

The New Psychology: Directed Thinking

5

In the last chapter we saw how the new tradition attacked one of the stumbling blocks of the British associationists—the problem of elements, the atomistic conception of complex thinking being made up of simple ideas, and the dependence on the Aristotelian dogma of "no image-no thought." In modern terms the resolution might have been to call the thinking processes theoretical and therefore not necessarily accessible to observation.

However, there was still left another associationist heritage - the problem of direction. Why does one train of thought rather than any other occur? What determines the direction of thinking?

There was no a priori reason why an associationistic psychology should ignore problems of motivation or purpose in thinking. In fact, these topics occur occasionally throughout our selections in Chapters 2 and 3. But the mention tends to be casual, as in Hobbes' *Leviathan*, for example, and even when James Mill introduces such concepts as desire or end in order to deal with directed thinking, the notion is nonetheless given a subsidiary and secondary role. For a long time it seemed that the associative play of sensory elements would be sufficient, that no directive or motivational concept would be needed to explain the flow of thought. Even when directive notions were considered, they were couched in associationistic terms, as when James Mill speaks of a pleasurable idea of the future being associated with the means to that end.

Nevertheless, by the end of the nineteenth century various extra-associational principles to account for the directional aspects of

186

thought and action began to appear. In 1889 Müller and Schumann published a paper on motor set,* in 1900 Müller and Pilzecker talked about perseverative tendencies †, and in 1893 Külpe, in his *Grundriss der Psychologie*, ‡ mentioned the importance of the subject's preparation in determining reactions to various stimuli.

The major credit for introducing a directional concept to the psychology of thought goes to Henry J. Watt who wrote his doctoral dissertation at Würzburg in 1904 on this topic. He experimentally investigated the effects of the task (*Aufgabe*) and demonstrated its vital importance to the course of the associations which took place in his reaction experiments. His work, and that of Ach on the similar concept of determining tendencies which was done at about the same time, created a true milestone in the history of thought. As Titchener put it, their work made it impossible for any future psychologist to write a theory in the language of content alone.

The beginnings were modest enough. Watt gave his subjects specific tasks to perform. When they saw the stimulus word they were either to name an example of the class to which it belonged, or to name a whole, or a part of it, or some similar simple problem. Not surprisingly he found that these tasks were at least as important as any associations or reproductive tendencies in determining the subject's response to the stimulus word.

At first, then, as the name "task" implies, the directive concept was an external or situational one. It might be conceived of as an independent variable, controlled by the experimenter and presented in the form of instructions in the same way as other stimuli were presented. Sophistication quickly set in, however. One of the first things Watt noticed was that, whereas in the beginning of an experiment the subject was completely conscious of the task, it

* G. E. Müller and F. Schumann, Über die psychologischen Grundlagen der Vergleichung gehobener Gewichte. *Arch. f.d. ges. Physiol.*, 1889, 45, 37-112.

† G. E. Müller and A. Pilzecker, Experimentelle Beiträge zur Lehre vom Gedächtniss. *Z.f. Psychol*, Ergzgsbd. 1, 1900, 300 pp.

‡ O. Külpe, *Grundriss der Psychologie*. Leipzig: Engelmann, 1893. Published in English: *Outlines of psychology*, transl. by E. B. Titchener. London: Swan Sonnenschein, 1895.

gradually seemed to drop out of consciousness, at the same time losing none of its effectiveness in determining the course of the reactions. Here then was another glimpse of the submerged portion of the iceberg; not only were large parts of the content of thought to be found outside of consciousness, but a vital controlling factor was found to be outside of consciousness as well. Watt was unwilling to commit himself on the status of this factor, stating firmly in the last page of the following selection that the ideas he has propounded in his thesis do not imply "notions like the unconscious"; in fact he implies that the concept of, unconscious operations is unnecessary. Rather the *Aufgaben* The one concept provides the material of thought and the other a kind of steering or guiding mechanism. seem to hold the same status as the reproductive tendencies (associative bonds); they are extraconscious rather than unconscious. The one concept provides the material of thought and the other a kind of steering or guiding mechanism.

A certain theoretical confusion is evident here, wherein *Aufgaben* can move from consciousness and the protocol language, out of consciousness and into the theoretical language. Such slippage from one universe to another, common in many psychological treatises of the time, was to be criticized with growing sophistication by Koffka (see p. 236) and later writers. Whatever the exact status of the *Aufgaben*, however, their introduction provided much needed flexibility for an associationistic theory of thought.

Experimental Contribution to a Theory of Thinking 189

Henry J. Watt

Experimental Contribution to a Theory of Thinking¹

For this thesis a long series of experiments was carried out. *Several hundred nouns* of common occurrence were printed in big, type on cards and were shown to the observing subject one at a time by means of an automatic *card-changer* (Dr. Ach's). A metal plate which covered the card, sprang up, when a string was pulled, and by so doing closed an electric current, which flowed through a Hipp *chronoscope* and a *speaking tube* (Cattel's). The chronoscope therefore marked the time which passed from the appearance of the printed word until the first vibrations from the subject's

¹ H. J. Watt, *Experimental contribution to a theory of thinking*. *J. Anat. Physiol.*, 1905-1906, 40, 257-266.

"This paper, which is to be regarded as an abstract of a thesis entitled, "Experimentelle Beiträge zu einer Theorie des Denkens" (Doctor Dissertation, Würzburg, 1904, *Archiv. für die gesamte Psychologie*, vol. iv. Leipzig: Engelmann, 1904. Pp. 154), was accompanied by a letter from the author addressed to Professor M'Kendrick, of which the following is a paragraph:

I have made no attempt to sketch a physiological theory which would give a basis for the psychological factors I distinguish in my thesis. It is only just to those who know the possibilities of such physiological theories better than I do, to allow a clear account of psychological analysis to tempt *them* to any such undertaking. In several points, besides, as will be evident to you, my work goes rather to strengthen the hands of those who, for the present, want to work out their physiological material directly without any conclusions from psychological theory. The most we psychologists can hope meanwhile is, that some analysis of ours may suggest a new idea to some physiologist which he might try and investigate directly on physiological material. That would be something to be proud of! It will also be good if the impression gains ground that experimental psychology is an intelligible and exact science and not a mere play with dreams."

voice broke the current in the speaking tube. This constituted the measure of the duration of the reaction and formed, with a full account of all the reproducible experiences of the observing subject, which were at once written down in full, and any other remarks he had to make, the experimental data of the thesis.

In contrast to previous experiments on association definite *tasks (Aufgaben)* were given, which the subject had to accomplish in the reaction. These referred to what the printed word on the card signified, and were as follows: to classify it, 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. Each subject performed the experiments separately, and every care was taken, both in regard to technical details and to the way the experiments were carried out, that no disturbing factors should be present. The most of the work was done by four practised observers, and over three thousand experiments were made in all.

The following are *the results*. In almost every case the subject is able to accomplish his task correctly. His description of his experiences shows that there are in the main *three kinds of complexes of experiences*. Most frequently the subject follows one line right through the experiment, which then leads to the spoken word. In the other cases, he may seek a word which he does not find, and which he even afterwards cannot name, or he may have intended to say a certain word, but for some reason or other, wittingly or unwittingly, have said another. In general the first class, the *simple reproductions*, take place in a good deal less time than the other two classes, the *complex reproductions*, of which two the second named usually and naturally last longer.

Within each of these classes there are *three groups*. In the *first* of these the spoken word follows directly on the given optical stimulus, sometimes after a pause which can be described in no particularly definite way, sometimes with the assurance of the subject that between the stimulus and the reaction nothing whatever has been experienced. Such a reaction lasts in general a very short time, and in the second form a shorter time than any other kind of association reaction. In a *second* and very large class, a *visual representation* follows the stimulus. Directly after that, or after a short pause or a so-called search, comes the spoken word. These are a

good deal longer than. the first set, and sometimes longer, sometimes shorter, among themselves according to the detail and vividness of the representation and the frequency of occurrence of such reactions containing visual representations for the particular subject. *Last* of all come those reactions in which a *word-representation*, or some experience which could only be described in conceptual terms and not analytically according to its psychological content-call it a thought-appeared between the presentation of the word and the spoken reaction. These were often shorter than those containing visual representations and sometimes longer. It is not, however, contended in this classification that the reaction could take no other course. On the contrary, it is easy to see that we could have tone, smell, taste, touch and other such representations playing a part in the reaction, provided the conditions of experiment produced them. None of these were clearly present among these experiments.

But what are these *conditions of experiment*? How does; any one particular reaction come about and not another? The *first influence* at work on the subject is the given *task*. This he hears spoken by the experimenter, and generally repeats. to himself in words, *e.g.* "find a part!" "name an example!" or he may exemplify the experiment to himself, *e.g.* "animal-dog," and so, on. The scanty description of the preparation for the experiment given in the subject's account of it does not help us to form a very clear idea of what the process itself is. It was found, however, as a series of detailed curves show, that of all the simple reproductions the percentage of occurrence of each of the three above-named classes changes regularly and similarly with each subject from one task to another. This leads to the assertion that the task has a regular influence on the *nature* of the experiences of each subject, which becomes particularly evident between the two larger groups of simple reproductions, those containing visual representations and those containing nothing at all. The change of task has a most decisive influence on the percentage. of these classes, and a subject who has hardly a single visual representation when the task "classify" is given, may have them in 50 per cent of the cases when the task "find a part" is given. Alongside this, a subject with 50 per cent visual representations in the first case, may have 90-100 per cent

in the second. Moreover it is found that the *duration of* the reaction in each of these classes is also on the average dependent on the nature of the task. So too is the duration of the complex reproductions, but the percentage

occurrence of these, out of all experiments made, is, curiously enough, quite *independent of* the nature of the task, as curves show. The attempt is made to explain this by a fairly probable consideration. 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 reproduction would depend then on the nature of the stimulus-word given and not on that of the task. The influence of the *task* has therefore to be carefully differentiated from that of the *stimulus*.

An analysis of the experiments worked with the fifth and sixth tasks shows that an experience which plays an *important* part in producing or leading to a reaction makes the reaction longer than when the experience only comes along with the stimulus or the reaction-word, that is, when it is only side-play, as it were.

States of consciousness *tend to persist* and to return more easily once they have been experienced. It is found that they come *more rapidly* after the first time. It is found, besides, that the task also tends to persist, for it also often comes to consciousness, in the form of a word-presentation or the like, during the course of the experiment. In the great majority of cases this occurs only where some disturbing factor has been present, while the normal reproduction runs its course smoothly from beginning to end, as soon as the regular preparation for the experiment, *i.e.* the given task, has worked on the stimulus without any repetition during the experiment. The *repetition of the task* is therefore, we suppose, made necessary as soon as the task ceases to operate sufficiently well. This shows the exchange which goes on between representations and the task in operation. A suitable representation may introduce the task, which then, when it has ceased to operate effectually, may come to consciousness in similar representations. By means

of such exchange it is possible to modify, strengthen, restrain, or check the task which is operating..

It has already been shown in experimental work on memory that the *rapidity of a reproduction* is dependent on the number of times the reproduction has occurred. In accordance with this it is found that the rapidity of such reproductions as those here described is dependent to a very large degree on the number of subjects who make any particular reproduction. The dependence is, of course, not supposed to be direct, but the co-ordination and the result presupposes that the number of subjects who make any given reproduction is a fair sign of the frequency of its repetition.

The result is very distinct and the exceptions can, as a rule, be explained by the record the subject gave of his experiences or by other experimental data. Further, if the average duration of each grade of frequency is co-ordinated with the change in the task for each subject, the *influence of the task* on the duration of the reaction in *each grade, of frequency* is seen to be surprisingly similar to its influence in the previous cases. This means that the influence of the task *is independent* of the rapidity of the tendency to reproduction in itself, so that the influence of the stimulus-word is for the second time differentiated from that of the task. It is, then, probable that 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 influence of the task operating at the moment. Whether the latter be to the increase of the former in every case remains to be settled.

It has often been asserted that over and above more or less mechanical reproductions, which are often to be found in our mental experience, there is a large number of cases in which the decision is not uniformly and completely determined by regular laws, but in which a greater or less amount of scope is allowed for the usually indefinite activity called choice or selection by the attention and the like. But a thorough examination of the complex reproductions, in which no particular description was given of the second tendency to reproduction, produces a large mass of evidence, partly from the record of the subject and partly from manifold combinations of the various experimental data, much too

detailed to be described, in favour of the reproduction which actually took place. This shows that, if other conditions remain the same, it is the individual strength or *rapidity* of the tendency to reproduction *which determines the reproduction*, and not anything else. In other words, the influence of the task is the same for all the reproductions it makes possible. It is not meant, of course, that our everyday conception of choice has no meaning, but only that 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 in question. On the one hand, the task may find no

reproductions, in which case no reaction can occur; and, on the other hand, the strength of the tendency to reproduction may be too great for the task to operate, in which case it forces its way out in spite of the task, or before any reproduction which the task favours has had time to become actual: in other words, a wrong reaction takes place. Otherwise, more or less suitable reactions occur. This is thought to be *valid for the whole of our mental experience*, because the very few cases which offered no explanation, contained no indication of any other determining factors, and are therefore to be placed alongside the others with the remark that in these cases the record of the subject or the experimental data were probably deficient, as can always occur in such experiments.

A detailed examination shows further that the general content, the vividness, and the frequency of our *visual representations* is dependent on the nature of the *task* in question. It is therefore probable that rather hasty generalisations have been made of the possible *types of mental imagery*. It could very well be, according to this result, that a subject who showed an entire absence of visual representation with the kind of task which has hitherto been given to determine the types of mental imagery, would with other tasks show quite a lively and detailed visual imagination. An example of almost such a case occurred among the subjects used for these experiments. It is probable, however, that one who has fewer and less vivid imagery than another with one task, will with another task again have less vivid and detailed imagery than the other.

The attempt to establish an *association by contrast* or by *similarity* is then discussed, on the basis of the experiments, and is re-

Experimental Contribution to a Theory of Thinking

195

jected, because it is found to be impossible to show that similarity as such could determine an association. Apparent determinations of reproductions by similarity are found to dissolve into more detailed reproductions, which are themselves determined by the factors already discovered. There is no reason to expect that the subject in his record should be able to give the reason for any reaction, or even always the previous mental experience by which the reproduction in question under the operation of the task was determined.

A detailed examination of the experiments with each task by themselves, leads to interesting results which tend to separate the task as a psychological factor still more from the tendency to reproduction in itself and from other factors. Interesting connections are shown between the logical relations contained in the tasks given and the psychological processes found in the experiments, in which the psychological simplicity and rapidity of happening are shown to be sometimes on the side of the logical simplicity and sometimes not.

In a lengthy *summary* the results are brought together under various points of view and several *theories* formulated.

After a short summary of *individual differences*, a *criticism of the distinction between motor and sensory reaction* is given. First of all, the facts are brought together to show that this distinction is a fairly good description of some differences between the subjects. The first basis of the distinction was the usual arithmetical mean, but of late it has been thought that the *curve of distribution* of the reaction-times gives a better foundation. This curve is formed by making a time equal to the probable error of all time observations of the series the unit in the horizontal, and by setting the number of cases which occur at each such unit on the perpendicular. If the number of factors involved is small and limited, then this curve ought to rise to one or more symmetrical points. This is sometimes the case, especially in the motor reaction, according to the latest researches.. It is evident, according to the last two of these, that the time of even the motor reaction can be shortened a good deal with practice, and the curves seem to show points at somewhat regular periods-these periods being, however, liable to minimal displacements when the nature or quantity of the

196 Henry J. Watt

stimulus is changed. It is also indisputably true, that the *class* to which any experiment is to be reckoned, is not determined by the nature of the experiment after it has been made, but by the nature of the *given preparation*, the direction of the attention to sensory or motor elements. Here, then, we have again differences between what we call the task and the mere tendency to reproduction or any physiological basis for the latter. A *motor reaction* is, therefore, merely, the quickest and most constant reaction possible, which constancy and rapidity are achieved by simple and constant conditions of experiment and of task especially. The long-practised so-called *natural reaction*, in which the task directs the attention specially neither to the stimulus nor to the movement which is to be carried out, also shows a regular curve of distribution. It is evident that in this natural reaction, too, the factors involved are constant and regular. The *sensory reaction*, however, is not nearly so liable to be regular, and it is supposed that this

lies in the *greater complexity of factors*, because the curve of distribution contains not one, but several high points. This is made probable by its being shown that, in the curves of distribution of the experiments made, the average times of most of the big classes of experiments found and distinguished on the basis of the records, lie under the larger rises, and *vice versa*. It is then likely that, if the conditions could be kept as constant as they are in the shortest possible reactions, the curves of distribution would be quite as regular for any set of conditions whatever. Peculiarities in the form of the curve of distribution would then be *symptomatic* of peculiarities in the reactions or in the factors which bring about these, and thereby an aid to discovery. The distinction between sensory and motor reactions is, therefore, *not physiological but psychological* in the prime instance, and is not an exact distinction. It has to be split up into its elements, and when this is done nothing new is found.

This result leads to a more decisive way of looking at those reactions which, through frequent repetition, are held by many to become *unconscious* or *mechanical*. It is evident that, if reflexes be excluded from this class, 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 whatsoever. There is no need to appeal to the unconscious even when everything else falls away except the essentials, task and stimulus.

The *method of subtraction* -of different sets of reactions from one another, in order to find the duration of an act of recognition, of distinction, and of association, is subjected to a criticism. In order to find the duration of elementary acts, it is no guarantee to suppose that the contents of all experiments carried out with the same task are the same. First of all, those experiments which are really similarly composed, must be collected with the help of the experimental data and the records. An ideally complete reaction, made up of bits out of many different reactions, is of no use for this purpose. The scheme which has been the basis of this method of subtraction is, besides, very mechanical, much too mechanical for any one to suppose it to be based on data which are true, or likely to be found true in physiology. But even if the number and nature of the elements in an experiment were experimentally determined, it has to be remembered that it is not yet settled how exactly the task affects each element which goes to make up the reaction. All this does not make the method impossible, but only for a long time purposeless.

If *association* be understood as the cause of the known fact and experience of reproduction, it may be *defined* as that by means of which it first becomes possible for one experience to be reproduced by another. Other definitions are found to rest on logical divisions, and to give no guarantee of unity in research. There can be only one kind of association, as far as we know, and on the basis of the previous results the later experience is never reproduced by the earlier by means of the *value* of the logical relations between them but only by the factors described above. The only conceivable condition for the origin of association is, that the two experiences shall have once been together or immediately successive in consciousness.

It is evident that, to form a *judgment*, the subject must have at the moment some experience, and, besides, some experience which consists of reproductions, because an absolutely new experience and nothing else could not be held to form a judgment by itself. An absolutely fixed and rigid system of reproductions, however,

198 Henry J. Watt.

gives no judgments, but merely a succession of experiences under the one principle of association. Even the subjects themselves tend to decline the responsibility for judgments in which the reaction which constituted the judgment was determined by the overwhelming strength of a tendency to reproduction. The experimental conclusion drawn by Marbe is accepted, that if one confines oneself to the experiences between the stimulus and the reaction, there is no psychological criterion of the judgment. Outside of this limit, however, stands the *task* which, even if it is not identical in the sense of being always either visual representation. or word-representation or the like, is yet *functionally identical*, and is the one factor which goes beyond the rigidity which the single tie of association would give. *The operation of a task makes the reaction* which is determined by or in spite of it, *a judgment* in reference to this task. This position must be met before the attempt can be made to set up hidden unconscious or rare experiences as the criterion of the judgment. It is also evident that the agreement of ideas with their objects, whether these be themselves ideas or not, can never be directly the aim in view. Such agreement, if it exists, can be only and merely the result of the operation of the

factors enumerated, of which the one, the task, may of course include the conception agreement. For how would it be possible to proceed to obtain such agreement psychologically?

A *theory of thinking* has, then, to start from our experience as we know it. This presents to us no sharply defined states with beginning and end like printed letters, but only continued observation leads us to a more and more detailed and exact description of our experiences. By means of experimental data we can work ourselves out beyond this position and formulate our factors more precisely. We decline, to accept choice and apperception or contrast and similarity as exact or useful scientific conceptions any further. The tendency to reproduction which realises itself, *ceteris paribus*, is that one which, by reason of more frequent actualisation, 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, and its sphere of operation is doubtless much larger than we have been able to

Experimental Contribution to a Theory of Thinking

199

determine it to be. Over against any tendency to reproduction, the task can only overpower a limited amount of force, a circumstance which makes false reactions possible. Any theory of association which operates only with associations between two experiences immediately following one another, is thus seen to be insufficient, though this much must be presupposed in any theory. Physiology can, perhaps, not offer us more than this at present, but a more exact definition of psychological factors and their sphere of operation can only be welcome to physiology, while the prospect that physiology and psychology will one day be able to give an account of their material which they will find to be much more intelligible to one another than it is now, is by no means excluded. It seems probable at present that the *variable factor* is the strength or rapidity of reproduction and *not the task*, which is supposed to favour in equal strength all tendencies to reproduction which come under its influence. The operations of these two classes of factors on one another, which seems to be confined to a small area which contains at least our fully conscious experiences, is what we know as thinking.

It must not be supposed that the picture of his mental experience given in a subject's record is by any means complete. We see from these results that besides mere suppression of parts of a record, which is not presupposed, the subject may have forgotten something, or the tendencies to reproduction and the tasks which would have enabled him to give a full and accurate record may not have been present, or, for want of practice, very poorly developed. Even if forgetfulness is put aside, we have therefore no right to suppose that what is not in the record was not experienced. But granting this, what can we say about that part of experience which does not come fully to consciousness in reproductions and judgments? A mere mechanical succession of events in consciousness seems to us obviously intelligible, as soon as it happens in fact. What we do not understand is the *meaning* contained in the reference of one experience to another, whether it reproduce or be reproduced by this other. The reaction refers to the stimulus, and, under the influence of the task, brings to fuller consciousness something which was latent in it, although, as we have seen, no other fully conscious elements need be found

200 Thinking: From Association to Gestalt

either in the record or by experimental investigation. There are, besides, several elementary experiences which cannot be further analysed into psychological components, but can only be rendered by one or many reproductions. Such experiences are the more indefinite conceptual states of consciousness, what is often called feeling (other than pleasure and pain). Such experiences may besides be introduced by representations, for example, word-representations, and they are then to be exemplified by conceptions and tasks.. All this points to an *insufficiency of consciousness* to give a full knowledge of our subjective experience. The only means we possess for supplementing this deficiency, is to contrive that every part of our consciousness shall be operated on by tasks capable of bringing as much as possible to full consciousness in reactions or judgments. At the same time, this conception of the insufficiency of consciousness starts out from conscious experience and does not necessarily imply notions like the *unconscious*, which lie further afield and are as yet more or less indefinite and unsettled. The *great advantage of the experimental method* is, that it enables us, by grouping of data and by a more exact knowledge of the elementary factors of experience, to overcome the insufficiency of our direct introspection.

The thesis closes with a critical discussion of general representations and conceptions.

Whether or not Watt was ready to take the plunge into the unconscious, it was not long before others did. By the turn of the century the unconscious was part of the *Zeitgeist*. The new concepts of evolutionary theory, economic theory, and Freud's work in psychological theory were all eroding the supremacy of the conscious mind in determining thought and action. While the belief in the rationality of mankind holds sway, the conscious mind must remain king. But as the belief in rationality began to be undermined, other concepts rose up to fill the breach. Behaviorism found root in this soil, and so did the unconscious.

Messer, as we have seen in the last chapter, during his struggles to classify the *Bsl* came to the conclusion that much of the think-

Determining Tendencies 201

ing process went on at an unconscious level. When he tackled the problem of the *Aufgaben*, he expanded the role of the unconscious, noting that their role was primarily an unconscious one. The importance of the unconscious, however, was voiced most convincingly by Ach in 1905. Working at the same time but independently of Watt, he developed the concept of determining tendencies. The concept is very similar to that of *Aufgabe* but placed within the framework of a more elaborate theory. The unconscious nature of the determining tendencies was dramatically illustrated by his use of posthypnotic suggestion, a sample of which is given in the following selection. Although the determining tendencies are similar in nature to the *Aufgaben*, there are some differences in emphasis and they play a more complex role in the thinking process. The concept is a more truly motivational one, in the modern sense of the term, that is, it is less an external stimulus than an internal condition of the subject. Its directing functions have been expanded; in one experiment, for example, Ach demonstrated that the determining tendencies could influence perception as well as the course of associations. He also pointed out that a determining tendency could form a new association or reproductive tendency where none was before.

Determining Tendencies

Narziss Ach

I THE EFFECTS OF POST-HYPNOTIC SUGGESTION. The experimental findings of G. E. Müller and A. Pilzecker were the first to shatter

N. Ach, *Über die Willenstätigkeit und das Denken*. Göttingen: Vandenhoeck and Ruprecht, 1905, Chap. 4. This selection translated by D. Rapaport, from D. Rapaport, *Organization and pathology of thought*. New York: Columbia University Press, 1951. PP. 15-24 reprinted by permission of the publisher.

the view of association-psychology that the train of ideas is governed solely by associative reproduction-tendencies. They have shown that perseverating reproduction-tendencies also may determine the contents of consciousness, and may under certain conditions even become dominant.

The investigations reported in this volume indicate that, besides these associative and perseverative reproduction-tendencies, there is yet another factor of decisive influence on the emerging state of consciousness: the determining tendency. Determining tendencies arise from the specific content of the goal-presentation, and define that state of consciousness so that it accords with the meaning of the goal-presentation. These determining tendencies are the basis of psychological phenomena long described as will-activity. The psychological processes that occur in the wake of suggestions are the most striking examples of these. Suggestions may become effective in the hypnotic state, or in a subsequent state of consciousness, either normal or hypnotic.

The literature reports many post-hypnotic suggestions demonstrating the existence of determining tendencies. Since they were given mostly for therapeutic reasons, I reinvestigated them in a fashion similar to my other experiments, carefully considering the psychological situation of the subject. The procedure was unknown to the subject.

The following suggestion was given to Subject G. in deep hypnosis: "Later on I will show you two cards with two numbers on each. To the first card you will react with the sum, to the second with the difference of the numbers. When the card appears you will immediately, and of your own will, say the correct number, without thinking of what I have now told you." This suggestion was repeated and, on request of the subject, its content retold. Thereupon G. was awakened from hypnosis. In order to make the procedure appear as natural as possible and to avoid the appearance of suggestion, I had already shown the cards to G. before the hypnosis, "incidentally" explaining, as it were, their use. Having terminated the hypnosis we went to another room, and after a few minutes of indifferent conversation I showed G. a card with the numbers 6/2. G. immediately said, "8." To the

Determining Tendencies 203

second card, 4/2, he immediately said, "2." The suggestion was, surprisingly, realized. I asked G.-showing him the first card- "Why did you say 8?" "Just happened to say it." "Did you not think at the moment that this is the sum?" "No. I had the need to say 8." "How about this one?" (showing the second card). -"It was just accidental that I said 2." "But this is not accidental!" "I had to say that." "Didn't you think that $4 - 2 = 2$?" "No."

in order to allay the suspicion that a suggested amnesia might play a role here, I repeated this experiment, adding the following suggestion: "When questioned, you will be able to describe the experience exactly." The determination by the hypnotic suggestion was again manifest. The suggestion was to give the difference on the first card and the sum on the second. After hypnosis, the instant reaction to card 6/3 was "3"; to card 4/1, "5." Again the subject realized only later that the numbers he spoke were the difference and the sum. The experiment misfired only once: before reacting, the subject repeated the instruction itself. That is, to card 6/3 the subject said, "The sum is 9"; to card 4/1, "The difference is 3." The explanation is that in this case the suggestion was given not in precise form, but as follows: "Upon seeing the first card you will give the sum, upon seeing the second the difference." Indeed, this instruction was followed. A further experiment, using the precisely worded suggestion, yielded the usual results...

The results are similar in the case of the following suggestion: "I will show you some numbers., To the first one, you will say the number that comes before it in the number-continuum, to the second the number that follows it. When you see the number, you will utter the correct number, of your own free will and without delay." G. repeats the instructions. A few minutes after hypnosis is terminated, he is shown the number 6 and answers immediately, "5." Now 6 is shown again and he answers immediately, "7." "What did you say after the first number?" "5." "Why?" "I don't know, it just came to my mind." "When I showed it to You the second time you said 7, why?" "I felt the need to say it, but I don't know why." Here, again, the idea corresponding to the meaning of the suggestion becomes directly over-valent. Ex-

ecuting a suggestion does not imply a mediation-process in which the number presented elicits the memory of the suggestion, due to which, in turn the correct answer associatively arises. Rather, the determining tendency arising from the suggestion raises above the threshold of consciousness the idea which corresponds to the meaning of the suggestion.

This also explains the effects of negative suggestion. In another experiment I added the suggestion: "You will be shown a third card, but that one you won't be able to see." When shown this third card, G. was silent, moved his head to and fro, trying to look at my hand more closely. "What do you see?" "It looks like you want to show me something." "What do I have in my hand?" "Nothing." G. saw my hand, but not the card it held....

It would be desirable to conduct experiments with time measurements on post-hypnotic suggestions. So far I have not been in a position to do that. My previous reaction-experiments with time measurements, in hypnosis or in a state of systematically narrowed consciousness, led to no results.

II. CONCERNING DETERMINING TENDENCIES. The influence of determining tendencies has been demonstrated in striking and extreme form by post-hypnotic suggestions, but it can also be demonstrated, in reaction-experiments, particularly in those without coordination of activity. This reaction-form is quite variable. In these reaction-experiments there are five different ways in which the determining tendency arising from the goal-presentation manifests itself. The presentation to which the intention refers-in our case, the card with numbers-will henceforth be called referent-presentation.

(a) The goal-presentation was rarely reproduced at the time the referent-presentation appeared. When this happened, it was due to associative or perseverative reproduction-tendencies, and the goal-presentation had been in consciousness even in the preparatory period. With Subject B. this happened altogether three times, with C. only once. On these occasions ... attention in the preparatory period was below its usual intensity. (b) Besides its reappearance due to perseverative or associative reproduction,

Determining Tendencies 205

the goal-presentation became noticeable when it entered an *apperceptive fusion* with the appearing stimulus. The subject visualized a plus sign, and fitted the stimulus-numbers into the thus prepared schema. The result issued associatively from this apperceptive fusion. (c) The intention can be realized also by an apperceptive fusion between a presentation readied by it and the referent-presentation. In Subject C., for instance, we note a spatial displacement of the two numbers that correspond to the intention. When the intention is to add, the two numbers pull closer together; when it is to subtract, the smaller number appears to sidle toward the larger. When the result coincides with one of the two numbers presented, it issues from this apperceptive fusion, either associatively or directly. (d) In a fourth set of experiments, we again encounter an apperceptive fusion. Upon perceiving the stimuli, presentations readied by the goal-presentation fuse with those associatively reproduced. This was characteristic of the behavior of Subject A. throughout. When this subject intended to add upon the appearance of 5/2, his intention manifested itself by the internal utterance, "5 and 2 make 7." This occurred repeatedly with C. and once with B. (e) Finally, determination arising from the intention may become effective, so that tendencies readied by the goal-presentation reinforce the reproduction-tendencies which issue from the referent-presentation and correspond to the meaning of the goal-presentation. In these cases, the correct presentation appears in consciousness *immediately* upon the apprehension of the stimuli (referent-presentations). This was the usual procedure of B., and occurred with C. on the last two experimental days... It is characteristic of all forms of determination that their realization is in accord with the meaning of the goal-presentation, whether or not their means be apperceptive fusion or the raising of the intended result over the threshold of consciousness directly through the referent-presentation. Only a few experiments were exceptions to this. The results so far available suggest that in these cases the necessary intensity of intention was not present. As already mentioned, the direct realization of the intention was most striking in posthypnotic suggestions. But even in simple experiments without

coordination of activity, it was usual with Subjects D. and E. that the number corresponding to the intention came directly to consciousness.

Thus the stimulus alone does not determine the content of consciousness that follows its appearance: the same numbers may be followed at various times by different ones, depending upon the intention. For example, 6/2 may be followed by 8, 4, or 3, according to whether the intention was to add, subtract, or divide. *The same stimulus may lead to the reproduction of different presentations; in each case it is the presentation corresponding to the meaning of the intention which becomes over-valent.* It is due to determining tendencies that, of all the tendencies readied by the perception of the stimulus, those will become reinforced to over-valence which are associatively coordinated with a presentation corresponding to the given intention...

There are yet other observations which indicate the decisive influence of determining tendencies arising from goal-presentations. When an intention to divide was followed by two numbers that would yield a fraction, the perception was accompanied by a state of surprise and an awareness of difficulty, connected with displeasure or with the immediate consciousness, "This doesn't work." No acoustic, kinesthetic, or other presentations occurred in these experiences. When, however, the calculation was easy, no awareness of difficulty or surprise was present. Such experiences were rather frequent....

These observations indicate that the apperception and elaboration of the stimulus (referent-presentation) occur under influences corresponding to the meaning of the goal-presentation. If we do not assume that from the goal-presentation specific influences arise which are directed toward the apperception of the referent-presentation, then we find no content in the preparatory period of the examples here given which could explain this behavior upon perceiving the stimulus. Influences, arising from the goal-presentation and directed, toward the referent-presentation, which determine the course of events so as to accord with the goal-presentation, are called determining tendencies. This term does not imply anything as to the nature of these curious effects, and ex-

Determining Tendencies 207

presses only the fact that mental happening is regulated by intentions, that is, goal-presentations. The distinction of these tendencies from associative and perseverative reproduction-tendencies will be discussed later on.

Thus, the ordered and goal-directed course of mental happening is the effect of determining tendencies. The independence of goal-directed mental happening from incidental external stimuli, and from the customary associative course of presentations, is due to the influence of these determining tendencies. We refer here to the fact of this independence, without discussing its limits. These determining tendencies may issue not only from existing intentions but from suggestive influences, from commands, and from tasks. Here we are concerned only with the effect and not with the origin of these determining tendencies.

The determining tendencies do more than merely establish an ordered goal-directed course of mental happening. They insure a certain independence [for the thought-process] by making possible the formation of new associations. Even though we are bound to the perceived presentation-material, the determining tendencies enable us to bring it into new, previously non-existent, associative connections.

The next step in building a consistent theory of directed thinking was taken by Otto Selz, but his developments do not belong properly into the history of the Würzburg school. That movement had done its work in a period of barely more than a decade. The isomorphism between conscious experience and the processes of thinking had been rejected and never again would psychologists insist that thinking must be amenable to detailed self-observation. Nor would it be possible for anyone to ignore the importance of directive influences on the train of thought. The importance of the Würzburg movement and the hopes for the future were summarized in 1912 by Oswald Külpe.

*The Modern Psychology of Thinking***Oswald Külpe**

The study of thinking, which in Germany has been nurtured primarily at the Würzburger Psychological Institute, belongs to [the] developmental phase of experimental psychology.

While earlier psychology in general did not pay adequate attention to thinking, the new experimental direction was so busy bringing order into the more solid institutions of sensations, images, and feelings, that it was quite late before it could devote itself to the airy thoughts. The first mental contents to be noted in consciousness were those of pressures and punctures, tastes and smells, sounds and colors. They were the easiest to perceive, followed by their images and the pleasures and pains. That there was anything else without the palpable* constitution of these

O. Külpe, *Über die moderne Psychologie des Denkens*. Appendix in O. Külpe, *Vorlesungen über Psychologie*, 2nd ed., edited by K. Bühler. Leipzig: Hirzel, 1922. This appendix was originally given as a lecture at the Fifth Congress of the German Society for Experimental Psychology, Berlin, 1912. It was first published in the *Internat. Monatsschrift für Wissenschaft, Kunst und Technik*, June 1912, pp. 1070 ff. Pp. 301-316 from the 1922 edition, transl. by George and Jean M. Mandler.

* Translators' note: In facing the troublesome problem of translating "*anschaulich*" and "*unanschaulich*," we have generally translated the latter as "imageless" in keeping with traditional usage. However, the word "*anschaulich*" seemed more amenable to a variety of translations such as "palpable," "self-evident," "perceptual," and "specifiable." We have used these words in keeping with the context and have also, at times, substituted such choices as "non-perceptual" or "impalpable" for "*unanschaulich*" in order to point up the generality of the notion which relieves it from the suggestion of the visual that "imageless" implies.

The Modern Psychology of Thinking 209

formations escaped the eye of the scientist who had not been trained to perceive it. The experience of natural science directed the researcher's attention toward sensory stimuli and sensations, after-images, contrast phenomena and fantastic variations of reality. Whatever did not have such characteristics simply, did not seem to exist. And thus when the first experimental psychologists undertook experiments about the meaning of words they were able to report anything at all only if self-evident representations or their accompanying phenomena made an appearance. In many other cases, particularly when the words signified something abstract or general, they found "nothing." The fact that a word could be understood without eliciting images, that a sentence could be understood and judged even though only its sounds appeared to be present in consciousness, never gave these psychologists cause to postulate or to determine imageless as well as imageable contents.

The prejudice upon which we have touched here has a long history. Aristotle declared that there were no thoughts without an image and during the scholastic period this position was held fast. The division between perception and thinking, between objects of the senses and objects of thought, made repeatedly by Plato, had never been psychologically pursued. In modern times one found words, and nothing but words when the perceptions were missing that were supposed to give them meaning and understanding. In the pedagogy of Pestalozzi and Herbart, perception was honored as the ABC of all mental development. Kant considered concepts without images as empty, and Schopenhauer wanted to base all of mathematics upon imagery; he even wanted to ban proof from geometry. Similar conceptions were added in poetry. Poetic art could only function through images; the more it tried to follow Horace and emulate painting-to create with the brush of perception-the more completely did it seem to fulfill its mission....

What finally led us in psychology to another theory was the *systematic application of self-observation*. Previously it was the rule not to obtain reports about all experiences that occurred during an experiment as soon as it was concluded, but only to obtain occasional reports from subjects about exceptional or ab-

normal occurrences. Only at the conclusion of a whole series was a general report requested about the main facts that were still remembered. In this fashion only the grossest aspects came to light. Furthermore, the commitment to the traditional concepts of sensations, feelings, and images prevented the observation or labelling of that which was neither sensation nor feeling nor image. However, as soon as persons trained in self-observation were allowed to make complete and unprejudiced reports about their experiences of an experiment immediately after its completion, the necessity for an extension of the previous concepts and definitions became obvious. We found in ourselves processes, states, directions, and acts which did not fit the schema of the older psychology. Subjects started to speak in the language of everyday life and to give images only a subordinate importance in their private world. They knew and thought, judged and understood, apprehended meaning and interpreted connections, without receiving any real support from occasionally appearing sensory events [*Versinnlichungen*]. Consider the following examples. [There follow two examples, only one of which will be presented here.] The subject is asked: "Do you understand the sentence: Thinking is so extraordinarily difficult that many prefer to judge?" The protocol reads: "I knew immediately after the conclusion of the sentence what the point was. But the thought was still quite unclear. In order to gain clarity, I slowly repeated the sentence and when I was finished with that the thought was clear so that I can now repeat it: To judge here implies thoughtless speech and a dismissal of the subject matter in contrast to the searching activity of thinking. Apart from the words of the sentence that I heard and which I then reproduced, there was nothing in the way of images in my consciousness." This is not just a simple process of imageless thought. What is notable is that [subjects] stated that understanding proceeded generally in this fashion with difficult sentences. It is thus not an artificial product of the laboratory, but the blossoming life of reality that has been opened up by these experiments. [There follows a string of aphorisms and sayings to demonstrate examples from daily experience that produce just such thinking, e. g., Man is noble, charitable and good; that alone differentiates him from all other known beings.] Who

The Modern Psychology of Thinking 211

would experience images here and for whom would such images be the basis, the inescapable condition of comprehension? And who wants to maintain that words alone suffice to represent the meaning? No, these cases provide proof for the existence of imageless conscious contents, especially thoughts.

But if thoughts differ from the images of colors and sounds, of forests and gardens, of men and animals, then this difference will also be found in their behavior, in their forms, and in their course. We know what lawfulness governs images. Everybody speaks of association and reproduction, of the appearance of an image, of its elicitation by others, of its connection with other images. We learn a poem or a new vocabulary. Here knowledge of content, knowledge of meaning is not sufficient; we must learn one word after another so that we can later faithfully reproduce the whole. We develop strong associations between the succeeding or coordinated members of a poem or a list of words, and for this we need a long period of time and a large number of repetitions. If thoughts are nothing but images, then the same tediousness should govern their memorization. Any reflection about the manner in which we assimilate the meaning of a poem shows immediately that the state of affairs is different here. One attentive reading is frequently sufficient to reproduce the thought content. And thus we progress through sheer mental exposure to such comprehensive feats as the reproduction of the thoughts contained in a sermon, a lecture, a dramatic production, a novel, a scientific work, or a long conversation. We not infrequently find to our sorrow how independent we are of the actual words. Sometimes we would like very much to be able to reproduce faithfully a striking expression, the pregnant form of a sentence, or an attractive picture. But even though the sense of what has been said is quite available to us, we cannot reproduce its form.

[There follows a discussion of some of Bühler's experiments.]

It is notable that one of the first results of our psychology of thought was negative: The old conceptual notions that experimental psychology had provided for descriptions of sensation, feeling, and imagination, and their relations, did not permit comprehension or definition of intellectual processes. But similarly the new concept of dispositions of consciousness [*Bewusstseins*]-

lage] which was pressed upon us by factual observation, was not sufficient and only made possible circumscription rather than description. Even the study of primitive processes of thinking soon showed that the imageless can be known. Self-observation, in contrast to observations of nature, can perceive the presence and definite characteristics of what is neither color nor sound, of what may be given without image or feeling. The meaning of abstract and general expressions can be shown to exist in consciousness when nothing perceptual may be discovered apart from the words, and these meanings may be experienced and realized even without words or other signs. The new concept of conscious knowing [*Bewusstheit*] gave expression to these facts. And thus the inflexible schema of the previously accepted elements of mental life was extended in an important direction.

Experimental psychology is thus confronted with new problems which disclose many and varied perspectives. Not only do imageless states include known, meant, and thought objects with all their characteristics and relations, and states of affairs that can be expressed in judgments, but also the many actions whereby we take a position toward a given conscious content, whereby we order, classify, recognize or reject it. Although one once could use sensations and images to construct a mosaic of mental life and an automatic lawfulness of the coming and going of conscious elements, such a simplification and dependence upon chemical analogies has now lost its footing. Perceptual [*anschaulich*] contents could only persist as artificial abstractions, as arbitrarily isolated and separated components. Within a complete consciousness, however, they have become partial phenomena, dependent upon a variety of different conceptions, and it was only when they were placed in a complex of mental processes that they gained meaning and value for the experiencing subject. Just as perception could not be characterized as a mere having of sensation, no less could thinking be conceived as the associative course of images. Association psychology, as it, had been founded by Hume, lost its hegemony.

The fact that thoughts are independent of the signs in which they are expressed, and that they have peculiar and fluid interrelations, uninfluenced by the laws of the association of images,

demonstrated their autonomy as a special class of conscious contents. As a result, the area of self-observation has been extended to a considerable degree. Not only images and sensations and their characteristics and colorations belong to our mental life, but we can also include thought and knowledge, in which we can perceive neither color nor form, neither pleasure nor unpleasure. We know from daily experience that we have at our disposal a great spontaneity in our search for objects, their registration and comprehension, in our activity with and our actions upon them. Psychology has taken little notice of this activity of the mind. F. A. Lange coined the phrase about the scientific psychology without a soul, a psychology in which sensations and images and their feeling tones are the sole contents of consciousness. Such a psychology had to be watchful that no mystical force such as the ego should insinuate itself into this psychological world. More exactly, one had to say, "Thinking occurs," but not: "I think," and the process of such thinking consisted in nothing but the coming and going of images regulated by the laws of association. Even today there are psychologists who have not risen above this point of view. Their psychology can rightly be accused of unreality, of moving in an abstract region where it neither seeks nor finds entry to full experience. These are the psychologists who offer stones instead of bread to those representatives of the humanities [*Geisteswissenschaften*] who are asking for psychological justification; nor can these psychologists advise or help a biology that is seeking a connection with psychology...

[The psychology of] thinking unlocked the door to the true internal world, and it was no mysticism that led us there, but the abandoning of a prejudice. Bacon already knew that the road to truth is paved with prejudices. In the present instance they happen to derive from the exact natural sciences, for whom in the last decades sensory observation meant everything and for whom concepts were only an expedient used to represent, in the simplest possible fashion, facts based on sensory experience. But now thoughts became not only signs for sensations but independent structures and values that could be ascertained with certainty just as any sensory impression. They were even more

faithful, lasting, and freer than the pictures with which our memory and fantasy otherwise operate. But they did not, of course, admit to the same immediate observation as perceptual objects. The discovery was made that the ego could not be divided. To think with a certain devotion and depth and to observe the thoughts at the same time—that could not be done. First one and then the other, that was the watchword of the young psychology of thought. And it succeeded

surprisingly well. Once a mental task was solved, the process that had been experienced became in all its phases an object of intensive determination by the retrospective observer. Comparison of several subjects and of several results from the same subject demonstrated that the procedure was unobjectionable. The pronounced agreement of our studies in the psychology of thought, whereby one could be built upon another, was a beautiful confirmation of our results. Once again it became clear why the previously used methods of observation could not find any thinking or other expressions of our conscious activity. Observation itself is a particular act, a committed activity of the ego. No other activity can be executed next to it at the same time. Our mental efficiency is limited, our personality is a unitary whole. But observation can take place after the completion of a function and can make it the object of self-perception. And now many acts were recognized which previously had not existed for psychology: attending and recognizing, willing and rejecting, comparing and differentiating, and many more. All of them were lacking the perceptual [*anschaulich*] character of sensations, images, and feelings, even though these phenomena could accompany the newly found actions. It is characteristic of the helplessness of the previous psychology that it thought it could define these acts through their symptoms. Attention was considered as a group of tension and muscle sensations, because so-called strained attention gives rise to such sensations. Similarly, willing was dissolved into images of motions because they usually precede an external act of the will. These constructions, whose artificiality immediately becomes apparent, were left without a leg to stand on as soon as the existence of special psychic acts was recognized, thus robbing sensations and images of their sole dominion in consciousness.

with the recognition of these acts another important innovation came to the fore. The center of gravity of mental life had to be moved. Previously one could say: We are attentive because our eyes are fixed on a particular point in the visual field and the muscles that keep the eyes in that position are tensed. It now became clear that this conception inverted the real state of affairs and that what it should rather say is: We direct our eyes toward a certain point and strain our muscles because we want to observe it. *Activity became the central focus*, receptivity and the mechanism of images secondary...

The actions of the ego are always subject to points of view and tasks [*Aufgaben*] and through them are moved to activity. One could also say that they serve a purpose, either self-generated or set by others. The thinking of the theoretician is no more nor less aimless than that of the practitioner. Psychologists are used to taking this into consideration. The subject receives a task, a direction or instruction as to the point of view which he must adopt toward the presented stimulus. He may have to compare two light intensities one with another, to execute a movement upon a pressure or a sound, to reply quickly to a called-out word with the first word that he can think of, to understand a sentence, to draw a conclusion, and so forth. All such tasks, if they are willingly undertaken and remembered, exercise a great determining force upon the behavior of the subject. This force is called the determining tendency. In a sense the ego contains an unlimited variety of response possibilities. If one of these is to come to the fore to the exclusion of all others, then a determination, a selection, is needed.

The independence of the task and the determining tendency that was derived from it was also fateful for association psychology. Such a task is not some ordinary type of reproductive motive. It must be accepted, the subject must support it, and it gives his activity a certain direction. Sensations, feelings, and images are not given tasks; a task is set for a subject, whose mental character does not dissolve into these contents, but whose spontaneity alone can adopt the instructions and execute them. Since in all thinking such determining viewpoints play a role, since abstraction and combination, judgment and conclusion, com-

parison and differentiation, the finding and construction of relations, all become carriers of determining tendencies, the psychology of the task became an essential part of the modern investigation of thinking. And even the psychology of the task proved to have an importance that significantly transcended the narrower area in which it was developed. No psychological experiments are imaginable without tasks! The tasks must, therefore, be considered just as important an experimental condition as the apparatus and the stimuli that it presents. A variation in the task is at least as important an experimental procedure as a change in external experimental conditions.

This importance of the task and its effects on the structure and course of mental events could not be explained with the tools of association psychology. Rather, Ach was able to show that even associations of considerable strength could be overcome with a counteracting task. The force with which a determining tendency acts is not only greater than the familiar reproductive tendencies, it also derives from a different source and its effectiveness is not tied to associative relations.

The new findings from Würzburg were both startling and provoking to most psychologists interested in thought, whatever their theoretical stance. And while all this ferment was in progress the association psychologists could not and did not sit idly by. We have seen already how one sophisticated defender of the classical position-Titchener-reacted to the notion of imageless thought. At the time, the major defender of an associationist theory of directed thought was Georg Elias Müller. The following excerpt, in which he takes the Würzburgers to task, was published in 1913, that is after the major findings of that movement were available to him. Apart from chiding the association critics for prematurely jumping to conclusions, he quite properly indicated the vagueness of the concepts that psychologists such as Ach were trying to substitute for associative mechanisms. The tenor of Müller's critique

In Defense of Association Psychology

217

of determining tendencies, for example, was to be echoed many years later in the criticism of so-called cognitive concepts, such as "hypothesis," by the S-R theorists of the 1940's and 1950's. The history of psychology in the twentieth century has repeatedly produced the phenomenon of the classical associationists keeping the "cognitive" rebels honest by demanding strict definitions and deductive theories.

In Defense of Association Psychology

Georg Elias Müller

I must describe as utterly incomprehensible Watt's remarks that any theory which attempts to make do with mere associations or reproductive tendencies is incompatible with his experimental results. This remark of Watt's runs completely counter to the conclusions of any attentive study of his own experimental observations. All his reports-about the way his subjects adjust the task [*Aufgabe*] in order better to handle it, how they behave after the appearance of the stimulus word, the number and type of false reactions he observed, his own remark ... that the task produces a set [*Einstellung*] toward a specific group of representations favorable for its fulfillment-all of these show sufficiently that insofar as a solution of the task actually occurs in his experiments, this solution takes place not as a result of the action of mysterious determining tendencies, but rather on the basis of associative or perseverative reproductive tendencies that have been aroused by

the psychic constellation (instruction and voluntary preparation, response opportunity [the occasion at which the response is required], preceding experiments, and so forth). The same goes for the expositions of Ach, who originated the term "determining tendencies". It must be stressed that neither in Watt's nor Ach's work, nor in the parallel statements of Messer, can be found the slightest trace of an experiment that really proves that considerations such as those presented by us are inadequate for an explanation of their experimental results. But it is after all an elementary rule of science that one should proceed to the postulation of new principles only after one has compellingly shown by intensive investigation that known principles, demonstrated with certainty to be valid, are not sufficient for the explanation of certain facts.

The assumption of determining tendencies, however, is not only utterly unsubstantiated, but also completely unsuited to provide a stimulus for an intensive psychological analysis of the phenomena of the will. We have seen that the solution of a task can come about in a variety of ways; for example, through the association, during the voluntary preparation, of the response opportunity with a particular state of attention or some other purposeful mode of behavior, or by the arousal of a set toward a particular group of images or through the cooperation of the task image, or by the controlling role of the task influencing those images which are produced haphazardly, so to speak, by the response opportunity or other factors. Nothing can be called less of a psychological analysis than, in all of these cases, to speak simply about the operation of determining tendencies.

The assumption of a determining tendency would only be worthy of consideration as an explanation of the phenomena involved if one were in the position to state specific laws that more closely define the character and action of these determining tendencies. Such laws should permit us to deduce why the solution of a task occurs in certain cases, why it is absent in others, why under certain conditions the solution of the task proceeds in one way, under other conditions in another way. If, however, one were to proceed with the establishment of such functional laws, one would find that determining tendencies lead to a solution of the task only insofar as the reproductive tendencies-which, according to the reproductive laws, become effective following the pre-

In Defense of Association Psychology 219

sentation of the response opportunity-can lead to such a solution. In the same fashion, the manner in which the solution of the task comes about is determined by the nature of these reproductive tendencies. In short, one would find that the assumption of a determining tendency would be quite superfluous....

Therefore I come to the conclusion that the assumption of determining tendencies is unproven, that it is useless for the explanation of the phenomena involved, that it does not promote psychological analysis, and that its psychophysical consequences are incompatible with currently predominating views. If anyone does not agree with our assertion that the reaction experiments discussed can be adequately explained by the laws of reproduction, then let him describe clearly and unequivocally those phenomena that cannot be explained by the point of view that I represent, and let him show, in a logically adequate fashion, that these phenomena will not permit such an explanation....

I am afraid that I cannot escape the unrewarding task of demonstrating and criticizing the manner in which certain circles have treated questions about the lawfulness of the train of thought. Külpe [in the selection on p. 208] cites as evidence for his statement that the influence of the task and its effects cannot be explained with the tools of association psychology, the fact that Ach "was able to show that even associations of considerable strength could be overcome with a counteracting task." The force with which the determining tendency makes itself felt was said to be "greater than the known reproductive tendencies." First it should be noted that in no way did Ach prove or even state that a determining tendency is stronger than the known reproductive tendencies. One would find, for example, that in all cases where the ... goal to produce a correct response ... creates, during the voluntary preparation, a strong association between the [subjects] image of the response opportunity and the appropriate orientation of attention, then, following the occurrence of the response opportunity, the accomplishment of the task proceeds on the basis of the associated orientation. Obviously, one would disdain an explanation of the accomplishment of the task ... in terms of a peculiar lawfulness applicable to the function of determining tendencies rather than on the basis of [the laws of] association.... I do not understand how one can prove that the effect of the task

does not depend on association and perseveration by the fact that the voluntary preparation, occurring with high concentration immediately prior to the appearance of the stimulus syllable, supersedes in its effects a syllable

association ... that has not been similarly renewed during the foreperiod. By what investigations has it been determined that the advantage that the task must have had, according to the laws of association and perseveration, and that was developed... [with] high concentration immediately before the appearance of the stimulus syllable was not in fact greater than the advantage that many previous repetitions had given to the juxtaposed syllable association ... ? I cannot understand how one can base a statement of such great import on such inadequate grounds...

According to Messer,¹ the associative laws of similarity and contiguity "are not even remotely adequate to explain in any particular case why the arousal of traces which have been associated in manifold ways progress in just one particular direction." The reader is not told that decades ago association psychology stated that the decision which of two associative reproductive tendencies ... will triumph depends on two factors: first, the degree of strength that accords to the competing association as a function of the number and distribution of the repetitions on which they are based, and second, the degree of readiness which the preceding experiences have transmitted to the representations corresponding to the competing reproductive tendencies. * The investigations undertaken by Pilzecker and me have, in certain respects, elaborated this principle and made it more precise.

The polemic against the "common association psychology" reaches unbelievable heights in Wreschner's paper.² For example,

¹A. Messer, *Empfindung und Denken*. Leipzig. 1908.

* [This is the core of the constellation theory which Müller credits to Bain. Not only is the previously established strength of an association important, but prior instructions, e.g., the task or the image of what type of response is required will put into readiness the representations of one set of competing tendencies rather than another and thus produce additional strength for those reproductive tendencies at the time of responding - Eds.]

²A., Wreschner, Die Reproduktion und Assoziation von Vorstellungen. *Z. f. Psychol.*, Ergänzungsbd. 3, 1907-1909, 599 pp.

we are told the following: "The theory of associated experiences pretty nearly excludes all invention, discovery, and every new combination from our train of thought." Even a beginner in psychology could advance the notion that whenever an image *a* is associated on one occasion with *b*, and on another with *c*, then the reappearance of *c* may, as a result of association, result in the appearance of the new combination *b + c* or an associative mixed effect of novel character conditioned by the reproductive tendencies appropriate to *b* and *c*. Furthermore, according to association psychology, a subsequent strengthening of reproductive tendencies that have been aroused by quite different images may lead to a new combination of images, and even according to pure association psychology a goal representation directed toward something novel must be at work.

Even in his defense, Müller harks back to the atomism of the British associationists and in fact gives Bain credit for originating the constellation theory of directed thinking. However, the inadequacy of a position that tries to build complex thought out of simple associations is best illustrated by Müller's final argument that goal-representations (images) of the new are quite adequate to account for the appearance of novelty in thought. His argument here is just as vague and useless as some of the passages for which he excoriates the Würzburgers. However, Müller, like his antagonists, resorts to a concept (goal-representations) that, like tasks and determining tendencies, encompasses a much larger unit of consciousness-or behavior-than do images or sensations.