessary for (physical or mental) action. He cannot be consistent in this; e.g. in the reaction experiment, the stimulus (his own

example) has originally no reproductive tendencies attached to it. He was forced to his hypothesis because of the prevailing theory that the basis of thought was association.

THE DISCUSSION OF the Würzburg work has hitherto been confined to the qualitative aspect of the thought processes. To the question: What kind of mental event constitutes the process of thinking? it has been seen that the Würzburg answer was at first negative in the sense that it excluded imagery and imaginal processes, and, in its later development, positive, in that it maintained that the constitutive events of thinking were unique thought-processes, thoughts that are *sui generis*. It is now time to consider the correlative aspect of the question, namely by what principle do such thinking-events follow each other.

When the Würzburgers began their work, the conventional answer to the question was "by the laws of association". It is true that there were those who, repelled by the starkness of the associational scheme, which ultimately represented mental life as a fortuitous clash of elements, had attempted formulations which professed to do more justice to the real activity of the mind itself. Thus was born Wundt's doctrine of Apperception, the culmination of many theories carrying the same name. Wundt's doctrine was developed in the successive editions of his *Principles of Physiological Psychology* (first edition, 1874, sixth, 1908-11), and stressed the activity of the mind, as contrasted with the passivity of the process of association.<sup>1</sup> In the same way, Ward had attacked the doctrine of associationism or presentationism, as he preferred to call it.<sup>2</sup> Nevertheless, it is fair to say that in the early nineteenth hundreds the conventional explanation of the mechanism of thought was couched in associational terms. Once more the Würzburg group developed a doctrine running counter to the conventional scheme, and once more we must look to Külpe for the ultimate source of the work. In 1893 Külpe had already stated<sup>3</sup> that reactions to the reaction-time experiments

<sup>1</sup> See Boring's *History of Experimental Psychology*, pp. 333-35, for a clear summary. See also Ward, 1918, pp. 308-11, for a history and criticism of the doctrine of Apperception.

<sup>2</sup> See his articles in the tenth (1902) and eleventh (1908) editions of the *Encyclopaedia Britannica*. They were expanded and supplemented to form his *Psychological Principles*, 1918.

<sup>3</sup> *Grundriss der Psychologie*, Berlin, 1893, p. 422. This was pointed out by R. M. Ogden (1911, p. 185). The statement is actually repeated almost verbatim by Watt. "The *class*, i.e. sensorial or motor reaction, is not determined by the nature of the experiment after it has been made, but by the nature of the given

differed according to the preparation of the subject. This was the germ from which later sprang the work of Watt and Ach, whose contributions to (he theory of thinking are here complementary although their experiments were independently conceived and executed. It has been seen that the associational theory had already been severely criticized on theoretical grounds. It was, however, as the result of elaborate experiment, of "systematic experimental self-observation", that these two men proposed, as a qualitatively different mechanism to account for the sequence of the thinking process, the Determining Tendencies (Ach) which spring from the Task (*Aufgabe*, Watt). The work of Watt will be considered first.

*Experimental Demonstration of the Task*

Watt used the method of partially constrained association which was two years later to be employed in the experiments of Messer already described. By means of Ach's newly devised card changer, printed words were shown on cards. According to the specified task (*Aufgabe*), the subject was to classify the object signified, to name an example of it, to name a whole to which it belonged, to name a part, to name another of the same class or another part of the same whole. Six subjects were employed, most of the work being done by four practised observers, who included Angell, Külpe, and Dürr. Fifteen words were allotted to each of the tasks, and in all over three thousand experiments were made. Time was registered by the Hipp chronoscope. Elaborate introspections were made after each word. These were recorded together with any remarks that the subject cared to make. Occasionally the experimenter questioned the subject on specific points. In addition, a series of experiments was made in which every observer was required to concentrate particular attention on one phase of the experience. For the purpose there were recognized four stages of the total process of association: that of the preparation <sup>4</sup> for the experiment, that of the appearance of the stimulus word, the search for the reaction word, when it occurred, and lastly the appearance of the reaction word (1905, p. 316). For example, the subject might be required to notice particularly what happened in consciousness before the stimulus word appeared. This was the method of fractionation, already mentioned in connection

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preparation. Here we have the difference between what we call the task and the mere tendency to reproduction . . ." (1906, p. 262). The intimate connection between the Wurzbürg work and Külpe's thought is here well illustrated.

<sup>4</sup> The influence of Külpe's already quoted statement may perhaps here be seen.

with Ach's experiments. Watt claimed that the method made possible more careful and better introspection.

The experiences reported by the subject could be classified under three headings. (A) The subject followed, throughout the experiment, a single line which led directly to the spoken word. This was the most frequent type. (B) The subject might seek a word which he did not find. (C) He may have intended to say one word, but actually have said another <sup>5</sup> (1905, pp. 303, 321; 1906, p. 258). In each of these three classes Watt distinguished three subdivisions.

(i) The reaction word may follow directly upon the stimulus with no intermediate experience or none that was describable.

(ii) In a great many cases, visual imagery ("a visual representation") follows the stimulus. Thereupon, either directly or after a pause or a search, comes the reaction word.

(iii) Sometimes there appeared between stimulus and response a verbal image, or "some experiences which could only be described in conceptual terms and not analytically according to the content— call it a thought—appeared between the presentation of the word and the spoken reaction" (1906, p. 258). This last is of course the *Bewusstseinslage* of Marbe, and it so appears in the German text (p. 304). In a footnote Watt explains: "We understand provisionally by this term an experience which is not yet analysable more closely" (*ibid.*).

The main object of the paper is to describe the effect of the task; and to distinguish it and its influence from the "reproductive tendencies"—and their influence. The effect of the task may be seen by the uniform influence it exerts on the general nature of the thinking process. To take first the simple reproductions, where the subject followed a single line until the final response was given, the percentage of each of the three subdivisions was found to change regularly and similarly with each subject from one task to another. Thus when observer I was given the task "name a whole of", 76 per cent. of his responses occurred without intermediate step, 23 per cent. showed intermediate visual images, 2 per cent. verbal images or *Bewusstscins-lagen*. When the same observer was given the task "name an example of", these figures were 68 per cent., 21 per cent., and II per cent. respectively.<sup>6</sup> Thus, says Watt, the nature of the task has an effect on the experiences of the subject. A subject who shows hardly any

<sup>5</sup> I follow here Watt's own English account in his abstract of 1906, which differs slightly in wording and arrangement from that of the paper of 1905.

<sup>6</sup> These figures are as given by Watt, 1905, p. 311.

visual imagery when asked to classify, may experience such imagery in 50 per cent. of his responses when he is asked to name a part. This same change of task may increase another subject's visual imagery from 50 per cent. to between 90 and 100 per cent. The duration of reaction is similarly influenced by the task.

We have hitherto been speaking of the simple "single-line" reactions. When we come to the complex reactions, where the subject follows more than one line or gives one word while intending to say another, here also we find reaction times varying with the task. The percentage occurrence of such complex reactions is, however, independent of it. This Watt explains as follows.

The occurrence of such complex reactions must depend on the number of associations or reproductive tendencies diverging from the stimulus in question. A stimulus with more reproductive tendencies attaching to it would be expected to give more cases where the subject pursued more than one line before giving his response. But the number of reproductive tendencies attaching to a stimulus depends on the stimulus and is independent of the task. Therefore it is natural to find that change in task does not change the number of complex reactions. Thus the experimental fact that the number of complex reactions is independent of the particular task shows once again that we must distinguish the influence of the task from that of the stimulus. This argument is put forward as embodying a probable hypothesis only.<sup>7</sup>

Watt attempts to separate the respective influences of the task and of the stimulus word upon the speed of the reactions in the following ingenious manner. Consider first the reactions of a single individual. Repetition, we know, diminishes reaction time. The more often an individual has made a given reaction, the shorter reaction time becomes, until the minimum time is reached. Now the associations that are more frequently experienced by one individual are likely to be those which he shares with other people. Consequently we are likely to find that, when the same response is made by different observers, the number of such different observers sharing the same response will vary directly with the speed of the response in question. The fastest responses would then be those given by the most subjects, and so on. Analysis of the experimental data shows this to be very generally true, with explainable exceptions. This gives a possible

<sup>7</sup> It will later be seen that Ach claims that a task, or what here comes to the same thing, the determining tendencies, may cause new associations to arise. If this contention is justified, it invalidates Watt's argument at this point.

method of eliminating the effect of repetition in an individual's reaction times.

Responses given by two or more persons are grouped together, and in each group the speed under different tasks is compared. It is found that within these groups of equally frequent responses, change of task has much the same effect as was found before when the general effect of task on duration was considered. That is to say, "the influence of the task is independent of the rapidity of the tendency of reproduction in itself". When that part of the speed which belongs, so to speak, to the stimulus word has been eliminated, it is found that the influence of the task in respect of speed of response is the same as before. So that, once again, the task is differentiated from the stimulus word (1906, p. 260). By a further analysis, he shows that "if other conditions remain the same, it is the individual strength or *rapidity* of the tendency to reproduction *which determines the reproduction*" (loc. cit., p. 261, original italics), and not any other factor such as arbitrary choice or selective attention. Different stimulus words, taken by themselves, have different sets of associations diverging from them. Any particular task, such as "name a part of", affects these equally, whatever their individual strength.

Thus he reaches the conception of a dual division of the factors affecting our mental life. There is the task in question, which has the same influence on all possible associatory reproductions. It acts by furthering certain reproductions and inhibiting others, and can only bring about a response if it has such previously existing associations to work upon. The task is generally repeated by the subject at the beginning of the series. Thus he may say "find a part", or "name an example", or exemplify the experiment to himself, in such terms as "animal—dog", and so on. Ordinarily, however, once the task is impressed responses are made without its repetition during the experiment, unless there is disturbance by the persistence or perseveration<sup>8</sup> of a former task, or for some other reason. In this case, the task will be repeated. The subject will "remind" himself that he is to "find a part", etc. Watt made the general statement, "The presentation becomes a task when it becomes constantly operative in the aforementioned manner; the task becomes a presentation or is

<sup>8</sup> Perseveration was first experimentally demonstrated by Muller and Pilzecker, *Experimentelle Beitrage Zur Lehre vom Gedachtnis, Zts fUr Psych.*, Erg. Bd. I, 1900, p. 58. It was taken over by Watt from its associational context, and applied here to the other mental principle he is setting up, viz. the task. It is doubtful whether the transfer is theoretically justifiable, at least without more careful examination than Watt gives the matter.

known (*bewusst*) as such, when it is no longer operative or when it must again be brought into operation" (1905, p. 346). *The unconscious -working of the task is one of the most striking features.* Thus a subject may report, to the stimulus word *copper* "consciousness of the meaning of the word lead' spoken involuntarily" (1905, p. 344). Only when the process of thinking is not running smoothly is the task brought to light in consciousness.

The task and the reproductive tendency may then be roughly demarcated in their function as follows: *the operation of both task and reproductive tendency are necessary for thinking. The essential material of the thinking process comes from the reproductive tendencies, which, according to the number of times the associations have been repeated, have acquired their own intrinsic speed. The actual speed of reproduction may, however, be affected by a task, which will favour some reproductions and repress others.* Thus to Watt thought is carried on by the fundamental machinery of association, with its own independent speed; the task directs the machinery, adding to, or in some cases possibly diminishing, the intrinsic speed of the fundamental mechanics on which it works.<sup>9</sup>

*Application of the Concept of Task to Two Problems. Messer's Contribution*

To illustrate this conception of the task it will not be out of place to show how Watt applied it to the solution of two psychological problems. The first concerns the old question of sensory and motor reaction types. It is well known that reaction times differ according as attention is directed to the stimulus or to the action to be performed. Into Watt's discussion we shall not enter except to say that he claimed that the subject is given a different task in the two cases. The distinction he says is, therefore, not physiological but psychological.

More important for our purposes is Watt's discussion of the Judgment which was adopted and characteristically elaborated by Messer. Watt points out that sheer association does not form a judgment.<sup>10</sup> Subjects refuse to recognize as judgments responses that were of the nature of free associations. Nobody, for example, would

<sup>9</sup> See 1906, p. 260.

<sup>10</sup> In the earlier paper of 1905, Watt quite clearly states this. In the later paper of 1906, he speaks of reproduction as being determined by the "overwhelming strength of the reproductive tendency", and thus conceivably against the influence of a task. The total context of the second passage implies, however, the contrast between free association and judgment,

claim that the ordinary association "man"- "woman" constitutes a judgment. Reproductions by themselves cannot then constitute judgment, but are "merely a succession of experiences under the one principle of association". It will be remembered that Marbe found no psychological criterion of judgment. He was right, says Watt, if attention is confined to what is experienced between the stimulus and the response. If, however, we look beyond these limits we see that what makes the difference between sheer association and judgment is the existence and the working of a task. Where there is a task operative, then there is judgment with reference to the task. Thus *copper-lead* as a sheer association would not be considered to constitute judgment; while if the accepted task was "find a co-ordinate object", and the stimulus word was *copper*, the same sequence would be accepted as a judgment with reference to the task in question.

This thesis that the task is a constitutive feature of judgment was, we have seen, confirmed and extended by Messer (1906, p. 93 *et seq.*), whose subjects very definitely refused to apply the term "Judgment" to a sheer association. Messer's analysis should be considered together with Watt's. A typical statement is "The judgment was experienced as something different from an association" (p. 95). Messer agrees that the task is of fundamental importance in judgment. Marbe's results are due, he says, to the fact that the tasks concerned have, by repetition, disappeared from consciousness because they have attained the status of self-evident presuppositions. This is the case with many of the tasks of everyday life, as, for example, the task that ordinary perception, thought, and speech shall so take place as to conform with reality.<sup>11</sup> Here we do not recognize the existence of a specific task. Yet a specific task must be present. In the same way we do not in ordinary circumstances recognize that a specific task is present when we make a judgment. Marbe's observers failed to take into consideration the question of the task, and for that reason they could find no criterion of judgment. In any case, the task had of course not been investigated when Marbe wrote, so that the observers did not know what to look for. However, Messer claimed that his own subjects were presented with so many different kinds of tasks that comparison and consequently self-observation was easier for them. Messer's general contention is that if judgment is compared, under proper conditions, with sheer association, it will be found that in the one case there is mental activity, act, function, while in the other there are only mental contents, data.

<sup>11</sup> One is curiously reminded of Freud's "reality principle" in thinking.

This he says is the real distinction as recognized by his own subjects in the judgments they made. Their judgment-experiences embraced first the stimulus and response words as perceived. These are data or content. In addition there was, however, the definite mental activity (act or function) of willing a specific judgment-relation between the two. There was gratifying agreement among the subjects that in judgment, "a relation between stimulus and reaction-presentation (*Vorstellungen*), which is characterized more closely as a predicative (or prepositional) relation, must be willed (meant) or at least recognized" (p. 105). Like every other such mental act, according to the act-content psychology, the judgment refers to an object. The thinking activity is a *meaning* activity. When we pass a judgment we refer to something that is not the judgment itself, but is that concerning which we are judging. We judge *about* something. We do so because of a specific task which we have accepted, and it is this task which is so difficult to recognize, because it is so familiar. In this discussion we are keeping strictly to the territory of psychology, for this "intention", or "intentional relation to an object", is treated "solely as a characteristic aspect of conscious experience".

Watt then had claimed merely that the psychological criterion of judgment was the task. Messer expanded the thesis (1) by pointing out that the familiarity of the judgment-task ordinarily obscures the fact of its existence, and (ii) by equating the judgment-experience with the *act of judging* in the act-content antithesis.

For a general estimate of the work of the Wurzburgers the reader is referred to the next chapter. On the specific point just discussed it seems better, however, to make certain criticisms *in situ*. The most cursory examination of Messer's general thesis reveals, in fact, many difficulties, which have been discussed in detail by Titchener.<sup>12</sup> They may be summarized by saying that if the act-content antithesis is to be used in the description of thinking careful distinction must be made between the "object" and the "content" of thinking. Thus Külpe<sup>13</sup> states: "Red is doubtless a content of the colour-sensation in which I experience it; the picture of a house is in the same way a content of the visual presentation in which the house is given to me. But the quartz-crystal of which I am thinking when I wish to represent to myself a case of hexagonal crystal formation, is not in the same way content of the thought by which I bring it to my con-

<sup>12</sup> On the whole, the present writer endorses what Titchener has to say concerning Messer's psychology of judgment.

<sup>13</sup> 1922, p. 320.

sciousness. Consequently there is no contradiction in the thinking of objects which are not thoughts, while in the sensing of a colour which is not the content of this sensation, there would certainly be a contradiction. Thinking can then be directed towards objects which are essentially different from thinking itself, and which, by being thought, do not become mere contents of thinking or mere thoughts."

That is to say we must, as did Bühler, distinguish between (1) the act or function of thinking, in Messer's case judging; (2) the (psychic) content of the act, including the terms of the judgment, and (3) the object of the judgment.<sup>14</sup> There is great difficulty in deciding what is the nature of the terms to be related in Messer's account of the judgment. Sometimes these must be facts of thought, sometimes objective facts. In the same way, there is difficulty in deciding what the judgment-relation is, whether it is a relation given by thought or a "relation between objects". As Bühler himself points out, Messer missed the further step of seeing that "the consciousness of the signification (of the terms related) must be regarded as something thought, as a thought *sui generis*. . . . *The predicative relation does not join two experiences as such but their objects, that which was thought in them.*"<sup>15</sup> That is to say, one cannot get a judgment out of any manipulation of "presentations". There must be reference to the object of thought.

*Summary and Criticism of the Würzburg Contribution to the Psychology of Judgment*

The history and criticism of the Würzburg doctrine of the judgment may then be summarized. Marbe had attempted a psychological analysis of the process of judging. This was to contrast with previous analysis in that it was to use the experimental method of scientifically directed and controlled introspection to determine what actually happens in consciousness when a person undergoes the judging experience. Marbe was able to find no introspective criterion of judgment. He left the problem with the declaration that the criterion was physiological not psychological. Watt made the task into the criterion of judgment. Judgment is "a sequence of experiences whose procession from its first term, the stimulus, has been determined by

<sup>14</sup> Messer makes the distinction, but in this paper at least is apparently not consistent in its use. According to Boring (1929), Messer enlarged his formulation of the act-content antithesis in his book *Empfindung und Denken*, published two years later in 1908.

<sup>15</sup> "*Remarques sur les problemes de la psychologie de la pensee*" in *Arch. de Psych.*, 6, 1907, p. 378. Italics by the present writer.

a psychological factor (that is, by the problem). As conscious experience, this psychological factor is itself past and gone, but it still persists as an appreciable influence" (Watt, 1905, p. 416; Titchener's translation). Actually, of course. Watt has not given a "psychological" criterion of judgment, any more than had Marbe. The fact that there has been a certain experience in the past does not confer a psychological (conscious) mark upon an experience at a later date. The use of the term "appreciable influence" merely obscures the issue. The critic is entitled to ask: is the task present in consciousness at the time of judging or not? The answer must be the latter, in which case no definition of judgment has been given in the terms Watt proposed. Specifically the question may be asked: how can a past task be "present" as a psychological <sup>16</sup> "influence" but not as a conscious experience? The question is unanswerable for Watt's psychology.

Finally, it might seem possible to amend Watt's analysis by adding Ach's conception of awareness. Watt's statement concerning the relation of the task to judgment would then read "as palpable, conscious experience, this psychological factor is itself past and gone, but it still persists as an impalpable awareness". At first sight plausible, this emendation does not, however, furnish a necessary and sufficient psychological criterion of judgment. It still leaves judgment a process of the manipulation of mental counters. The fact that one of these counters or a process involving them is impalpable does not vitiate the criticism already made in connection with Messer's work, namely that judgment does not solely concern experiences as such or their relation to a task. The emended statement would also, as Titchener points out in another context, make the definition of judgment too wide. Not every awareness of determination is a judgment-awareness. If so, then the word "judgment" loses its meaning in a sea of generality. Even the emended definition then leaves us with the original problem: what kind of impalpable awareness of determination is an awareness of judgment? Watt's criterion of judgment is not, and cannot be made, valid, at least as a sufficient criterion. It has further been seen that Messer accepted the "*Aufgabe*" criterion, and added an interpretation in terms of the act-content psychology. This interpretation must be rejected on the same kind of grounds.

Out of the discussions of Watt and Messer two facts emerge which do not indeed give a psychological criterion of judgment in the way in which these men understood the term, but which are of value in themselves. Judgment is more than association. This we knew before; but examination of Messer's protocols convinces one that his abundant introspective confirmation was very much worth while

<sup>16</sup> Using the term as equivalent to conscious, which is the point of the search for a psychological criterion for judgment.

in confirmation. Secondly, judgment may be recognized by a practised observer as "willed" (Messer) or, in more modern terms, voluntarily motivated. Those who accept Ach's *Bewusstheit* may wish to go farther and claim that such willing need not necessarily be cast in imaginal terms. It may be an "impalpable awareness". This fact of motivation seems to lose something of its value if it be remembered that the tendency is today to believe that all mental life, even the so-called free association of ideas, is motivated.<sup>17</sup>

There seems little doubt that the relatively unsatisfactory outcome of the investigations which we have just been discussing is due to a confusion between two terms which have since been clearly distinguished, namely that between the proposition and the judgment. Since the publication of Husserl's *Logische Untersuchungen*,<sup>18</sup> modern logic has been at pains to insist that it deals with propositions which are objectively true or false, and, at a first analysis at least, irrespective of the activity of a thinker. Judgment is the mental activity of affirming belief in such propositions. Judgments are therefore primarily psychological, and the conditions of their arising may be investigated by psychological methods. Propositions are independent of psychological considerations, just as much and just as little as are mathematical formulations. In this respect of independence of psychological considerations logic is closely allied to mathematics ; and indeed a great development in this direction is seen in modern symbolic logic. The general distinction between the judgment and the proposition is well brought out by Husserl in an extraordinarily able polemic against what he calls Psychologism in logic (loc. cit., p. 50 ft.). It deserves to be read for itself as a masterpiece of psychological exposition.

Granting this distinction,<sup>19</sup> it can readily be seen that the "objective" proposition cannot be derived from the act of believing or affirmation, which is the judgment. Nor can it be derived from any manipulation of mental presentations. Nor can a judgment that an "objective" proposition is true (that is to say, an affirmation of belief in such an objective proposition) be equated, as Messer thought it could, with the willing of a relation between presentations. Psychic

<sup>17</sup> See, e.g., Varendonck, *The Psychology of Day-dreams*, London, 1921.

<sup>18</sup> Husserl, Edmund: *Logische Untersuchungen*, Zweite Auflage, Halle, 1913. (The first edition was published in 1902, so that the Wurzbürgers could have read it, and indeed did so. The significance of the work for their problem seems, however, to have escaped them.)

<sup>19</sup> Which is now presupposed in textbooks of logic. See, e.g., Wolf, A., *Textbook of Logic*, London, 1930, § I, p. 18.

activity is indeed present in judgment, but it is not adequate to describe judgment, any more than it is adequate to describe a mathematical formula. In each case, there must be an "objective" proposition which, independently of the thinker, relates its terms. Husserl's main endeavour was to free logic from the shackles of psychology. Equally he has succeeded in freeing psychology from the shackles of logic. The task for psychological research is now clearly demarcated, as it could hardly be in the time of the Würzburgers. It is to examine such problems as that of the nature and the conditions of the affirmation, on the part of individual thinkers, of "objectively independent propositions." Thus will a purely psychological research be unencumbered by the many epistemological difficulties which flock round the notion of the objective proposition, and which undeservedly confused Messer in his psychological inquiry.<sup>20</sup>

#### *Watt and Messer on the Function of Task and Association in Thinking*

To return to Watt and his chief contribution—the task. The properties of the task and its influence on thought were in the main confirmed by Messer. In general, Messer finds that the task *gradually disappears from consciousness*, and yet still functions. The usual course of events is for the task to be grasped attentively when the experimenter gives his instructions, and perhaps repeated several times. During the first experiments of a series the task is present in consciousness in a more or less definite form. As the series progresses it is no longer present, but the fact that it is still functioning is shown by the appearance of the appropriate responses. When the task is changed, it must again be brought into consciousness, and also when the nature of the stimulus demands careful attention. This is the case, for example, when objects or propositions are used as "stimuli". The fact that the task is not functioning properly is shown by the uncertainty of the subject, in which case the task is, as a rule, speci-

<sup>20</sup> Two quotations will illustrate the fundamental clarification of the important issue discussed on the last page and which modern logic has been able to effect. "Our use of the term proposition makes abstraction from the element or moment of belief." After a discussion of judgment, the same work proceeds "these are psychological matters with which we are not directly concerned" (Wolf, *op. cit.*, pp. 40 and 44.) Compare with this the following quotation from a standard textbook of logic written in 1916. "The true unit of thought, the simplest complete act of thought, is the Judgment or Proposition: between which, where a distinction is intended, it is that a proposition is the expression in words of a judgment" (Joseph, H. W. B., *An Introduction to Logic*, Oxford, 1916, p. 14). Chapter VII of Joseph's textbook is entitled "Of the Proposition or Judgment", a heading which, I venture to say, would be impossible in a modern textbook.

fically recalled. Thus, even when the task has become unconscious, it can be recalled, and this recall serves to strengthen it (Messer, loc. cit., p. 209).

Since Watt claims that all thinking may be considered to be due to the interaction of the two principles, task and memory or reproductive tendencies, if the task finds no reproductions to hand, no reaction or thought can occur. On the other hand, the tendency to reproduction may be too strong for the task to operate. In this case it ("reproduced presentation") "forces its way out in spite of the task, when a wrong reaction takes place" (Watt, 1906, p. 261). The task can only overcome a limited amount of force, he says, a statement which is reminiscent of Herbart's mental dynamics.

Both Watt and Messer note that there may be a certain amount of interaction between the task and the reproductive tendencies. For instance, Messer shows that subjects may tend to specialize the task. Thus, in his first series, when his subjects were told to give any random word, the first that occurred to them, they often sought for a word that stood in some definite relation to the stimulus word. In fact, it was quite difficult to give a meaningless response. In these cases the subject often set himself a task which might spring naturally from the stimulus word. "I am 'set' to associate the co-ordinate idea," said Külpe on one such occasion (Messer, p. 23). So-called free association regularly shows the influence of "reproductive tendencies" in inducing such specialization of task. There are, of course, individual differences. Messer quotes Binet as noting the same fact of specialization of task in "free association". The same point has later been made by many experimentalists.

In the same way. Watt notes the reciprocal influence exerted by the task and the mental representations, the conscious correlates of the stimuli in question. A suitable stimulus, for example the spoken words of the experimenter, may introduce the task. When the latter has ceased to function properly, it may again come into consciousness. Here the further stimuli presented in the progress of the experiment have induced states of consciousness which have influenced the task, causing it to appear once more in consciousness. The reciprocal influence of task and stimulus word, in the narrower sense, will prove to be important when we later consider the work of Selz.

Thus we have experimentally exhibited for the first time a contrast between what may be called mechanical and non-mechanical factors in thinking. Watt's task is exactly a factor in thought which is not the sheer interplay of associative tendencies aroused by the stimulus.

Just what difference Watt imagined to exist between the task and the reproductive tendencies, it is difficult to say. *in* one context he protests against "the general tendency to interpret and schematically represent the task in the sense of sheer reproductive tendencies" (1905, p. 329). In another he speaks of "the task, which indeed is itself to be thought of as a greater and stronger reproduction-motive" (1905, p. 420; cf. 1906, p. 265). But the general burden of his experimental study is that the task must be distinguished from the reproductive tendencies belonging to the stimulus word. They cannot be interchanged, nor simply replaced one by the other. Watt's scheme is thus an emended associationalism. In addition to providing the fundamental material of the thinking process, the reproductive tendencies provide also a fundamental speed factor. As already quoted, p. 71, "the rapidity of a tendency to reproduction from one point to another in the stream of succeeding ideas is something by itself, independent of the task operating at the moment" (1906, p. 260). Each of these inherent properties of the reproductive tendencies, the qualitative and the temporal property, may be modified, as regards the ultimate effect on consciousness, by the task.

On this experimental foundation Watt erects a general hypothesis of thinking: "Thinking is accordingly the clash and mutual resultant of different groups of factors in a unifying consciousness. Of these factors that which we have called the task exercises a decisive influence on the relative sequence of the others and from many directions determines the manner of their appearance." The condition that a specific conscious experience shall arise is that the appropriate reproductive tendency shall meet with the appropriate task. The Bsl. is a task without a definite name.

To give one example only. I am asked to buy a copy of D. H. Lawrence's novel *Sons and Lovers* when I am in town. On my way I am completely unconscious of the task. I walk down the main shopping street and see a bookshop. The sight of the shop serves as a stimulus. From the correlative presentation diverge a number of reproductive tendencies and of these certain are favoured by the task, and conscious reproduction, memory, takes place. At the same time, the task comes into consciousness. "Oh yes, I was to buy a copy of *Sons and Lovers*." I pass, let us say a garage, but the sight does not remind me that garages sell motor oil. There is no task here. If, however, I stand at the window of the bookshop, and think "Oh yes, I was to buy a book. Let me see, it was by what do you call him?" Then I have a *Bewusstseinslage*, one of "doubt, with the cognate

forms of uneasiness, difficulty, hesitation" (Titchener). I have a "task without a name"<sup>21</sup> as Watt called it. Anybody who has tied a knot in his handkerchief, in order to remember to do something, and has then forgotten what the knot was for, will feel that Watt's description of a Bsl. as a task without a name is sometimes justified!

In conformance with the practice already established for this chapter, general criticisms will be deferred to a later occasion. Specifically, however, it should be said at this point that Watt's account of the *Bewusstseinslage* is clearly inadequate. What Watt has done is first to dichotomize mental life into "task" and "reproductive tendency", and then to lay down the postulate that the experiences called Bsl. by the Würzburg school must belong on the "task" side of the dichotomy. There is hardly need to insist that such a postulate is unjustified. One need only mention the Bsl. of "*Memory of a common figure of speech*",<sup>22</sup> "*remembrance of instructions*", "*remembrance of past conversations*",<sup>23</sup> and "doubt" (*passim*) to make it abundantly clear that, even adopting the dichotomy, the Bsl. need not necessarily be of the nature of a task. As we have seen, the concept of the *Bewusstseinslage* was gradually found to be unworkable and was ultimately abandoned. One should then perhaps not take too seriously this enthusiastic attempt of Watt to explain it in terms of his own particular system.

#### *The Determining Tendencies*

Watt's conception was elaborated and fresh data on the whole problem were given by the complementary work of Ach. Ach attempts to make the method of the interaction of task and reproduction more specific. How does purpose bring about specific action? This is the question he asks. His answer is as follows.

There has been present in consciousness an "aim-presentation" (*Zielvorstellung*).<sup>24</sup> From part of the content<sup>25</sup> of this presentation proceed influences which carry with them a determination in the sense of, or according to the meaning of, the aim-presentation. When, in the laboratory, the stimulus is shown, these influences

<sup>21</sup> Here only part of the total conscious content is present as a Bsl. The whole task will take over the aspect of a Bsl. if on looking at the shop I am reminded "Oh yes, I am to do something or other".

<sup>22</sup> Chapter II, p. 33.

<sup>23</sup> Marbe, pp. 18, 87. Italics are the present writer's.

<sup>24</sup> The *Zielvorsfellung* is first mentioned on p. 187, unless I have missed an earlier reference. The phrase was apparently regarded as self-explanatory, as I can discover no definition.

<sup>25</sup> *Eigenartiger Vorstellungsinhalt der Zieivorslellung*, p. 187.

work on the stimulus-presentation to form a (specific) purpose, and action takes place. These influences Ach calls the "Determining Tendencies". Instructions are, for example, to lift the right index finger if the letter *E* appears, the left if the letter *O* appears. Suppose that the letter *E* appears. From part of the content of the aim-presentation arising when the instructions are given, proceed influences which work on the stimulus-presentation of the letter *E* to form the specific purpose of lifting the right index finger and action follows.

Thus the specific purpose is formed by the establishment of relations between two psychic presentations, namely the "presentation of aim" and the "presentation of stimulus"<sup>26</sup>; when the stimulus actually appears, the latter of these is termed the "concrete stimulus presentation", to distinguish it from that which is present in the purpose as part of an awareness (Ach, 1905, p. 224).

The influence of the determining tendencies may be seen, says Ach, in a number of ways. When, for instance, the coloured card appears it may be seen not simply as coloured, but as "coloured according to instructions". Or a mental assent may be attached to the visual quality. "Yes, this is red." The process whereby this occurs is called "Apperceptive Fusion". It will be noted that there is no conscious representational experience directly correlated with these tendencies at the time when this fusion occurs. The influence of the same tendencies, says Ach, is evident in the attitude of surprise which is often experienced when an unexpected card appears. This happens, for example, when the subject is "set" to react to a white card, and a red one is shown instead; or when the subject had the purpose of dividing, and two figures appeared of which one cannot be divided by the other without leaving a remainder; here the influence of the (unconscious) determining tendencies is shown by their effect on the perception of the stimulus. Ach distinguishes, not very successfully, between apperceptive fusion and determined apperception. An example of the latter is to be found in the subject who carried a visual image of a "plus" sign when he was given the task of adding. The figures when they appeared fitted themselves into the visual scheme imagined, and the "determined presentation arose from this *apperceptive fusion*". To another subject stimulus-figures appeared distorted according to the task; when he had been told to add, the figures appeared to be pressed together, when he had been told to subtract they were pressed apart. All these effects Ach attributes to

<sup>26</sup> Or perhaps "object"

the influence of the unconscious determining tendencies. Such influences may even produce what Ach calls apperceptive substitution. When, for example, the task was to "find a rhyme for", and the subject had been thinking of a specific letter, the stimulus may be actually perceived with the first letter altered accordingly. Thus "mek" was perceived as "bek" by one person; the task was to "find a rhyme for", and the subject had been "thinking of" the letter "b". In all these cases, Ach argues, the effect upon consciousness of the stimulus is modified because of the existence of influences which spring from the "aim-presentation", but which have no direct and explicit conscious representation.

The existence of such determining tendencies, he claims further, is illustrated by many well-known experiments on hypnotic suggestion. In one of his own experiments (p. 188) a subject was told under hypnosis: "Two cards will later be shown to you, each with two figures on them. When you see the first, you will name the sum, when you see the second you will name the difference of the figures, etc." The subject was wakened up. "After a few minutes of trivial conversation, I held in front of him in my hand a card with the figures 6/2. Immediately he said *eight*. When I showed him a second card with 4/2, he immediately said *two*." On being questioned, he stated that he said eight "quite casually—1 had the need to say eight", and so on. Control experiments were carried out. The hypnotic experiment is impressive evidence for Ach's unconsciously working, determining tendencies. It presents in a clear form a further argument for their existence. The argument is that it is necessary to postulate some psychic principle other than association pure and simple; for the same stimuli may cause different responses according to the particular purpose undertaken. If the figures 6/2 are shown, the response may be either 8, 4 or 3 according as the subject has in mind to add, subtract or divide—the purpose, again, having had no representation in consciousness. Some selective influence between reproductive tendencies must be assumed. This he finds once more in the determining tendencies.

Association and perseveration<sup>27</sup> had already been postulated as mental mechanisms. Ach is then proposing to add the determining tendency as a third mechanism. According to his theory, it is these tendencies which give to thinking its ordered and purposeful character. Without them mental life would be a chaotic clash of associative

<sup>27</sup> The tendency towards persistence. See G. E. Müller and A. Pilzecker, *Zts. f. Psych. Ergänzungsbd*, 1, 1900, pp. 58 ff.

tendencies. The determining tendencies are the directive factor in thinking. They rule out irrelevancies. They prevent chance stimuli from distracting the course of the thinking-process. The rule is that they operate by favouring those reproductive tendencies which are in line with the purpose of the subject. On presentation of the stimulus, the aim may come to mind, though this is not usual; it apparently occurs when the purpose has not been intensively enough grounded. Determining tendencies may proceed, not only from an accepted purpose, but from a suggestion, a command, or a task, though Ach explicitly states that he is interested not so much in the problem of how they are established, as in the fact of their existence (p. 196).

That they are independent of the associative connections of the material presented, Ach claims to have shown by the fact <sup>28</sup> that by means of the determining tendencies fresh associative connections may be made. Thus the instructions were to find a nonsense rhyme to a nonsense syllable, or to give an alliterative response. For example, when "lep" was presented the response was "les", and these syllables were thereafter bound together associatively. This new association is formed by the subsumption of the two elements under a single common aim.

The final general statement of the book follows. It will be noticed that it stresses the unconscious nature of the determining tendencies. "Thus the qualitative determination of the determined presentation is here without doubt to be referred to influences which function in the unconscious, understanding by the unconscious simply that of which we are not conscious. These acts, which work in the unconscious, proceed from the meaning of the aim-presentation, are directed towards the coming object-presentation, and which bring with them a spontaneous appearance of the determined presentation, we designate determining tendencies" (Ach, 1905, p. 228).

The picture is completed by Ach in a work thirty years later.<sup>29</sup> Here once more it is explicitly stated that "the activity of the Determining Tendencies is brought to fulfilment **in the unconscious**. The determination . . . is effective without conscious memory of the Task" (op. cit., pp. 150-1). The aim appears in consciousness only under special circumstances and as a means of attaining the goal; "for example, on the occasion of diversion of the attention, of

<sup>28</sup> It will be remembered that this runs counter to Watt's belief.

<sup>29</sup> Ach, N., *Analyse des Willens*, Berlin, 1935. Reprinted from Abderhalden's *Handbuch d. htologischm Arbeitsmethockn*, Abt. VI, Teil E.

special difficulties, inhibitions, and so on, and also when false reactions have appeared, which come on the scene with the awareness of error". The determination knits the mental process into a functional whole, "whose parts", he says, "form a nexus, a structure; . . . the co-ordination of the parts, mutually and to the whole, is in functional dependence on the special properties of the determination".

So much for the primary function of the determining tendency. To the question as to its nature, Ach gives then no answer. We have seen that he was hardly interested in the problem. Thirty years after the original paper, he was inclined to think that no answer was possible at the present stage of psychological knowledge.<sup>30</sup> The determining tendencies remain like the atom, hypothetical agencies, known by their effects but apparently by their nature unobservable. We have noted that in his later work Ach is still quite explicit on the point that the determining tendencies operate in the unconscious, although the aim may at one time have been conscious (Ach, 1935, p. 150). It is important, of course, to distinguish between the original consciousness of the aim or purpose from that of the determining tendencies.

But although the determining tendency is not, as such, conscious, it is, nevertheless, not without effect upon consciousness. Such effect has already been found in the *Bewusstheit*, or awareness of determination. It has been seen that the *Bewusstheit* of determination is an intermediate form between the awareness of meaning and the awareness of relation. As an awareness, it is "the presence of an impalpably given *Knowing*" (*Wissen*). Ach's observers found that they were immediately aware, as a characteristic experience, whether or not a given psychic event conformed to a previously established determination. Where the train of events accords with a previous determination, it is characterized, because of its content, as "willed". "Such a train of psychic processes, which is to be referred to the influence of previous, determining tendencies, we designate as 'willed', or alternatively as a procedure which occurs with the agreement of the subject. The known experience of such an event is qualitatively uniquely determined, and the individual can in particular cases immediately report whether the procedure was willed or not" (Ach, 1905, p. 230). In this way one can distinguish between willed activities and such events as fantasy or reflection. With practice, the awareness of determination disappears, in

<sup>30</sup> Ach, 1935, p. 195.

greater or less time according to the nature of the purpose and the peculiarities of the subject. The awareness of determination has been described previously.

*Application of the Determining Tendencies to the Problem of Abstraction*

An important function of the determining tendencies should now be described, namely the *determination of abstraction*. According to Ach's scheme, repetition of any particular stimulus results in abstraction because the essential associations (reproductive tendencies) are repeated most often, and thus gain strength at the expense of inessential adventitious associations. Thus arises what he calls "associative abstraction", which is fundamental for conceptual thinking. In addition, he describes two other forms of abstraction. There is first *determined abstraction*, which is of two forms, simultaneous and successive.

*Simultaneous determined abstraction* was first described by Külpe. In response to a given task, Külpe's (1904) subject might for example describe a figure correctly, without conscious experience of the nature of the surrounding figures.<sup>31</sup> Ach's own subjects behaved in something the same way. A subject might carry the letter "s" in his head. When the stimulus "c s v z" appeared, "s" alone was perceived and the appropriate reaction made. The other letters were disregarded as the result of a process of abstraction. This process might be simplified. The mental repetition of the letter in question might be omitted, and there might be merely "intentional sensations of movement" in the appropriate finger. In either case, the abstraction was effected through the agency of the determining tendencies. The awareness of determination would have as its conscious token in the one case the verbo-motor image of the letter "s", in the other the kinaesthetic image of a finger movement. Closely allied is what is known as "concentration of attention".

In *successive determined abstraction*, the process of abstraction is directed towards conscious events which follow each other. Thus with the instructions to react as quickly as possible, the subject gradually abstracted from the quality of the stimulus as the series of reactions progressed. In general, this occurred whenever the instructions were sufficiently independent of the qualitative determination of the stimulus. The subject begins to react first to "something white", and then to a "change" pure and simple, apart from

<sup>31</sup> The experiment was repeated by Chapman, 1932.

spatial and other considerations. The transition came gradually (as indeed is the case in all experiments with abstraction). So strong is this tendency to abstraction that it is only by stringent repetition of the instructions or persistent watching of the stimulus that it can be avoided. Other instances of successive determined abstraction may be seen in the process whereby an intervening middle term may be gradually dropped. For example, a subject might begin a reaction series by mentally repeating the letter *E* when that letter appeared. Gradually this "acousticokinaesthetic presentation" disappeared, and reaction followed directly on the perception of the stimulus. The determined abstraction here operates in such a way that it "seeks as far as possible to eliminate all . . . intervening processes" (Ach, 1905, p. 242).

By the combination of these two forms of abstraction, associative and determined, the formation of general ideas is made possible. Suppose, for example, that reaction takes place to a "change", this being effected by means of the successive form of determined abstraction. This reaction may take place only when the change occurs under certain spatial conditions. Adventitious changes, such as irrelevant movements, will be eliminated as stimulus-factors by means of associative abstraction. In the same way, alterations in the quality of the motion will lose their psychological effect. Here both forms of abstraction are functioning, and Ach calls the process *Combined Associative-determined Abstraction*. By virtue of their associative function, the determining tendencies may cause a verbal sign to be attached to this psychic event<sup>32</sup>; and conversely, when the sign, e.g., "change" is given in consciousness, the correlative meaning is present in consciousness as a *Wissen*, a knowing, this being given by means of the subexcitation of reproductive tendencies.<sup>33</sup> Further repetition eliminates adventitious spatial determinations so that we are left with the sign "change", with a general, though delimited, meaning. Thus, through the combined influence of determined abstraction and associative abstraction, a general meaning has been attached to the word "change". This process bridges the gap between the concrete content of an awareness, which is already, from a psychological point of view, abstract, to ideas which are abstract in the narrower sense. Thus Ach has distinguished three main processes of abstraction.

<sup>32</sup> It will be remembered that the determining tendencies may cause fresh associations to arise.

<sup>33</sup> See p. 50.

There is (a) associative abstraction, (b) determined abstraction, which may be either simultaneous or successive, (c) combined associative-determined abstraction.<sup>34</sup>

A child sees a bird flying in the street. The whole scene is psychologically registered, including houses, people, and so on. Later the same child sees a bird flying in another street. All the details with which each bird has been associated have left their mark on the nervous system, and appropriate reproductive tendencies have been formed. Of these reproductive tendencies the essential ones are reinforced, the inessentials—what Aristotle would call the "accidents"—remain relatively ineffective. When the child sees a bird on later occasions, the effective reproductive tendencies are subexcited, and the resultant in consciousness is a *Wissen*, a knowing, which is not present in terms of any specific sense modality, and is thereby to be contrasted with its explicitly visual sign, the bird as it presents itself to visual perception. Thus the bird as seen, the "visual presentation", is accompanied in consciousness by an impalpable halo of awareness of knowing, which is gradually sharpened and made more precise by repetition of essentials and dropping away of inessentials.<sup>35</sup> This again is the product of associative abstraction. It proceeds quite mechanically, and is not motivated, is independent of the action of determining tendencies.

With this mechanical process may be contrasted abstraction that is motivated, determined. Under social pressure, exerted by his teacher or otherwise, a child learns to read. At first he observes every detail of the complex situation before him, the position of the word on the page, the number of the page,<sup>36</sup> any individual peculiarity of the letters, and so on. With further experience, these irrelevant details gradually disappear from consciousness. Few of us who read a novel notice the number of the page which we happen to be reading. It is well known that reading takes place from the presence of strategically placed cues, that in what is called "proof-reader's error" we can actually misread words that are wrongly spelled (Ach's "determined

<sup>34</sup> These two methods of abstraction, both accepted by Ach, apparently embody the two hypotheses now in dispute in the discussions over the "Continuity Theory" (Lashley, 1942).

<sup>35</sup> It is difficult to see whether Ach believes that inessentials drop away by themselves, or whether their energy is sapped, so to speak, by drainage of energy towards essentials. On the last page but one of his earlier book (249), he speaks as though the latter were the case when concentration of attention occurs.

<sup>36</sup> The writer remembers a visitor to a class where he was learning to read asking "What page of the book tells you about so and so?" *With one accord*, it seemed to him then, the children answered "Page ten".

apperception") The number of the page and the details of individually printed words are not present in consciousness because they are irrelevant to the aim in mind, which is to "read" the novel. Ach would say that the determining tendencies have eliminated the corresponding factors from consciousness. Since it is practice that has effected this result, such abstraction from all but a few relevant cues would be classed as successive. As Ach notes, it is difficult to avoid such abstraction, as anybody who has read proof can testify. As he finally points out, such abstraction, with the correlative concentration of attention which it entails, makes towards economy of action.

To illustrate the third form, combined associative-determined abstraction, let us take as a hypothetical example the way in which a new species of animal may be described. The child, having become familiar with birds in general, later, we may suppose, becomes an ornithologist. He is impelled by his scientific purpose to examine more closely the birds of a particular species, to which the name has been attached by the ordinary process of association. His idea of the birds of this species and his reaction towards them is now moulded by his general purpose. He notices certain members of the class with a particularly long bill. Still under the influence of the determining tendencies, he watches for this particular variety. "Long bill" becomes the sign for birds of this variety. His attention is abstracted from the rest of the bird's appearance, and is focused only on the bird's bill. Gradually the fact is borne upon him that the bird has a particular kind of song. A new variety is described, the "Long bill", the term being attached by determined association. In this process abstraction and determination are clearly very intimately related. It is hard to tell where associative reaction ends and determined abstraction begins. Finally the name "Long bill", whether seen in print, or repeated imaginably, serves as a palpable sign for the impalpable knowing (*Wissen*) that members of this variety have a long, slightly curving bill, a certain kind of song which changes to a deeper note as the summer wears on, that they lay four to six eggs with certain markings, and so on. These details, which have been attached to the sign "Long bill" by determined association, are not of course present imaginably whenever the name is read, heard, or imagined. Since they have in the past been observed together with the bird, reproductive tendencies corresponding to them are aroused when the bird is seen. The relevant reproductive tendencies have persisted, while irrelevant ones—such as the different details of the trees on which the bird has been sitting—have faded away. This happens, according to

Ach's theory, because the essential features have occurred more frequently in conjunction with the bird than inessential ones. When the word "Long bill" is heard or seen, the relevant reproductive tendencies are subexcited, such excitation being sufficient to produce an impalpable *Wissen* without coming to the point of imagery.<sup>37</sup>

By a devious path Ach has reached his experimental goal, which was the will. The subject is told to react in a more or less definite way to a stimulus which is to follow. When the stimulus appears, he forms a purpose to react to it. The whole course of events between the "ready" signal and the appearance of the stimulus is guided and unified by unconsciously working determining tendencies. When reaction follows, which occurs in accordance with these regulative, unconsciously working forces, the subject is impalpably aware of the conformity; he "agrees" with the response, recognizes that the procedure was "willed". In the interval between stimulus and response, there is present in consciousness an impalpable knowing of what is to come, embracing (*a*) the temporal and a qualitative determination of the stimulus, together with (*b*) what is to follow on the subject's own part, and (*c*) the relation between his reaction and the coming stimulus. This simultaneous, impalpable knowing is accompanied or immediately preceded by an imaginal or sensational sign. The combination is called an awareness.

#### *Confusion of Ach's Exposition*

This account has been presented as closely as possible to its original form in 1905. The exposition is poor. The argument is confused and repetitious. In particular, the general relation of experimental data to experimental result is disorderly to the point of chaos. Any faithful account of the monograph must inevitably reflect the confusion of the original presentation. To take examples: Apperceptive fusion is treated twice, on pp. 226 and the following, and on pp. 191 and the following: there is no apparent relation between the two treatments. The same sentence is repeated word for word in each of these two accounts (*Beim addieren . . . grosseren*, p. 227, lines three to five, and p. 192, lines eight to eleven). Again the main experimental results are described in chapters two and three. Chapter four is headed "The Determining Tendencies. The Awareness." Logically it should contain a discussion of the results of the main experiments just treated, and early in the chapter is to be found the statement that

<sup>37</sup> See Chapter IX for a fuller discussion of Abstraction, together with an account of Ach's later experiments.

the investigations described in the previous paragraphs make necessary the concept of the determining tendencies. This statement comes as a surprise to the reader; for the determining tendencies have apparently been mentioned in one previous context only (p. 119), and here almost incidentally in the course of a statement that the working of the will need not necessarily be "given as conscious experience" (ibid.). This seems to be the only mention of the determining tendencies as such during the whole course of the description of the original experiments, a description which covers a hundred and fifty pages.<sup>38</sup> Actually, therefore, the concept of the determining tendencies is not necessary for the description of the experiments. In view of his insistence on the strictly experimental nature of his inquiry Ach owes it to his readers to analyse the previous experimental data, and to show why they necessitate the conception of the D.T.'s. What he actually says is: "From the investigations described in the previous paragraphs it results that side by side with the associative and perseverative tendencies to reproduction we must place still other factors . . . the Determining Tendencies" (p. 187). The assumption of the existence of the determining tendencies may or may not be necessary for the adequate description of mental life. But the relation of this assumption to the previously described experiments has not been adequately shown. Again, after the statement that the determining tendencies are a necessary inference from experiments already conducted, there follows a description of further experiments, those on hypnosis, which illustrate the same tendencies. The resulting effect is one of further confusion, since once again it is here that the reader expects to find an analysis of experiments previously described, together with a demonstration that the D.T.'s follow as a necessary inference from them. Throughout the book, in fact, there is, at least in the matter of the determining tendency, no *clear expositional distinction between experimental data and description* on the one hand, and *deduction or hypothesis* on the other. This expositional confusion is further illustrated in section 13, p. 191, headed "On the Determining Tendencies". Here, at last, one feels, must come a conspectus of the previous experiments, showing how they necessitate the concept of the determining tendencies. It is once again disconcerting to find an account of an entirely fresh batch of experimentation, with no fresh heading, and proving a *special property* of the D.T.'s. This account of fresh experiments fills eleven

<sup>38</sup> There are, in contrast, many mentions of the word *Bewusstheit* in these pages.

out of the nineteen pages of section thirteen, which once more should logically contain deductions from the experiments previously described. These are, in a sense, trivialities. But they do illustrate the fact that Ach's exposition is poor, and that there is no orderly distinction of experimental data from experimental conclusions. In a work which professes a rigid experimental programme, and one with the oft-repeated motto of "systematic experimental introspection", this amounts to a serious error in technique. When the existence of an essentially unobservable, hypothetical entity is being demonstrated by experimental methods, we are entitled to ask for a clearly defined expositional separation of data, deduction, and application.

*Argument for Existence and Effects of Determining Tendencies*

In view of this confusion, and at the risk of repetition, the following brief summary of the argument is appended for the existence and the effects of the determining tendencies. The experimental facts are, briefly, the sudden appearance in consciousness of the appropriate idea (presentation), when the purpose has not been represented in consciousness; the facts of apperceptive substitution and fusion, and of determined apperception; those of hypnotic suggestion; the fact that an association can be formed between two nonsense syllables that have not been experienced together, and that the same stimulus may give rise to different responses with different purposes. These seem to be the primary experimental data on which is based the hypothesis of a directive influence proceeding from the content of the aim-presentation, although it has been seen that these data are not given when the main experiments are being described. Observation shows that such an influence is not directly represented in consciousness, but its effect may be seen in the Awareness of Determination. Granting the hypothesis of the determining tendency, then determined abstraction seems to follow as an application of the hypothesis though the logical sequence is not made clear. And as a general application, we have the undoubted fact that the course of thought is directed, teleological. Such at least seems to be the argument, though it is difficult to disentangle.

*Criticism of the Experimental Work of Watt and Ach*

Following the practice already adopted, criticism *of specific* points only in the work of Watt and Ach on the mechanism of thinking will be made at this point. The first, and perhaps the most serious, of such specific criticisms immediately suggests itself from what has

just been said. *Ach's method of obtaining the facts in question was not really experimental in any strict sense.* It did not comprise a series of strictly controlled observations, made under standard and therefore reproducible conditions. There were, for example, no standard questions which the experimenter asked the subject. Questions, indeed, there were; that was part of the method. But they varied, apparently, from experiment to experiment and from subject to subject. "In this way there takes place a continual, closely-knit exchange of thoughts between the observing subject and the observer who is recording" (Ach, 1905, p. 8). A set of conditions (questions and remarks on the part of the experimenter) which varies intimately with the nature of what is being observed and recorded is not and cannot be strictly scientific. Neither Watt nor Ach gives any hint of a list of standard questions, for the reason that there was no such list. The point seems not to have occurred to them. Watt gives certain questions incidentally; throughout Ach's monograph there is no mention of specific questions *in situ*, only the general statement quoted above, and similar statements and implications.<sup>39</sup> (see, e.g., p. 14). Ach is indeed cognizant of the relative uncertainty of his method compared with that of the exact sciences, and of the difficulty of obtaining standard conditions (p. 16). When "wide play is allowed for the tact and cleverness of the experimenter" (p. 17), standardization and thereby reproducibility was necessarily ruled out. It was, says Ach, impossible, "beyond any man's strength", to record the questions. One has considerable sympathy for him; yet this impossibility nevertheless touches a grave fault of method. Actually, in the passage where Ach speaks of the possibility of "variation of single conditions of experiment" and the resultant "possibility of establishing lawfulness of behaviour" (p. 21), he has apparently forgotten that not only variation of conditions is necessary for experiment, but standardizing of conditions as well. And this he has himself confessed that he could not obtain.

Thus in one important respect, that of standardization of conditions, Ach's demonstration of the existence of the determining tendencies falls seriously short when judged by rigid experimental canons. But apart from this, it has already been indicated that there is no real attempt to correlate the conclusion with the main body of the experimental results. Thus it has been seen that the determining

<sup>39</sup> A sample of the questions is given in Ach, 1905, p. 17. There is, however, no hint of any regularity in posing them. Questions used in the experiments on hypnosis are recorded on pp. 207-8, footnote, and also on p. 233.

tendency is apparently introduced for the first time almost casually on p. 119, after eighty-eight pages describing the main body of the experiments.<sup>40</sup> There are indeed references to the "set" (*Einstellung*) towards movement (pp. 52-3); but this is no novelty, and is a very different thing from the statement that an entirely new and fundamental principle of mental life must be set up as a result of the previously described experiments. There is further no clear demonstration of the necessity for assuming both purpose and determining tendencies. It is stated, for example, that the "quality of the determined presentation follows in consequence of the activity of a previously given Aim-presentation" (p. 228). Just before, the same effect had been attributed to the D.T.'s (*ibid.*). Watt, who was working in the same laboratory, would have been well entitled to ask what evidence there is for the necessity of assuming the determining tendency in addition to the *Aufgabe* with which he himself worked. In fact, Ach has not shown experimentally that his multiplication of entities is necessary or desirable. The most he can be said to have done in this direction is to have effected a certain elaboration of Watt's theory. In his introduction (p. vii) Ach states: "Part of the work, including those results which led me to the assertion of the determining tendencies, or of the Realization-Tendencies, as I then called them, . . . was announced in the Summer semester of 1902."<sup>41</sup> In contrast to the experimental exposition of the *Bewusstheit*, one cannot avoid the uneasy feeling when reading the monograph that the writer's mind was already made up on the question of the Determining Tendencies; that they were not really being demonstrated but assumed, or alternatively put in as an afterthought. The contrast with the *Bewusstheit* in this connection is interesting: one does really feel that the *Bewusstheit* is being made the subject of an experimental inquiry, that the word was naturally used at the time to describe what was experimentally observed, and that the section (p. 210) which specifically describes the awareness is a summary of previously reported experimental findings.

<sup>40</sup> The present writer has read carefully through Ach's book with the express purpose of discovering any previous reference to the determining tendencies. If any such are actually present in the book, they are incidental, and not an integral part of the argument at any point.

<sup>41</sup> Questions of priority are always unpleasant. It may be pointed out here that Ach uses the *Aufgabe* several times in the discussion of the difference between sensorial and motor reactions. Watt made exactly the same differentiation, in the same context, in a work published the year before (Ach, 1905, p. 114; Watt, 1904). Külpe made the same fundamental distinction, but with a different terminology, in 1893.

The determining tendency seems, in fact, to have been forced upon Ach not by experimental data but by psychological dogma. His endeavour is apparently to describe the facts of purpose or motive in terms of the presentational psychology. This may be illustrated by various statements throughout the book. The determining tendencies are influences which proceed from peculiar presentation-contents of the aim-presentation (p. 187); the tendencies set in readiness by the aim-presentation facilitate relevant reproductive tendencies proceeding from the aim-presentation (p. 192); these sets, working in the unconscious, proceeding from the meaning of the aim-presentation, directed towards the coming stimulus-presentation, . . . we designate as D.T.'s (p. 228). Clearly the problem is here, then, considered in terms of the influence of presentations upon one another. In order to understand how the experimenter's instructions cause a specific response to a later stimulus, the assumption is that we must consider the presentation of the purpose and the presentation of the stimulus, and show how the one can influence the other.

There is no need at this date to flog the ancient and dead horse of presentationism. For a complete and subtle demolition of this doctrine, the reader is referred to Ward's *Psychological Principles*. It is enough to mention the fallacy, already discussed in the particular case of the judgment, of assuming that the thought and action of a man in his environment can—indeed must—be explained by manipulation of presentations—perceptions or images—of that environment. Specifically, the question must be asked of Ach—why does action follow when what he calls the determined presentation has been fashioned under the influence of the determining tendencies? Specifically, a subject is instructed to add: the figures 6 and 5 are shown. We know that they may appear bent towards each other, or with the plus sign between them, or in some other modified form. What then? The reproductive tendencies corresponding to the process of addition are favoured by the D.T.'s, and there is "spontaneous appearance of the determined *presentation*" (p. 228). "The movement-*presentation* is, as we say, set in readiness, or determining tendencies are founded by the purpose to move, so that immediately after the appearance of the stimulus the appropriate movement follows" (p. 119; italics are the present writer's in both quotations). Ach's experimental account contains no hint of a "movement-*presentation*", as separate from the actual movement. On the contrary, Ach's own words here deny the existence of any such intermediate step. But even if a movement-*presentation* did occur, there

is no justification for stating that actual movement will necessarily follow it. He is working in a closed world of presentations, and has neglected to show how to escape from it into the outside world of objective fact and objective action. Throughout the treatment there is the implicit assumption that once given the determined presentation, action will follow by itself. The more closely Ach's schema is examined, the more cumbersome and essentially inconsistent it appears. In his latest book Ach adds a further stipulation: Not every perception or presentation leads to a voluntary movement . . . rather is there necessary in addition a further event called a Will Impulse or Fiat" (*Analyse des Willens*, Berlin, 1935, p. 121). Will Impulse is defined in the first book as *Bewusstheit* that movement must follow (1905, p. 104). Disregarding the implied assumption that what finally causes action is the imageless awareness that action will follow, we then have as Ach's final statement something like this. The words of the experimenter who repeats the instruction cause an aim-presentation to arise in the subject's mind. This disappears as such, but from it proceed unconsciously functioning determining tendencies, which when the stimulus-presentation appears, cause the determined presentation, the "end product" of determination, to arise. This relational process is the establishment of a purpose. With the determined presentation is associated the movement-presentation (that is the idea of *saying* "eleven", as contrasted with the idea or presentation of the word "eleven"), but the manner of this association is not made clear. After the movement-presentation must come a "will-impulse or Fiat" before movement actually takes place. That is to say, a second set of determining tendencies is postulated to cause movement. In reality Ach has set out to show how the will operates; he concludes that it is through a "Will-impulse or Fiat".

One of the difficulties Ach had to contend with was the implicit assumption inherent in the presentational psychology that action is *through* the determined presentation *to* the perceived card. Such an implication is of course psychologically untenable. Action is *directly to the perceived card*. No determined presentation is necessary as an intermediate step between perception of the card and response. This is not to deny the extreme complexity of the relation between perception of the world and action in the world. But any discussion of this difficult question must start with the fact that we do react directly to our environment, not indirectly through a presentation. It was partly, perhaps largely, because his thinking was cast along presentational lines that Ach found himself forced to postulate un-

consciously working determining tendencies, by means of which the aim-presentation, after it had, as a matter of experimental fact, disappeared from consciousness, could influence the stimulus-presentation. Without the necessity of explaining what happens in presentational terms, the necessity for postulating separate determining tendencies disappears, and one is left with the simpler statement that the purpose or task exercises a directive influence over the course of thought and perception. To speak of *influences* or *tendencies* seems to come very near to the scholastic "properties"—as when salt was said to have the property of melting ice. The relation of the purpose or task to the perceived words or sentences by which that task is communicated; the relation of these to the perceived "stimulus"; the relation of both to the action that follows, these constitute difficult problems. Ach's attempted solution in terms of determining tendencies by which, in his words, the "presentation of aim" works on the "presentation of stimulus" solves neither the general nor the particular problem. A detailed solution would show what is meant by the statement that purpose or motive can unify and incidentally modify the whole course of perception, thought, and action consequent upon a later situation. This Ach is far from giving.<sup>42</sup>

One final defence is possible. It may be said that Ach has solved his specific problem which is to show how thought is determined. Action, the objectors might say, is a different problem, and may properly be left for later consideration. Two answers may be given. First of all, thought *cannot* thus be divorced from action. The two form an inseparable unity—psychologically inseparable, that is to say. Any theory which tears thought from its natural matrix must at least be one-sided, and will almost inevitably be false. This is even more obviously true of will, in terms of which Ach cast his problem. Clearly, will cannot be separated from action. Secondly, even as a

<sup>42</sup> Certain readers will still argue thus: "Purpose, as gained through auditory perceptions of the instructions, must nevertheless have an effect on reaction to the perceived stimulus. But purpose is not conscious when the stimulus appears. Therefore there exist unconscious effects of the purpose, which is what Ach meant when he used the term D.T.'s." But once more, the answer is that as soon as science begins to hypostasize *effects* of X, as separate from X itself, a mythology springs up. The data at present are that a purpose or if it be preferred motive can unconsciously influence action or, to be more exact, that human beings, when activated by what is known as purpose or motive modify their perceptions and actions accordingly, without being at every moment necessarily "conscious" of the purpose in question. To bring in determining tendencies complicates rather than simplifies the problem.

theory of thought *in vacuo*, if such were possible, Ach's Determining Tendencies do not help us. For once again, the data are that purpose (motive or task) at one time conscious, may, after its original conscious representation has disappeared, affect thought and perception. Again, why put in determining tendencies, of which neither Ach nor anybody else knows anything? They are, once more, an unnecessary piece of machinery, and their apparent explanatory value is spurious. Actually, then, Ach's solution is not valid even in the restricted field which he might be said to have marked out for himself. And when one begins to inquire into the mechanism and nature of the determining tendencies, another flock of difficult problems arises. The D.T.'s spring from the "presentational content of the aim-presentation" (Ach, 1905, p. 187). How and when do they achieve unconsciousness? Or are they ever conscious at all? If not, the notion of intrinsically unconscious *tendencies* proceeding from conscious presentations seems very difficult and complicated, especially when they must work on other, qualitatively different and equally unconscious, reproductive *tendencies*. And is the determining tendency qualitatively different from the reproductive tendency? If so, how is it different? Watt assumes in general such a qualitative difference, but has not experimentally demonstrated it. One has the right to ask for an answer to these and many other questions, even though Ach has explicitly disclaimed knowledge of the nature of the determining tendencies.

Watt's simpler statement is apparently preferable to Ach's because it dispenses with the elaborate superstructure which Ach has built up upon observed fact. Ach's fundamental contribution, which he no doubt owed at least indirectly to Külpe, was the proposal, or at least the experimental verification of the dichotomy (task)-(reproductive-tendency). As Watt states it, this is a dichotomy separating the mechanical from the non-mechanical factors in thinking.<sup>43</sup> Concerning this fundamental dichotomy and its relation to other proposed dichotomies, more will be said later in this book. It should here be pointed out, however, that the dichotomy is made by both Watt and Ach, Watt's statement of it being preferable for reasons already given. There remains to discuss Watt's particular presentation of this part of the theory that is common to both.

Watt assumes as a groundwork the conventional associational theory that if experience A has occurred together with experience **B**, then if either A or B occurs later, there is a tendency for the other to

<sup>43</sup> Watt, 1905, p. 187.

recur. This theory Watt has overlaid with the stipulation that before this tendency can be realized, there must be a task present, which will itself contribute energy that may reinforce or inhibit any particular association. It is necessary to examine this more closely.

The fundamental question is this: whence comes the dynamic power, the energizing force which causes an "event in our mental experience", to use Watt's phrase? Starting from Watt's theory, there are four main possibilities. The energy might conceivably originate either in (1) the reproductive tendency; that is, from the bond between one experience and another. This is in essence the theory that was upheld by Thorndike under the title of "connectionism",<sup>44</sup> though Thorndike added certain embroideries of his own. It is, we have seen, the conventional associational theory. The energy may, however, conceivably originate in (2) the task or motive. This is apparently the root idea behind the modern theory of drive or motive. Or, thirdly, both task and associative bond may be powerless in themselves to induce a mental event, having this result only when they interact, to form, so to speak, a dynamized unity. This may be called the unitary theory. Or, finally, associative bond and task may, each of them, possess dynamic force, which is, however, manifested only when the two occur together. In any particular case they may work in the same or opposite directions. This may be called the contributory theory. It is apparently that of Watt.

I have been wondering, for example, how to afford a certain ocean trip. I think of the sea, and the thought of a tossing ship follows. According to the first, the "connectionist" theory, this sequence is due to the associative bonds which exist between ship and sea. According to the second theory, the driving force is the task of finding ways and means for the trip; this task causes the thought of the ship to arise. This demands, of course, that the task shall have the requisite material to work upon; but it also demands that the material of past experience is *simply* material, to be used by the energizing task and without the dynamic power of itself to cause a mental event. This seems to be the fundamental idea behind the "wish" psychology of Freud, the hormic psychology of Mac-Dougall, and the motivational theory of Lewin. Again, the third theory would demand that both the task of finding ways and means and the thought ("visual presentation") of the sea are of themselves powerless to induce a further mental event. Specifically, that the fact that sea and ship have been experienced together in the past,

<sup>44</sup> See Thorndike, 1932.

under whatever circumstances and with whatever result, whether pleasant or unpleasant, does not produce a connection through which, if the thought of sea occurs, the thought of ship will follow. Instead, when the thought of sea comes up and meets with the task in question, a new dynamic unity is formed, from which proceeds the next term, ship. Here the energy is provided by the union. This is the earlier theory of Selz and would perhaps be allowed as a possibility by the Gestalt group. Finally, the task and the thought of "sea" may each of them be unable in itself to determine a further mental event. But when the two occur together, they may each contribute determining energy as the result of which the thought of the ship follows. This, then, seems to be Watt's theory.

Quotations may readily be found in illustration. First, the task cannot of itself determine a mental event. "The task may find no reproductions, in which case no reaction can occur" (1906, p. 261). "An association must be presupposed before the task working with the stimulus could produce any reaction" (ibid., p. 259). And "The tendency to reproduction, which realizes itself *ceteris paribus*, is that one which, by reason of more frequent actualization, possesses a greater speed of reproduction. The task which is no doubt itself a wider and stronger tendency to reproduction has been sketched in detail as an operative force. . . . Over against any tendency to reproduction the task can only overcome a limited power of force." And further, "The influences which determine every event in our mental experience fall into two large groups, the operating task and the individual strength of the reproductions which come thereby into question."<sup>45</sup> That is to say, both task and reproductive tendencies must be present, and each is represented as exciting psychic "force".

This raises difficult problems. If a reproductive tendency has power to cause reproduction *against* the prevailing task, one may ask why it cannot do so when there is no task present at all. That is to say, why is the task necessary? Further, the conception of a task which does not energize the reproductive tendency, but which by its presence enables the latter to function, seems very difficult. It is not as though we are dealing with a release function, at least of the usual kind, such as that of the biological stimulus in determining the biological response. For when the task appears it directly contributes energy to succeeding events, while the biological stimulus, for example, essentially contributes no energy to the nerve impulse. Whether it could be possible for the task to effect some kind of

<sup>45</sup> Already quoted.

release, and at the same time to contribute to the energy of succeeding events, it is difficult to say. At least such a theory would require experimental proof such as Watt has not provided.

Closer examination of Watt's account reveals further difficulties. The account of judgment as involving a task, and as contrasting with those mental events in which "the reaction which constituted the judgment was determined by the overwhelming strength of the tendency to reproduction" (*ibid.*, p. 264), really presupposes the existence of mental events which are determined without the operation of a task. The apology may be made that such recalcitrant reproductions are determined by other, conflicting tasks. But this, if taken to its logical conclusion, would imply the reference of all mental action to tasks alone ; that is, to a hormic principle working on inert memory-material. It would imply, that is, a scheme of the second, task-dynamic type, mentioned before. As a defence of Watt's scheme, it would not be of service. Watt apparently saw the difficulty of classifying "free association" in the interval between writing the first and second paper. In the first paper he writes, "Everything which happens solely by virtue of the inherent force of the reproductive tendencies is not yet a judgment. This can be clearly seen in all investigations on memory and the like" (1905, p. 411). In the second paper he is apparently careful not to say that "an absolutely fixed and rigid system of reproductions" ever operates in practice; instead, he says that it "gives no judgments". Nevertheless, the implication of the taskless reproduction is clearly present in the second paper, and it is contrary to his statement in the first paper that every mental event is doubly determined.<sup>46</sup>

When further we come to action, as contrasted with thinking, there is again inconsistency. Here a reproductionless theory is implied. He explains "reactions which through frequent repetition are held by many to become *unconscious* or *mechanical*" by the statement that "a task is always necessarily presupposed for the accomplishment of such a reaction. The task may not have been given before each experiment but it must at least have become operative. The stimulus is given and the reaction follows without any conscious links intervening whatever. There is no need to appeal to the unconscious when everything else falls away except the essentials, task and stimulus" (1906, p. 263). The stimulus itself contains no motive power for action. There is no mention of the reproductive tendencies. The meaning of the passage, which, like

<sup>46</sup> For other difficulties, see Titchener, (*loc. cit.*) p. 260.

all others taken for criticism of Watt's theory, is from the second abstracted paper, and thus represents the writer's mature opinion, must be that the task is the motor, to use a term of Lewin's. That is to say, that the reaction experiment, after practice, becomes task-dynamic. Once again, an apology is possible. It may be said that by frequent association with the action in question the stimulus has acquired reproductive tendencies, that is to say, reproductive of action, not thought, and that the learned, automatic reaction is the product of the particular task and the reproductive tendencies in question. This was certainly not in Watt's mind. The whole passage is intended to show that in such reactions everything falls away but the task and the perceived signal for action. But apart from what he intended, it is doubtful whether the apology would hold good. For the essence of the reaction experiment is that an originally indifferent stimulus—that is, one with no adherent reproductive tendencies acquired by sheer association—does, by virtue of a specific task, come to set off a reaction. That is to say, it is not necessary that the task shall find appropriate reproductive tendencies in order that it shall function for the first time at least. It is abusing the concept of the reproductive tendency to maintain that, on the first occasion of reaction, the stimulus acquires adherent reproductive tendencies to action when the instructions are given, and before the experience of its perception has ever occurred together with the action. The only way in which on the conventional theory reproductive tendencies to action can be acquired by the stimulus as perceived is for the action to occur simultaneously with the mental event of perceiving the stimulus. Association by contrast or similarity is not admitted by Watt (*ibid.*, p. 261). But actually it should not be necessary once more to apologize for the fictitious apology which we have put into Watt's mind, and which was obviously not there when he made an abstract of his argument in 1906. The passage is obviously a plea for the task-dynamic nature of mechanized motor reactions. Rather than attempt to patch up Watt's avowed theory by questionable emendations, which certainly did not occur to him at the time, it seems better to pay him the compliment of assuming that he was a good enough man of science momentarily to forget his theory in the face of what seemed to be fact. The doctrine of presentations, at least in the form in which Watt assumed it, must come up against difficulties when action is to be explained. Once more, it is a doctrine of mental action in a closed system, and contains no provision within itself for reaching out beyond its confines into action and the object-

ive world. This we have already seen illustrated in our criticism of the Würzburg theory of judgment and of Ach's determining tendencies. Watt's theory would explain why, on perception of the stimulus, the thought of action might come into the subject's mind; it does not explain why action takes place. For that some fresh principle is necessary.<sup>47</sup>

Thus Watt professes to hold what we have called a contributory theory of mental energetics, one which derives motive power in the kind of experiment which he performed, and for all mental events, summatively from task and reproductive tendency, with the possibility that these may function in opposite senses. Actually, his explanations of specific points imply that some mental events are task-dynamic, while others are bond-dynamic, each of which possibilities is irreconcilable with the contributory theory. Whether the contributory theory, in its simplest form or modified in some way, can be made to fit all facts of mental life, is not here discussed. The point will be elaborated later in this book. At least Watt has not succeeded in showing experimentally that this theory is a necessary and adequate explanation for the motivation of all mental events.

There is no doubt that Watt was handicapped, as was Ach, by an uncritical acceptance of current presentational psychology and all that this implied. Accepting this theory as axiomatic, and finding a residue which it did not explain, he equated the latter with the task. This appears to be the ultimate argument. It can be seen clearly exhibited in Watt's own summary, from which have been taken most of the quotations of the last few pages. He states first that the task is found to have an influence on the nature of each subject's experiences, whether, for example, they are predominantly visual or not; the same influence is exerted on the duration of the reactions, but the percentage of complex reproductions, those with intervening mental events, is independent of the task's nature. And as quoted before: "The number of tendencies to reproduction which diverge from any one stimulus must depend on the number of ideas with which the stimulus is associated. It is impossible to conceive how the task should change these, as an association must be presupposed before the task working with the stimulus could produce any reaction. The occurrence of a complex representation would depend then on the nature of the stimulus word given and not on the task. The influence of the *task* has therefore to be carefully distinguished from that of the *stimulus*" (1906, p. 259. Watt's italics). Here it is first stated that

<sup>47</sup> As e.g. the now discredited ideo-motor theory.

association must be presupposed before the "task working on the stimulus could produce any reaction". That is to say, the distinction of task and reproductive tendencies is first laid down as axiomatic. Then it is argued that *therefore* we must distinguish the task from the reproductive tendencies. The question is begged. This, it should be noted, is the first of the two critical points of his argument, the point that is, where he explicitly attempts to show that his experimental results demand the separation of reproductive tendency from task.

*Estimate of the Würzburg Experiments on Motive*

It cannot be said, then, that either Ach or Watt has succeeded in giving experimental proof of either the necessity or the adequacy of the summative combination of task or purpose and the reproductive tendency as an explanation of the mechanics of mental life. Nevertheless, their contribution is great, both historically and for present-day psychology. They have shown alike the inadequacy of the presentationism current in their day, and the great importance for mental life of factors of which we are not conscious. They showed, or at least Ach did so, that non-associational factors can influence perception. Most important of all, they brought into the laboratory the fact that the process of thinking was directed, controlled, "determined" by machinery of the working of which we are largely unconscious. All this was no doubt known before. But Watt and Ach demonstrated it under experimental conditions which, if they fall short when judged by modern standards, are at least very much better controlled than anything hitherto attempted. Their enthusiasm, their patient work and their hard thinking have shown that it is possible to employ the experimental method in the investigation of the mechanism of thought. Most important of all, they introduced into experimental psychology the problem of "motive." There is nobody who reads the accounts of their detailed and laborious investigations but will come away with a very high respect for the quality of these two men, and a conviction of the importance of their work for today's psychology, fifty years later. It seems probable that they saw the problem in terms at once too complex and too simple—too complex because of the machinery of reproductive tendencies and presentations with which they encumbered it, too simple because of the abstract nature of the experimental situations they employed. But they were the first to examine motive in the laboratory: Watt was the first actually to relate the nature of the thought-process with the nature of the motive, he and Ach the first

to adopt the experimental hypothesis of unconscious motivation, Ach the first to sketch an experimental hypothesis of the integrative nature of thinking, a hypothesis which bore fruit in the later work of Selz, Maier, and the Gestalt group. This is achievement of a high order.<sup>48</sup>

NOTE ON THE USE OF THE WORD "SET"

J. J. Gibson, in his excellent article "A Critical Review of the Concept of Set in Contemporary Experimental Psychology", *Psychological Bulletin*, 1941, has mentioned some forty ways in which the word "set" has been employed in relatively modern psychology. Many more could be added by a sufficiently patient reader, especially one who collected the ways in which the word *Einstellung* has been used in German and English literature. Gibson claims that no common meaning can be discerned in all these usages. For this reason, when the accepted term motive is to hand, I feel that to call the Determining Tendencies or the Task a "set" as Woodworth does (1938, p. 790), makes confusion worse confounded. No clear line of distinction has yet been drawn between what Ach and Watt were describing and the "Motive" of more modern usage. One of Ach's subjects said, "I had the *need* to add". Murphy defines Motivation as the process by which *needs* give rise to behaviour (1935, p. 15). There is no hard-and-fast line where a set to action becomes a motive to action. If it be said that Motive is specific, e.g. hunger motive, while set is more general, e.g. set to add different pairs of figures, it should be pointed out that a man can properly be said to be motivated by hunger to steal, to "work", or to ask for a second helping. This is not to deny that there are contexts in which the word set is properly used, but only that Watt's *Aufgabe* is one of them. Finally, to say as Young does that the *task* produces a *set* to performance seems once more to add an unnecessary *tertium quid* between task and performance. This is not to decry the excellence of Young's experiments. (Reported with references in Young, 1948.)

<sup>48</sup> Mention should be made here of the work of May (1917) and Jersild (1927), both working at Columbia University, who verified and somewhat expanded Watt's work. Since these papers are well reported by Woodworth (1938, pp. 791-4), further details will not be given here.