

CHAPTER II THE WORK OF THE WURZBURG GROUP

IMAGELESS THOUGHT

The Rise and Fall of the Bewusstseinslage

The work of the Wurzburg school was conducted within the framework of the "presentational" psychology, which postulated that we perceive the world, and also react to it, through the medium of presentations, i.e. perceptions and images. Mental life thus becomes very close to a manipulation of such presentations; in order that voluntary movement may take place, a "presentation of movement" (idea of movement) must first occur. Much of the difficulty for a modern reader comes from this framework. The outdated psychological theory does not, however, detract from the fundamental novelty of the experiments and the power of the thought behind them, or their importance for modern psychology. The unnecessary problems raised by the "presentations" give an instance of what happens when "thought" is analytically divorced from its context of action.

1901. Mayer and Orth. Investigation of association. Attempted to classify association psychologically as opposed to logically. *Result.* Certain mental events cannot be classified under any of the accepted categories. These unknowns were named "*Bewusst-seinslage*" (Bsl.), which had no sensory content.
1901. Marbe. Attempted to find a psychological criterion of judgment. He could not do so, but verified the existence of Mayer and Orth's Bsl.
1905. Ach. Investigation of the Will, which turned out to be also an Investigation of Thinking. *Method.* Introspection of reaction experiment. *Result.* The non-sensual thought, the Bsl. is directed towards an object. It is the imageless *knowing that . . . (Bewusstheit)*.
1906. Messer. Paper entitled: "An experimental investigation into the Psychology of Thought".
Method. Associations, free and constrained, to various stimuli. Judgments to be made concerning various objects, etc. *Results.* Various. The Bsl. is identified with thought. It is thought of a relatively unformulated kind. A large part of thought is unconscious. "Meaning" is described in terms of Bsl. The term Bsl. has outlived its usefulness. We had better replace it by the current term Thoughts (*Gedanken*).
- 1907-8. Bühler. Investigated thought by using difficult problems. *Result.* Thought is a new "Mental category". The Bsl. is the "turning-point" of thought. During the activity of thinking, the

meaning is represented in conscious experience but usually not in sensory terms.

IN THE WORK of the Würzburg group we have the first systematic experimental investigation into the psychology of thought. At the beginning of the twentieth century the experimental method had accomplished much for psychology. The fifth edition of Wundt's *Grundzüge* appeared in 1902-3, and although it contains much that is of a theoretical nature, yet the whole work is predominantly experimental in tone. The results achieved were indeed imposing; nevertheless, they had stopped short of the most important problem of all. Wundt, in fact, definitely believed that the higher mental processes were not amenable to direct experimentation. It is true that experimental work had been done on certain slightly more complex activities, such as the comparison of lifted weights and the judgments therein involved. More important, Ebbinghaus had, in 1885, published his highly significant investigation of memory. Yet until the advent of the Würzburg group experimental psychology had not come to grips with the problem of the higher mental processes. Once in the laboratory, thought has stayed there. No psychologist now seriously questions the applicability of the experimental method to the psychology of thinking.

Now the investigations to be described raised a number of questions which belong primarily to the spheres of analytical psychology and philosophy. With these questions we shall not primarily concern ourselves, except in so far as their discussion is necessary for adequate exposition of the experimental results. Not that experimental psychology can ultimately dispense with the two disciplines in question. On the contrary, there is at the present time no branch of inquiry in greater need of a rigorous examination of its categories and postulates. But we have now reached the stage where such examination is out of keeping in a study whose purpose is primarily to discuss the experimental psychology of thought. With this proviso, it may be said that the achievement of the Würzburg group may roughly be classified under two headings, involving what may be called the matter and the mechanism of thinking respectively. Under each heading radical innovations were proposed. Direct experimental contradiction was given to the Aristotelian dogma that thought is impossible without images.¹ Descartes had maintained the existence of pure

¹ "We cannot think without imagery, for the same thing occurs in thinking as is found in the construction of geometrical figures. There, though we do not employ as a supplementary requirement of our proof a determinateness in the

intellection as contrasted with thinking in imaginal terms. Stout had urged the reality of imageless thought. Beginning with an almost incidental observation that there are mental processes without imaginal content, the Wurzburgers gradually developed a doctrine which, in its final form, maintained that the very warp and woof of our thinking consists of psychic processes containing no trace of any sensory or imaginal content. For the mechanism of thinking there was adopted a modified form of associationism, whereby "reproductive tendencies" were guided—favoured and impeded—by a previously accepted task, or *Aufgabe*.² Behind the whole movement, the source of its power, stood Külpe, philosopher, student of aesthetics, pupil of Wundt in experimental psychology. While it is true that the work of Wurzburg was actually performed by a band of exceptionally able experimenters, yet it must not be forgotten that it was Külpe who, with others, sat many hours as their expert subject. When in 1909 Külpe went to take a famous chair at Bonn, and at the same time was beginning to interest himself in other things, the movement died.³

Chronologically the movement began with a paper of Mayer and Orth, published in 1901, and characteristically intended to bring into the laboratory a subject which had long been the battleground of logicians. At the outset the writers refer to previous publications in which they have pointed out that the conventional classification of Associations is a logical one, and that it is not based upon the psychological peculiarities of the associations classified. In the present paper, entitled "A Qualitative Investigation of Associations", it is proposed to establish such a psychological classification by means of a strictly controlled procedure of introspection.

The method was that of free association of a verbal stimulus. After the signal "ready" had been given, the observer called the stimulus word. The subject was instructed to report everything that went on

size of the triangle, yet when we draw it we make it of a determinate size. Similarly in thinking also, though we do not think of the size, yet we present the object visually to ourselves as a quantum, though we do not think of its quantum."—Aristotle, *De Memoria*, II, 453a (trans. Loukas, slightly modified). It is clear that here as elsewhere he distinguishes thought from the image used by thought.

² The German *Aufgabe* is translated as "task" rather than "problem" (Titch-ener). Watt, in his English writings, uses the term "task". The word "problem" has misleading implications. It tends to insinuate the theory that "all thinking is directed towards the solution of a problem"—a statement to which no specific objection need be made, but which was not in the minds of the Wurzburgers. Bühler, who was chronologically the last of the group, largely departed from the associationist point of view as an explanation of thinking.

³ For a brief account of this remarkable man, see Boring, *History of Experimental Psychology*, pp. 386 *et seq.*

in his consciousness until he gave his response. Reaction time was measured with a stop-watch. Four observers were used, including, it should be noted, both Orth and Mayer, the writers of the paper. In all, 1,224 associations were evoked.

In the course of the process of classification, which has not proved to be of any particular importance, an interesting fact emerged. After excluding perceptions, images, and acts of will, the authors state:

"In addition to these two classes of conscious events we must set up also a third group of facts of consciousness, one that has not been sufficiently stressed in psychology up to the present day. In the course of our experiments we were, again and again, involuntarily brought up against the fact of the existence of this third group. The subjects frequently reported that they experienced certain events of consciousness which they could quite clearly designate neither as definite images nor yet as volitions. For example, the subject Mayer made the observation that, in reference to the auditory stimulus-word "metre" a peculiar event of consciousness intervened which could not be characterized more exactly, and which was succeeded by the spoken response "trochee". In other cases, the subjects could give a closer account of these psychic facts. For example, Orth observed that the stimulus word "mustard" released such a peculiar event of consciousness, which he thought he could characterize as "Memory of a common figure of speech". Thereafter the reaction "grain" (*Korn*) followed. In all such cases, the subject could, nevertheless, not detect the slightest trace of the presence in consciousness of "presentations"⁴ (*Vorstellungen*) by which they specified the psychic fact more exactly in their reports. "All these events of consciousness, in spite of their obviously, often totally, different quality, we class together under the name *Bewusstseinslagen*—states of consciousness. The replies of the observers show that these states of consciousness are sometimes marked by feeling, but are, however, sometimes without any feeling tone."⁵ These special states were not of such frequent occurrence as images (Mayer & Orth, 1901, p. 6). Later in the same year appeared a monograph by Marbe. Once

⁴ Ward's *Psychological Principles*, 1933, has been followed in translating *Vorstellung* by *presentation*. Ward includes under presentation "sensations, percepts, images, intuitions, concepts, notions". According to the Law of Association, the presentation tended to reproduce others with which it had been "in the mind". This "reproductive tendency" will frequently be referred to in this and the succeeding chapter.

⁵ The translation of the word *Bewusstseinslage* has caused considerable confusion. Since Titchener called it "an almost untranslatable word meaning some-

more the experimental method was to be used to settle an ancient problem of logic. This time it was the logical judgment upon which the young science was to pronounce. The judgment, said the logicians, is the unit of thought. Thus: "The true unit of thought, the simplest complete act of thought or piece of thinking, is the Judgment or Proposition between which, where a distinction is intended, it is that the proposition is the expression in words of a judgment" (Joseph, 1916, p. 14). If, however, the logicians were asked what is the nature of this elementary act of thinking, they gave very different answers. Wundt's *Logic* contained, on about a single page of print, seven definitions, none of which were accepted by Wundt himself. It would not be difficult to find a dozen others. Such a state of affairs would never do. Psychology must find out what a Judgment *is*. This it must do by rejecting the haphazard methods by which confusion has been reached, and which consisted in a more or less casual observation of the writer's mental processes by the writer himself. Instead, a strict experimental procedure must be used. A number of observers must be caused to make judgments under standard, controllable conditions, and a careful record made of what takes place in their consciousness. Thus we shall find out what a judgment really is.

Now, there are facts of our experience which are not judgments. Our problem is then to find what further experiences must be added to make a judgment. By the word *Judgment* is provisionally understood an event of consciousness to which the predicate true or false

thing like posture or attitude of consciousness" (1909, p. 100), "conscious attitude" it has remained. This is clearly wrong, since the English word "attitude" ordinarily implied direction, both in its non-technical and still more in its psychologically technical use. It is important to realize that the term was originally used by the Würzburgers in a purely neutral sense. The *Bewusstseinslage* was an event of consciousness that was not an act of will, was not an image or a perception, and which could not be further analysed. The term was recommended by Marbe (Orth, 1903, pp. 69-70). It is not very felicitous. Orth remarks that it is ambiguous, since it may also mean the total state of consciousness at a given moment—a cross-section of consciousness. For this, however, he says we have the word "*Bewusstsein*". "The *Bsl.* observed by us and Marbe", he adds, "are of very varying character, and have only this in common, that they represent psychological facts which were not exactly capable of further analysis." Flournoy's term "intellection" does not seem to fit the case, nor Larguier's "conception", though both were apparently employed by Descartes in a similar connection (Bovet, p. 15). After reading the literature through several times, the writer finds himself naturally using the term "states of consciousness". It is neutral, and seems to correspond best with what the earlier workers had in mind. In what follows, the abbreviation *Bsl.* will be used when possible, as in the German texts.

can be meaningfully applied. Not only words, but also perceived gestures, may pass over into judgment, as when, for example, we answer a question as to the location of a place by pointing with the index finger. In fact, all conscious events of any sort whatever can pass over to judgment,⁶ including the Bsl. and feelings.

A series of varied though simple experiments followed. Weights of similar appearance had to be compared and the heavier reversed. Tones heard on a tuning-fork were whistled or sung. The lightest of three greys was to be fixated. Imaginary circles had to be compared, geometrical illustrations imaged, and so on. Simple questions were asked, to which the answer was given by a gesture. How large is an ell? The corresponding gesture is made with the two hands. How many are 7 minus 4? The arm is stretched out and three fingers extended. Other judgments are evoked that were expressible in a single word. 12 plus 3? $\frac{3}{3}$? Or the same kind of question might be answered by a proposition such as 8 plus 7 equals 15. Propositions were stated in internal speech. Finally, translations had to be made. "Homo cogitat" "*Der Mensch denkt*", answered K ulpe, the subject. "The translation followed by pure association," he reported.

One feels that Marbe has kept his promise to base his conclusions on a large number of different experiences under varied conditions. The conclusion is the same throughout. The same sentence is repeated time after time with endless variations, like a refrain, as Bovet remarks. "There are no concomitant events", says Marbe, "of which it could be said that they lend to judgment its character." That is to say, there is no psychological criterion of Judgment, and Judgment is the unit of thought. But judgments exist. Therefore, there must be other, non-psychological factors which raise experiences to the rank of judgments. Into the investigation of these we shall, however, not follow him.

This first peep which a properly controlled introspection afforded into the working of the thought process gave the early workers something of a shock. No psychological criterion of Judgment, which is the very backbone of thought, and apparently an utterly familiar experience to everybody's Judgments, recognized as such, with nothing in consciousness to indicate why they are judgments! Apparently Marbe can hardly believe his ears, and has to repeat the astonishing fact to give himself confidence. Thus the predominant note of Marbe's paper was negative, at

⁶ *Alle Bewusstseinsorgane zu Urteilen werden kommen*, p. 15.

least in the first part. He had failed to find the psychological criterion for which he was seeking. What he did find, however, was "certain obviously present facts of consciousness, whose content either escapes further characterization altogether, or proves accessible to such characterization only with difficulty. These experiences, which had already been discussed in the work of Mayer and Orth, may, like all other experiences, be affectively toned or otherwise, and will here also be designated as *Bewusstseinslagen*."

Orth's paper of 1903 confirmed the existence of the Bsl., and, more important, anticipated Ach in relating it to cognition.

Külpe later remarked on the noteworthy fact that one of the first results of the Würzburg investigation of thought was negative. The sole result had been the discovery that the conventional descriptive terms of experimental psychology were not adequate to account for the intellectual processes (Külpe, 1922, p. 309). Yet one can already discern positive achievement of a high order. For if the results were, at this stage, mainly negative, yet the method was obviously worth pursuing. Already one could see growing a faith in the efficacy of that systematic self-observation which was in large measure to constitute the programme of the school, and was technically developed by the later comers. To have subjected association and judgment to careful introspective examination, thereby making clear the necessity for new descriptive concepts and, as it turned out, improvement of technique—this was no mean achievement. One feels an enthusiasm already present.

On reading Marbe's study one is struck by an apparent naivete. He explains the meaning of experiment in psychology. He tells his reader that in order to obtain quantitative results one must employ statistical devices—this fourteen years after Fechner's death! He states that observation of physical events, such as the intensity of light, comes within the purview of the psychologist. This naivete is difficult to define, but is unmistakably present. Whether it was a personal characteristic, or whether Marbe conceived that such details were necessary in a work with the sub-title *An Introduction to Logic*, and perhaps intended partly for philosophers, is hard to say. Whatever the reason for these apologetics, they are very much absent from the later work. With Marbe, and to a certain extent with Mayer and Orth, one feels that the new movement is a little shy. With Watt, writing only three years later, it has grown up and lost the need for self-justification. With Bühler, after six years, it has become almost boisterous.

The ensuing papers fall naturally into two groups.⁷ Those of Watt and Ach appeared successively in 1905. They dealt primarily with what we have called the mechanism of thought, although each of them made important contributions to the problem of the material of thinking. These two form a natural pair, and their full consideration will be deferred until later, although one part of Ach's work is described in this chapter. Following were the papers of Messer, 1906, and Buhler, 1907 and onwards. The work of these two men seems most naturally to articulate with that already considered. It will, therefore, be described next in order.

Messer's work seems to show a remarkable growth of sophistication in the psychology of thought, a growth which one suspects was the product of countless discussions, papers at seminaries, arguments in the small hours. One gains the impression that in these five years an idea had developed into a more or less homogeneous school. Watt's work had appeared. Ach's was published while Messer was preparing his results. Messer is able to write on the "Psychology of Thought" the longest of these long articles, filling 224 pages, of which perhaps a third are in small print.

The paper is entitled "Experimental Investigations into the Psychology of Thought". Its general purpose is announced as the exploration of the events that occur in consciousness during simple thought processes—a much more ambitious programme than Marbe's five years before, and, in fact, the most ambitious of the programmes yet undertaken.⁸ The conventional, logical, division of conception (*Begriff*), judgment, and conclusion is accepted, though with a hint that the classification may be only provisional. The investigation of thought is beginning to find its psychological feet.

Messer proposed for himself a big task. As Titchener remarks (1909, p. 96), he hardly proved equal to it. He has given us no general account of thought, but a series of disconnected papers, which are, however, of great value. He should perhaps be considered as the systematist who at least in this paper did not quite systematize. If, however, one wishes to find introspective data on any particular

⁷ See Titchener, 1909, pp 118-19, for a brief statement. ⁸ Watt's paper (1905) was called "Experimental Contributions to a Theory of Thought", and was stated to contain investigations into "so-called Association reactions". Ach's, in the same year, was primarily an inquiry into the activity of the will, and apparently contained an investigation of thought processes only as an afterthought, although the title was "On the Activity of the Will and on Thought".

point, such as the psychology of images or the Bsl., one naturally turns to his paper.

The Hipp Chronoscope was used, with Ach's card changer. Cards were shown to the subject, whose reactions were timed by means of a voice key and the chronoscope. There were six subjects, including Külpe, Dürr, and Watt. Fourteen different series of experiments were conducted, as follows:

- (1) Free association to the word printed on the card.⁹
- (2) A co-ordinate object to be named (e.g. stimulus, hand; response, foot).
- (3) Co-ordinate idea (e.g. stimulus, cellar; response, vault).
- (4) Any adjective to be chosen.
- (5) The idea denoted by the stimulus was to be characterized (e.g. flood—"a great mass of water in movement", 7529 sigma).
- (6) Remember a definite object which falls under the idea of the stimulus word, and make a report about it.

In series (7) to (11) two words, one printed over the other, were given as stimuli:

- (7) Give a relation between the words.
- (8) Give a relation between the objects signified.
- (9) The names of famous men, artists, etc., to be compared objectively.
- (10) Personal preference to be expressed between two famous men, things, states.
- (11) A noun and an adjective given. A judgment to be made including them.
- (12) Propositions were shown. A position to be taken concerning them.
- (13) Objects or pictures. Free association.
- (14) Give a report on the object or picture shown.

(12) to (14) were timed with a stop-watch.

The first part of the paper deals with matters with which we shall not concern ourselves in detail at present, although reference will later be made to certain of the sections. Suffice it to say that Messer devotes ten pages to a justification of the method of introspection as he uses it; twenty-two to a very interesting account of the general behaviour of the different observers during the different tasks; ten to an important discussion of imagery, and so on. On p. 93 there comes an important section on the Judgment, discussion of which will be deferred until Watt's paper is being considered. The term Bsl. was, says Messer, already familiar to his observers, and was frequently employed by them in their reports. For this reason, he says in

⁹ Substantives of one and two syllables were used for the first six series. For series seven to eleven, longer words were used, up to four and five syllables.

a footnote, he has used the term as a provisional collective name for all experiences, "*Erlebnisse*"—the italics are his—different from the generally recognized classes of conscious contents, and not resolvable into them by analysis (p. 175).

It is in Messer's study that we first find an attempt to do anything more than proclaim that the Bsl is unanalysable. If they cannot be analysed they can be classified, says Messer. He concentrates his attention on the Bsl. of meaning.

The first group consists of those which represent in consciousness the meaning of word-presentations. This group includes the Bsl. of understanding.

When we examine these Bsl. of the meaning of words, we find that they occupy an intermediate position between two other groups of facts of consciousness. When a word is presented to a subject, the meaning of the word may be immediately clear, and appear in consciousness as inseparably bound up with the presentation of the word. "The stimulus word comes and I am clear about the meaning" (p. 72). "Some kind of knowing of the meaning is present," says Messer (p. 176, note). In other cases, however, the meaning may differentiate itself from the reading of the word as a separate experience. This may happen for a number of reasons, such as the strangeness or ambiguity of the word. When it happens, the subject may know what the word means, but be unable to make any further report. That is to say, there is an unanalysable Bsl. of meaning attached to the presentation of the word.

Thus to the printed stimulus "horse-fly" Külpe's reaction was "dragon-fly" (826). His report was "the superordinate idea 'vermin' was clearly present as a Bsl". To the stimulus "ball" another subject reported: "Had to wait purposely for a determinate meaning of 'ball'; this came through the Bsl. *dancing place*"¹⁰.

Finally, a definite image may be, so to speak, crystallized. Thus when the word "cellar" was given, with the task of naming a coordinate object, Durr reported "saw a house (schematic), with cellar and upper storeys. I wanted to name the upper part, the word did not come". This gives a ladder with three rungs. There is the word bringing its meaning directly with it; there is the word accompanied by a Bsl. of meaning, there is the word accompanied by an image of meaning

¹⁰ The discussion of the understanding of words and the representation of meaning in consciousness is treated in a separate section (pp 71-93) Reference is made to it in the present discussion and elsewhere

Thus Marbe's Bsl. was here found to be a transitional form between the presence in consciousness of a meaning immediately given with the stimulus, and its presence as an accessory image. One may say, perhaps, that it is something like an uncrystallized image.

The Bsl. of meaning hitherto considered are, so to speak, supernumerary to word-presentations. It is not, however, necessary that words should be present. Such states may exist with no verbal accompaniment at all. Here again these are transitional forms. Fragments of words ¹¹ may be present, or the subject may know how the word sounds. Thus we have two varieties of Bsl. of meaning, those with and those without verbal accompaniment. Both varieties may be widened so as to include propositions and judgments. Messer gives a number of examples where they contained the meaning of complete propositions. One instance may be given. Dürr was given the stimulus word *Angle* and replied "*Corner*". He reported: "The tendency was towards the well-known proposition that the sum of the angles of a triangle equals two right angles (Bsl.); but it did not mature. A number of such thoughts may be united in an embryonic form into one experience" (pp. 177 to 180).

The content of such Bsl. may naturally be of very great variety, being coterminous with the content of thought. A full survey of them is impossible, and the task is, in any case, one for the logicians. A few varieties are specified, giving us a logical classification—a classification by content. There is that of reality, those of spatial and temporal relationships and peculiarities, those of causal connection and of suitability; there are ten of various logical relationships, such as likeness and co-ordination; another set gives a relationship between what is thought, as object or idea, and the subject. Such are those of familiarity, strangeness, and value. Two further groups are related to the task that is being fulfilled; they contain three and fourteen headings respectively, and include such categories as "suitability", which is said to be relatively objective, and, on the other hand, such states as that of doubt and confusion, which are said to be more subjective.

Further, Bsl. may be classified on an entirely different principle according as they are of a purely intellectual nature, or are affectively or volitionally characterized.¹² In this case we might speak of them as intellectual and affective. We should thus have a psychological

¹¹ Also reported by many others writers, e.g. Grunbaum, Fisher, and Ach.

¹² See also Marbe, 1901, pp. 11-12.

division into which, as a matter of fact, our logical classes easily fall.¹³

"With the 'conscious states' here treated, whether they are of a material or rather of a more formal nature, whether they can be rendered in a word or in one or more propositions, whether they be, finally, of a purely intellectual or of an affective nature—with all these manifold conscious states we find ourselves in the realm of experiences which B. Erdmann has designated as 'unformulated' (or 'intuitive') thought.

"Of course, in our actual thinking there is no clear line of demarcation between formulated and unformulated thought. . . . There are continuous intermediate stages and many kinds of transition between the two. One might regard as limiting cases on the one side a thought in fully formulated propositions with clear consciousness of meaning, and on the other a lightning reflection and recognition, with no trace of a word; the difference between the two would be even greater than that between the tedious and correct writing of a child who has just learned to write properly, and the rapid script of a practised shorthand writer. . . ." (p. 186).

In order to explain the facts of meaning, Messer has already made the assumption of an unconscious machinery underlying the conscious process of thought. There are apparently, he says, unconscious real processes which, under certain specified circumstances, occur in different intensities, exert a correspondingly different influence (*reflex*) on consciousness, and are represented in consciousness in different degrees of clearness. Thus are produced conscious effects varying from clear word-images to unanalysable Bsl. This same assumption explains the behaviour of the Bsl. in general. So that we find ourselves with "the hypothesis that the real psychic processes, which underlie the fully formulated thought, can run their course in manifold manner, abbreviated, intricately inter-penetrating, partaking more or less of the psychic energy" (p. 187), thus giving us all stages between fully formulated thought and the vaguest *Bewusst-seinslage*.¹⁴

¹³ Messer has slipped over into a general discussion of the *Bewusstseinslage*, from the particular case of the Bsl. of the meaning of words, without making explicit the relation of meaning to thought in general. He includes Ach's *Bewusstheit*, awareness, under the term Bsl.

¹⁴ The notion that the *Bewusstseinslagen* were fundamental in the thought processes was evidently in the air. Thus Taylor states, in 1905, "More complicated structures of '*Bewusstseinslagen*' and word-images, which could not be described more closely, were designated as thought" (p. 235). In the same way Watt, speaking of the Bsl., says parenthetically, "Call it a thought" (1906).

He concludes the section with the following words: "The useful, provisional collective term *Bewusstseinslage* has then done its duty at this point, and it seems to us advisable to replace it by the current expression Thoughts' (*Gedanken*)."¹ He adds in a footnote, "Further, it would best correspond to the usage of the language to call thoughts those conscious states alone whose content can only be fully formulated in one or more propositions; and by contrast to call those of the meaning of single words or phrases *Begriffe*, ideas" (p. 188).

This marks a real stage in the development of the theory of thought. The difficult problem of meaning and understanding has been examined, and a solution suggested, involving what we have called "unconscious machinery". The solution has been found applicable to the problem of thought in general, and in particular to that of the so-called *Bewusstseinslage*. At the same time the Bsl. have been rescued from the museum case where, as psychological curiosities, patently existing but unclassifiable, they had been jointly deposited by Mayer and Orth, and by Marbe. These states are now maintained to be of high functional importance in our thinking. They are, in fact, thoughts, though of a relatively unformulated kind.

The discussion has revealed an important feature of Messer's work, namely his insistence that the processes involved in thinking are not amenable to any clear-cut classification, but actually consist of experience-types merging one into the other with no clear line of demarcation. The Bsl. of meaning is half-way between the accessory image and the immediately given meaning. That without verbal imagery is likewise ushered in by transitional forms. In the same way, a "feeling of visual direction " may develop during an experiment into "presentations (*Vorstellungen*) of almost hallucinatory clearness" (p. 51,; cf. Titchener, p. 112). This last is, however, not usual. Generally, only one degree of clearness is present, different intermediate stages being reported by different observers.

By relating this Bsl. to "meaning" and to thought in general, Messer had prepared the way for Bühler. Quite apart from the rich introspective data, and the attempts, not always very happy, at classification, his was a very real contribution to the Würzburg theory.

Thus we take leave of the Bsl. as a specific subject of inquiry. What seems to have happened is that the new technique, and a new courage, perhaps, resulted in the discovery of something unclassifiable and purely negative. Later on, positive characteristics were dis-

covered to belong to what had been discovered. The *terra incognita* was surveyed. This is the explanation which best fits in with Külpe's own account after the event.¹⁵ Each of the investigators coming after Marbe bent the new discovery in the direction of his own enthusiasm. Watt called the Bsl. an "unnamed task". Orth investigated its relation with feeling. Messer, the systematist, tried to classify it, and found it coterminous with thought itself. Buhler, as we shall see, makes it the "consciousness of the turning-point" of his thought element. Aristotle's dogma, that thought is impossible without an image, had apparently broken down. Henceforward, if one was interested in a certain aspect of thought, one was now interested in imageless thought from the same aspect. This is, again, strikingly illustrated in Buhler's work.

Awareness.—In order to follow the development of the Wurzburg doctrine as it concerns the material of thought, an aspect of Ach's work must now be considered. Ach's principal monograph appeared in 1905, a year before the publication of Messer's paper, but too late for Messer to do more than refer to it in footnotes (e.g. Messer, p. 11). Consideration of one of Ach's main theses has already been deferred to the next chapter, which deals with the mechanism of thinking. It is by his contribution to the latter problem that Ach is chiefly known. More important, however, in the opinion of the writer, is that part of his work which belongs to the present context, namely the experimental demonstration of the impalpable awareness of *knowing*.

Ach's primary object was the investigation of the will. His book is entitled *On the Activity of Will and on Thinking*. The preface states that the purpose of the monograph is a "treatment of the problem of the will upon an experimental basis". The problem of "willing" is, however, manifestly bound up with the whole problem of "thinking", and thus it was that Ach found himself not only investigating "the Determination that fulfils itself in the adoption (*Anschluss*) of a purpose or an aim", but also discovered that it was "necessary to make a closer examination of other psychic processes, for example those which are connected with the presence of [the experience of] knowing and which are henceforward designated as Awarenesses". "In addition, there was adjoined a discussion of the process of 'determined abstraction', of attention and so on." Thus Ach was forced to add to the original title the words "and on Thinking". A legitimate

¹⁵ Külpe says of the *Benusstseinslage* that it was a "conception, obtruding itself through the observation of the facts, making possible a periphrasis rather than a description" (ibid., pp. 309-10).

alternative title, he says, might have been "On Determination and Thinking" (Ach, 1905, pp. v *et seq.*).

The basis of the investigation was the reaction experiment, which Ach varied in new and ingenious ways. His list of reactions follows.

A. *Reactions with Unique Stimulus-response Correlation*¹⁶

1. *Reactions with Simple Correlation*.—Stimulus and movement may remain the same; for example, there may be a simple reaction of the right index finger to a white card (a-method of Donders), or there may be different stimuli with a single response (recognitive reactions), or different stimuli (words, colours, etc.), with variable but adequate response, such as naming the stimulus.

2. *Reactions with Manifold Correlation*.—To each of three, four, or five stimuli is assigned a specific reaction (b-method of Donders).

3. *Conditional Reactions*.—Reaction follows only under certain conditions ; for example, to red cards and to no others, reaction with the right index finger (c-method of Donders). Or the combination *ac* might be given, with reaction only if *a* stands to the right of *c*. (4) *Associational Reactions*.—(a) Free association. (b) Associations with special determination; e.g. the so-called judgment reaction, where the direction of judgment is determined by the previous setting of a task.¹⁷ Or the name of a town may be given, with instructions to give the river on which it lies.

B. *Reactions without Definite Correlation*

This leaves much more to the subject; e.g. the stimulus or the response may not be predetermined; or neither the stimulus nor the response may be predetermined. For example, cards might be shown with either *rx* or *xr* printed, with the instructions, "To *x* react with the right thumb, to *r* react with the left thumb. Do not make more than one movement" (p. 163). Here, then, the subject chose to which of the letters he reacted.

For the purpose of closer examination of the experiences involved Ach divided the introspective period into:

(1) The fore-period, including the time between the signal and the appearance of the stimulus.

(2) The main period, including the actual experience to be investigated, i.e. from the perception of the stimulus to the giving of the response. (3) The after-period.

The introspections were reinforced constantly by questions, to which Ach attaches great importance. These questions, he says, were not often included in the protocols (p. 18). The protocols were enormous enough as it was, and only a selection could be printed. It may, however, here be noted that the omission of the questions in the printed report constitutes a serious technical flaw; especially when we

¹⁶ *Reaktionen mit eindeutiger Zuordnung*, *ibid.*, p. 33.

¹⁷ It is to be noted that Ach here uses the term *Aufgabe* in much the same way as Watt.

find Ach maintaining that one of their important functions is "the education of the subject in self-observation" (ibid.). In order to obtain real experimental certainty and control, these questions should have been fully standardized and fully reported. With the best will in the world, one feels that an unstandardized set of questions must result in leading questions. More will be said on this point later. This point was, of course, noticed by Ach (op. cit., p. 17); one has the impression that he is a little uneasy about it. The matter is discussed in the next chapter.

Samples of the instructions may be given. First, those which the subject received for the so-called sensorial reaction. "At 'now' the finger will be depressed; about three seconds later a white card will appear. As soon as you see the white card, let the finger go. Direct your attention towards the coming impression. Thereafter report what you have experienced." After practice, the subject was told merely "instructions as usual". The instructions were suitably modified for the "muscular" form of the reaction. A more complicated set of instructions ran: "Cards with two figures will appear. At the word 'now', you should undertake to perform an arithmetical operation ; either divide, multiply, add, subtract, or else do nothing; and when you have finished say the syllable 'pe' into the voice-key" (p. 174). Early in the account of the experiments we find the term *Bewusstheit*, which has been translated by Titchener as "awareness".¹⁸ When, for example, Ach is describing the sensorial series of reactions included in his "simple" reactions, he reports of subject "H", as follows: "The appropriate spot on the card changer is fixated and there is inner speech of the words: 'it will come now' or 'now it's coming', with the meaning that something (i.e. a white card) will enter there, at the point of fixation. At the same time sensations of tension, as sensory accompaniments of the concentration of attention, arise in the eyes, region of the brow, temples, sometimes also in the muscles of the face and in the shoulders, as well as a holding of the breath.¹⁹ Sensations of tension in the hand or the finger were only exceptionally present. In spite of this, there was contained in the total state of tension the *knowing (Wissen)* that reaction should take place forthwith, without this being spoken internally or being represented

¹⁸ Seeing that the word implies imageless knowing, the term is apparently not exact, though the translation is valid.

¹⁹ The registration of tension-sensations in the eyes is evidence of the quality of the introspection. Such sensations have of course been fully confirmed by later observers. See, for example, Jacobson, E., 1929.

phenomenologically in any other way. Besides all this, there was present the awareness that in a short time that which was awaited— that is to say, the card—would come, and thus . . . there was also a temporal component" (p. 38). In the same way, on the next page: "the white card was present only as an awareness in the waiting-content ; that is to say, the subject knew that the white card would appear over there, where he was fixating, without any palpable representation of this presentational content which related to the white card" (ibid., p. 39).²⁰

It is impossible to list every context in which the term awareness is employed throughout the monograph. A representative selection of the passages will be given in order that the reader may have an idea of the kind of experimental evidence which Ach presents. In the description of the simple reactions, sensorial series, it is stated of subject "J": "On appearance of the card at the first trial a state of surprise and astonishment occurred, that is to say, the subject did not know what to do; then appeared the awareness that reaction should be made, after which the finger went up (611 ms). At the second trial after appearance [of the stimulus] there appeared the awareness that reaction should be made, and with it organic sensations were present in the head and in the right finger, after which movement followed (356 ms). At the third trial the finger rose immediately after the apprehension of the card; that is to say, without the aforesaid awareness (322 ms)."²¹ The passage continues by stating that the awareness reappears if preparation has not been good, and at the same time latency may increase. Again, in the muscular series of simple reactions, it was reported of subject "H": "Between the fixation of the plate and the intentional sensations of movement a known relation was given, in the sense that reaction should take place to a change (that is, the appearance of the card) which had to do with the object of regard. A more exact analysis of this event was not possible. One can only say that there occurs an unequivocal 'knowing' that reaction should take place as quickly as possible, as soon as the familiar change comes on the plate. In this complex the most prominent place is taken by the sensation of tension in the hand, which represents the most expedited possible entrance of the movement to be carried out. In addition, it is also given that this movement shall take place in a very short time" (op. cit., pp. 49-50).

²⁰ The exigencies of the English language compel me thus to translate the words "*ohne dass dieser . . . Vorstellungsinhalt anschaulich repräsentiert war*". ²¹ Loc. cit., pp. 45-6.

Again, in the same (muscular) series, it is stated of subject "L": "With the fixation of the plate came the "knowing" that something (i.e. card) will appear over there, uniquely determined (subject knows that a card will appear, without the presence of any visual elements or any kind of acoustic-kinaesthetic presentation-images) (ibid., p. 54).

In the account of reactions of recognition and discrimination comes the following passage: "In the main period there develops first the sensation of white or red, with which is bound up the 'knowing' that the subject must wait, the latter being not particularly prominent, however. It is given with the development of the apprehension. Thereafter comes the awareness that the subject must react, whereat the finger goes up. This 'knowing' is usually preceded by a state of agreement or understanding. With increasing practice the awareness that reaction should take place fell away, but in spite of this the movement was characterized as willed, on account of its known character" (pp. 81, 82). Later it is stated that practice diminishes the intensity both of sensations of tension and of the awareness. "It was now a passive, indifferent state of waiting. The temporal component. . . was no longer observable;... the expectation of the coming impression might fall off so much in intensity that one could no longer make certain that it was known to be present. With the fixation of the plate and with very weak intentional sensations in the reactive organ, there was present only the weakly impressed awareness that reaction should take place. Immediately after the carrying out of the reaction, often no further report could be given of the process of the reaction-event itself" (pp. 100-1).

Later, the awareness is equated with the will-impulse. In another context it is equated with an act of the act-content antithesis. "The two acts of understanding and of the awareness . . . followed very closely as the result of practice. They could now no longer be distinguished. The second act retreated more and more towards the end of the experiments. Here too no 'distinction' could be noticed." The awareness could admit of degrees of intensity (p. 94). And once more, in the description of the reactions with double determination, it is stated: "The waiting was in so far impalpable, as its content was not further determined phenomenologically by inner speech, visual pictures, etc.; but, nevertheless, the content corresponding to the instruction that 'in accordance with instructions when a determinate change takes place at the point of fixation, an unequivocally determined change in the behaviour of the subject is to follow'—this

content was present in an unequivocal, but not more closely describable manner. Accompanying it, diffuse sensations of tension in the head (neighbourhood of eyes and brows, upper jaws) were regularly perceived" (p. 127).

In summary of these and many other accounts given by his twelve subjects, Ach defines an awareness as follows: "We designate this presence of an impalpably given 'knowing' as an awareness."²² It is uniquely given, but cannot be analysed further. The subject can immediately afterwards say what was present to him. In the afterperiod the total event just experienced persists by perseveration. It is present as in a nutshell, without obtrusion of details or palpable representation. Thus an account can be given to the experimenter. Normally, during the fore-period, when there has not been too much practice, the following complex-content is, for example, present simultaneously, as an awareness. (1) The coming stimulus (a white card), with a spatial determination, in so far as the subject knows that the uniquely determined change will take place at the point of fixation. (2) The subject is aware that thereafter must follow an unequivocally determined change on his side; that is to say, the reaction. (3) In addition there is a relation present between (1) and (2); there is awareness that the reaction must follow as soon as the stimulus appears. (4) There is a temporal component, in so far as the *knowing* is given, that the stimulus will appear within a certain known time. The subject knows, for example, that the stimulus will not come in a half-second, and will come within a minute. In addition to this immediately given content, "there are also the accompanying phenomena of sensory attention, such as sensations of tension in the upper part of the body, and in the optical sense organ as well as the visual perception (in our experiments with the closure plate of the card changer). At times some of the above-mentioned constituent parts of the awareness-complex come up in the form of images, particularly at the beginning of the fore-period or during the first experiments on any day. Individual capabilities play a large role here. But, nevertheless, there are an extraordinarily large number of experiments, in which, apart from the above-mentioned accompanying phenomena, the whole waiting-content appears only as 'knowing', and this presence of a knowing-content we designate as an awareness" (p. 211,212). The impalpably given content of the awareness is often elusive.

²² *Wir bezeichnen dieses Gegenwärtigsein eines unanschaulich gegebenen Wissens als Bewusstheit*, p. 210.

Part of the experience is sometimes indicated by inner speech, such as "must come" or "corner, corner", or by rudiments of words, such as "add",²³ "folg",²⁴ and so on. This frequent occurrence of kinaesthetic or acoustic-kinaesthetic presentations, says Ach, may well be the reason for the widespread supposition that our thought "is always accomplished by inner speech or by adequate²⁵ visual, acoustic or other memory-images".

As against this supposition Ach points out that there are very complex contents in which the component parts are known in intricate, reciprocally related, manifolds, which have and indeed could have no adequate verbal representation. "If a phenomenologically constituent part is given, which as a relevant sign brings a meaning-content to expression, as, for example, "edge", then the correlative meaning is alone bound up with it, namely the expectation of the upper corner of the card, while the rest of the waiting-content that is simultaneously given has no such phenomenological representation, but is present in the total state of tension as awareness" (p. 215). In addition, there was recorded at times a "lightning-like momentary illumination of a complex-content, which can only be expressed verbally by several sentences, an event which because of its short-lived existence cannot possibly be given by inner speech" (ibid.). In these cases the meaning of the content is uniquely given, and the memory is clear and distinct, without any ascertainable sensational qualities. For instance, subject "C", in the fore-period of the reaction with double stimulus-response assignment, reported a visual memory picture of "0" with the lightning thought that it would be most practical to prepare for "0" alone, and in addition the awareness that perhaps only "E" will come. Ach maintains that it would be an abuse of terms to call such experiences "dark sensations" or memory pictures which are too weak to be identified. Often the palpable representation of a meaning-content is first given, as by inner speech, and thereafter the corresponding meaning-content as awareness without palpable representation. It has been seen that the awareness admits of degrees of intensity. For example, with practice, intensity gradually falls away.

Awareness of Meaning.—There are two main classes of awareness, those of meaning and of relation, with two transitional forms. The

²³ For "addieren".

²⁴ For "folgen" or "folgender" (p. 215).

²⁵ That is, images corresponding in every detail to that which they image; the phrase implies the correspondence theory of truth.

awareness of meaning is always accompanied by "a sensation as described above (i.e. a sensation of tension) or a visual, acoustic, kinaesthetic or other sensation, or a memory image" (p. 213). This is either simultaneous or it occurs immediately beforehand. In this way these sensations form the palpable conscious representation of the content impalpably present as a *knowing*. They are the signs of the meaning-content. It frequently came about that, for example, "after the appearance of a coloured card the sensation 'yellow' was present only in its optical quality. Not until after this did a 'knowing' appear, for example 'this is yellow'; and in fact this ingress followed clearly as a special act after the pure sensation was given. By this act the sensation was, so to speak, identified as the well-known colour yellow." A relation was thus established with previous experiences. This process Ach identifies with that of apperception.

Although the awareness is found in every subject, yet there are strong individual differences. Certain people incline to visual or kinaesthetic-acoustic illustration of the meaning-content. Ach claims that he personally has a distinct tendency to think in terms of *aware-nesses*, which, he says, may be due to the fact that his attention has been especially directed to the analysis of this kind of thought. Physiologically Ach suggests that the awareness of meaning is due to the subexcitation of neural structures which, when fully excited, give a fully fledged image. One reads, for example, the written word "bell". Associated with this are a multitude of images, each with its correlative neural pattern. On reading the word, however, no one of these patterns need necessarily be excited to the pitch of producing an image outright. They may, nevertheless, be excited to the point of producing mental events which are related to the images concerned, but are not intense enough to be of imaginal quality. These together constitute the meaning of the original image, which thus serves as a focus with a halo of meaning correlated with subexcited patterns. These subexcited patterns are then the physiological correlate of the *knowing*. If a nonsense syllable such as "chuz" is read, there are no neural connections to such patterns of meaning. That is what we mean by saying it is a nonsense syllable. In the same way, the differences of intensity already noted in awareness may be explained by assuming that the effect of repetition is to make certain connections more readily accessible.

Certain facts should here be noted, some tending towards, others against this piece of theorizing. One's first impulse is to reject the notion altogether, on the ground that the "all or none law" of neural

conduction would now make such subexcitation impossible. However, there do exist intensive variations both in images and in sensations of all kinds. Such differences are psychological facts, and it is the task of physiological psychology to explain them. Thus there is no *a priori* argument against the existence of degrees of intensity in awareness. But whether such difference may be correlated directly with differences in the degree of repetition is, of course, very doubtful. And it cannot be assumed that an image of a low degree of intensity may be equated with an imageless component of consciousness. To diminish the intensity of a conscious event belonging to a given sensory modality surely does not destroy the sensory modality. A weak smell, as perceived or imagined, is still of olfactory quality, and a slight sound of auditory quality. Ach's excursion into physiology surely proves the opposite of what he wished it to prove. A subexcited image still retains its imaginal character, and thus cannot be the explanation of imageless thought. Ach is able to cloud over the appearance of inconsistency by speaking of tendencies to reproduction. "We designate the awareness as a progressive function of such a state of excitation of reproductive tendencies" (p. 219). But his argument is throughout dependent on the implication of "presentations" of a specific sensory modality. If, for example, a connection only, or a bond, as Thorndike would put it, is excited, without the imaginal pattern (if that were possible), the hypothesis breaks down. The hypothesis demands the subexcitation of patterns, which when fully excited will give the presentation proper. It thus concerns experience belonging to a definite sensory modality, however slight the degree of its intensity.

Awareness of Determination.—The *awareness of determination* is defined through the fact that "the individual knows directly, as a characteristic experience, whether the given psychic occurrence is proceeding in the sense of a previously established determination or not" (p. 230). It may be called an awareness of agreement. It is not necessarily a special psychic act, but is rather a knowing contained in the course of such. The whole sequence of psychic processes is called a "willed" one—"The conscious experience of such an event is uniquely determined as regards its quality, and the individual can in every case immediately report whether the action was willed or not" (p. 230). This awareness of determination distinguishes such processes as free association, or aesthetic contemplation, from willed action or thought. It disappears or diminishes with practice, and the action becomes automatic. The activity of will is, accord-

ingly, immediately recognized while it is in progress by the characteristic awareness of determination (p. 232). A special form of it is given in the awareness of a tendency. A tendency is designated on the subject's part by such words as a search, an urge, and so on. One subject spoke of a peculiar urge, which was designated as a need for something to happen; there followed the visual image of the digit that was intended. The awareness of tendency is transitional to the events already discussed. I may feel the urge to lift my hand, either with or without doing so. The first case would correspond to the awareness of determination, the second to that of tendency. When the urge is present without the action, I may, then, experience the "awareness of tendency". Like other awarenesses, that of tendency is of course impalpable, imageless. Nevertheless, when the subject is asked he can say exactly what it is that he should or should not do.

The awareness of determination proper is found whenever mental events are occurring under the influence of the determining tendencies ²⁶—"whether these arise from a purpose, a suggestion, a command, the ordering of a task, or an instruction". According to Ach, the awareness apparently differs in the several cases; in those occurring during "voluntary" actions, the "personality", the "ego", is more prominent (p. 234). This is apparently an echo from Külpe.

The second main form of awareness is that of relation, where the reference is backwards to a preceding content of consciousness (p. 235). "If, for example, we are set to receive a specified impression, and another comes, this manifests itself in consciousness by an awareness of surprise" (ibid.). Clearly such an event depends on both the momentary state of consciousness and on that which interrupts it. Hence comes the term "awareness of relation". Instead of surprise, there may be satisfaction if the later impression conforms with the previous determination, or there may be confusion, with an immediately appearing *knowing*, such as "I do not know what I ought to do". The awareness of meaning refers then to a coming event, that of relation to a past one; that of "determination" to the directive process which unifies a past event (acceptance of purpose) with a future one (conclusion of thought or action). The awareness of determination, with its subdivision of tendency, thus stands between those of meaning and relation. This awareness of relation Ach

²⁶ See the next chapter, on "The Mechanism of Thinking". Determining tendencies may be provisionally defined as directive influences in the thinking processes.

identifies with the Bsl.²⁷ It may be accompanied by pleasant or unpleasant Affekt.

An excellent independent confirmation of Ach's experimentally derived hypothesis of "awareness" is to be found in the letters of the composer Mozart. The passage is worth quoting in its entirety.

"When I am," says Mozart, "as it were, completely myself, entirely alone and of good cheer—say travelling in a carriage or walking after a good meal, or during the night when I cannot sleep, it is on such occasions that my ideas flow best and most abundantly. When and how they come I know not; nor can I force them. Those ideas that please me I retain in memory, and am accustomed, as I have been told, to hum them to myself. If I continue in this way, it soon occurs to me how I may turn this or that morsel to good account, so as to make a good dish of it, that is to say agreeably to the rules of counterpoint, to the peculiarities of the various instruments, etc.

"All this fires my soul, and provided that I am not disturbed my subject enlarges itself and becomes methodized and defined, and the whole, though it be long, stands almost complete and finished in my mind, so that I can survey it, like a fine picture or a beautiful statue— at a glance. Nor do I hear in my imagination the parts successively, but I hear them, as it were, all at once. What a delight this is, I cannot tell. All this inventing, this producing, takes place in a pleasing lively dream. Still the actual hearing of the *tout ensemble* is, after all, the best. What has been thus produced, I do not easily forget, and this is perhaps the best gift I have my divine maker to thank for. Everything is, as it were, already finished; and it rarely differs on paper from what it was in my imagination."²⁸

Here, vividly described, is the "presence of an impalpably given knowing". For the *tout ensemble* of which the composer speaks must be a fundamentally imageless experience; the psychological process involved must be that which Ach calls *knowing*, even though Mozart describes it as hearing. There was clearly no time to hear the composition in an instant. In view of the criticisms raised by such writers as Wundt, who claimed that the complex mental events involved in thinking could not be remembered with sufficient accuracy for purposes of introspection, it is of interest to note that Mozart

²⁷ On the other hand, Ach quotes Marbe, in 1914, as claiming that "the *Bewusstheit* forms a part of the general realm of the Bsl." Ach says that Marbe's claim is unjustified, because Marbe has explicitly excluded the *knowing* from consciousness, and the *knowing* is the distinguishing mark of the awareness. See Ach, *Analyse des Willens*, Berlin, 1935.

²⁸ Sitwell, O., *Life of Mozart*, London. Beethoven reports similar experiences.

claims that: "What has been thus produced, I do not easily forget. . . . Everything is, as it were, already finished, and it rarely differs on paper from what it was in my imagination." Considering what is known from other sources of the phenomenal musical memory possessed by Mozart, it is difficult to contradict the composer when he says that he was aware of the totality of his compositions "like a fine picture or a beautiful statue", and that he remembers later what he then experienced. The parallel is striking with the reports of Ach's subjects to whom was present "in a nutshell" a simultaneous, complex awareness of the stimulus of the reaction, of the relation between them, of the fact of the minimal time requirement, and of the approximate time when the stimulus was to appear.

Ach's awareness was a development of the Bsl. of preceding investigators; it assigned a function to the imageless processes of Marbe, and of Mayer and Orth, namely the function of *knowing*. The theory of this imageless-knowing process was still further developed by Bühler into the hypothesis that it *is* essentially the articulated thinking process. The discussion passes therefore to Bühler's work.

Before, however, leaving Ach, there are certain minor criticisms which should here be noted. First of all, there is the important question of scientific controls to which reference has already been made. This point will be raised in detail in the next chapter, when we come to consider the mechanism of thinking, and also in the succeeding chapter, which deals with the general criticism that has been directed against the method of the Würzburg school. Here it is sufficient to say that, judged by modern experimental standards, Ach's work is technically deficient, as is that of his predecessors at Würzburg. Nevertheless, and in spite of other technical flaws which can easily be demonstrated in the work of Ach, of Marbe, and of Mayer and Orth, these men seem to the writer to have proved their point on the question of the existence of imageless components of thinking.

There are minor inconsistencies to be noted. It is, for example, hard to find Ach's opinion as to whether the awareness is a psychic *act* or not in the terms of the act-content psychology. In one context he says that the imageless knowing is contained in the course of such an act (p. 230), in another context the awareness is equated with the act (p. 213). Whether it is meant that the awareness of determination, of which he is speaking in the first context, is contained in the course of a psychic act, while that of meaning is such an act, it is

hard to say. And if so, difficult questions are involved as to the reason for this distinction. Again, it has been seen that Ach's physiological theory is probably untenable; but if psychologists are to be judged by their physiological theories, there are few, at least of Ach's generation, who would escape condemnation. Generations of physiological theorizing have taught psychologists to say as little as possible about the brain in their discussions of thinking. Again, there is some difficulty in deciding whether all awarenesses or only those of meaning have a palpable sign. In the footnote on p. 238 we are told that the sign is always present; though it is apparently not mentioned explicitly except in the account of the awareness of meaning. Further, the definition of the awareness on the same page contains no reference to it. Nor do the experimental results give data that would enable the point to be decided. This is a more serious omission, for on the point hangs the answer to the question as to whether Ach's experiments tend to the conclusion that thinking contains imageless *components*, or whether thinking may be entirely free from imaginal components. But these problems are raised only because Ach's work made it possible to raise them. They shrink into insignificance beside the massive solidity of his actual achievement. In spite of methodological errors, in spite of gaps in the presentation, the evidence which Ach has painstakingly amassed has placed the burden of proof squarely on the shoulders of those who maintain that the material of thought is of an exclusively sensory quality. There had been before this time theorists who had maintained the existence of imageless thought-processes. Ach gave overwhelming experimental confirmation of the fact that such processes do exist, in the form of the impalpable awareness or *knowing*. Bühler's work, next to be considered, did no more than complete the picture.

Imageless Thoughts.—A year later (1907) Bühler published a paper with the title "Facts and Problems in Relation to a Psychology of the Thought Processes. 1. On Thoughts."²⁹ The problem he proposes to investigate is by far the most ambitious of all. It is no less than the fundamental question—What happens when people think?

One feels in Bühler a certain scorn of those who had gone before. Here, he says, we have the immensely complex act of thinking. It has been investigated—how? By inverting weights, singing tones, by "demonstrating the well-known mortality of Caius, by solving the problem 3 x 8" (p. 301). The real thought processes, he says, have

²⁹ *Tatsachen und Probleme zu einer Psychologie der Denkvorgänge. 1. Ueber Gedanken.*

here been mechanized by repetition and have become unconscious. In order to investigate thought, we must investigate thought, not these elementary activities. Take a good aphorism from Nietzsche, such as "I explain to you your virtues from those of the future". I will guarantee that you think. Marbe was prejudiced by his preoccupation with Judgment. Messer had decided that he would find Ideas, Judgments, and Conclusions, and wished to examine these psychologically. For him, therefore, the question is already prejudged. But who knows whether psychological investigation will reveal these elements, or whether they are psychologically important? (p. 303). The true question for a psychologist is: "What is our actual experience when we think?"³⁰

Seven subjects were used. The reports of two only were utilized, and those the most distinguished, namely Külpe and Dürr. For this is to be an investigation of thinking in its highest form. If these men cannot think, who can? A statement or question was put, always answerable by Yes or No. The subject was to answer, and then give the fullest possible report of his experience. Timing was done with a stop-watch. A selection of the questions follows, taken, all but the last, from his sample collection (p. 304):

When Eucken speaks of a world-historical (*welt-geschichtlichen*) apperception, do you know what he means? Was the theorem of Pythagoras known in the Middle Ages? Can you get to Berlin from here in seven hours? Was Eucken right when he said: Even the limits of knowledge could not come to consciousness, unless Man somehow or other transcended them?

Do you consider the detailed presentation of Fichte's psychology a fruitful task?

Can you complete the sentence: The law of association states in its simplest form . . . ?

Can we with our thought comprehend the nature of thought? Can the atomic theory of physics ever be proved untrue by any discoveries?

Does monism really mean the negation of personality? The smaller the woman's foot, the larger the bill for the shoes? The first ten of these belonged to a group designed especially to throw light on the activity of knowing, and suggested by Ach's work (p. 310). The experimenter must adopt the most intimate and sympa-

³⁰ According to the definitions adopted in this book the problem-situations used in some of the earlier Würzburg work were certainly marginal.

thetic attitude towards the subject and his mental processes. The questions must be adapted to the interests and abilities of the subject.

On examining the protocols, many problems emerge. We must neglect them, and answer the problem: What are our experiences when we think, considered purely as modifications of consciousness and apart from their context? I.e. "*What are the constituent parts [elements, Bestandstücke] of our thought experiences?*"

The most obvious feature in the subject's reports, says Buhler, consists in sensory presentations of various modalities—auditory, kinaesthetic, and so on. Then come feelings. Then the peculiar stretches of consciousness described as doubt, astonishment, recollection, expectation, for which one can retain as a provisional designation the term *Bewusstseinslage* coined by Marbe. "It is exactly a consciousness of the process of thought, and particularly of the turning-points of this process in experience itself" (p. 315).

But this is not all. "The most important bits of experience are something that, in all the categories through which these formations can be defined, are not touched at all (I neglect for the time being the Bsl., whose position is peculiar). Something which before all shows no sensory quality, no sensory intensity. Something of which we may rightly predicate degree of clearness, degree of certainty, a vividness by means of which it arouses our psychic interest; which, however, in its content is quite differently determined from everything that is ultimately reducible to sensations; something for which it would be nonsense to try to determine whether it possessed a greater or less intensity, or even into what sensory qualities it could be resolved. These entities ³¹ are what the subjects, using Ach's term, have designated as awareneses, or sometimes as knowing, or simply as 'the consciousness that', but most frequently and correctly as 'thoughts'. Thought, that is also the term proposed by Binet. We shall retain it as the most natural and the most suitable" (pp. 315-16)

The question now narrows itself to the following part questions: how does the function of carrying thought-content distribute itself between images and thoughts? and, secondly, what is the mutual relation of these two? The first problem is easily solved. "A glance at the protocols will tell us: anything so fragmentary, so sporadic, so thoroughly at the mercy of chance when it enters consciousness as the images in our thought experiences, cannot be regarded as the carrier of the close-fitting and continuous thought-content. . . . The thoughts ³¹*Stücke*. Titchener translates "items".

alone can be regarded as the real constituent parts of our thought-experiences" (p. 317).

That is to say, our thinking consists essentially of a specific conscious process which must be considered to constitute a fresh mental category. It is neither sensation nor feeling nor image, and may, in fact, exist without any trace of imagery. It has its own articulations, not those of logic. It definitely has reference to some object, namely that concerning which we are thinking. Two reports follow, illustrating the imageless nature of such thought.

(Durr) "Is this correct: The future is just as much a condition of the present as of the past?" Answer: "No." (10 sees.) "First I thought: that sounds like something correct (without words). Then I made the attempt to represent it to myself. The thought came to me: Men are determined by thoughts of the future. Then, however, immediately the thought: *that the thought of the future should not be confounded with the future itself; that such confusions, however, constitute a frequent dodge in philosophical thought. (Of words or images there was throughout no trace.) Thereupon the answer: No.*"

Another protocol (Külpe). (Do you understand?) "When you think of purpose you must also think of chance and folly?" . . . "Yes." (11.5 sees.) "It was difficult and strange (*ungelaufig*) for me to bring purpose into contrast with the two others. That is to say, the thought darkly emerged, that the two others must be presupposed by purpose, in the same way as not-A is by A. Folly I succeeded, without more ado, in bringing into this scheme; with chance I did not succeed. Then I had the thought, *how, with Darwin, chance is considered as an explanation of purpose. (There were no images, not a trace of the word Darwin, this is the first time I have spoken the word. It was an immediate, quite clear Knowledge (knowing).)* Then I said with a measure of uncertainty for the second part: Yes. The task has a strong echo, it has not left me yet, because I am not yet finished with it." (pp. 318,319. Bühler's italics.)

Such a thought is not the sum of a number of images. It is a true, unanalysable unity. Nor is it associated images which have not come into consciousness but are potentially capable of doing so. This latter is Wundt's view. The view is untenable, says Bühler, because thought is a fact, not a possibility nor a potentiality. In short, the thought of something is once again an irreducible fact of experience.

If we carry down to its lowest legitimate terms an analysis of what we experience while thinking, we come ultimately to the thought as thus understood. "We designate as thoughts the ultimate units of our thinking experiences" (pp. 324-9). The unit is such that it contains only dependent parts, not independent ones. That is to say, further analysis would destroy the essential properties of that which is being analysed—the thought experience.

Although the thought is a unit, yet it is not entirely homogeneous. By various means one may distinguish within it different features or "moments", which are then not independent parts but dependent items. Thus of the thought expressed by the words "perseverance is a daughter of strength, stubbornness a daughter of weakness, that is, of weakness of understanding", a subject remembered "there were two virtues, concerning which a contrasting statement was made". Here the two virtues, and the contrast between them, are distinguishable as different features or "moments" of the original thought, and so on (p. 333). The moments are embraced in a single thought-experience.

Types of Thought.—It is possible to give a rough classification of these thought-elements. A very frequent type of thought-experience is what may be termed "consciousness of a rule" (*Regelbewusstsein*).

Thus to the question "Can the atomic theory of physics ever be shown to be untenable by any discoveries?" Dürr answered "Yes", after nine seconds. As part of the report appeared the statement "there was contained [i.e. in the mental processes involved] a knowledge of how such questions are solved". To another problem his answer contained the statement: "I knew that such questions cannot be decided by reflection." Here the subject was conscious of a rule that was of general validity. One knows not only that one can solve the particular problem, together with the method of solution, but also the general principle involved. The "consciousness of a rule" is very easily remembered. It is one of the most frequently encountered types of thinking. It is not simply thinking about a rule. Rather it is thinking of a rule or *in the form of a rule*. Definite facts (*Gegenstände*, objects), which the logician designates as laws, are "adequately thought" (pp. 339-40). Such "thinking a rule" is of great importance in scientific thought. It is found, for example, when we prove a mathematical proposition or when we employ a mathematical function. An example of the latter is given when we think of decrease with the square of the distance. Here we "think the function", without reference to any particular quantity. Another frequent instance of the "consciousness of a rule" is to be found in the grammatical rules which come to consciousness when we are uncertain concerning our speech.

A second type of thought is characterized by the presence of the *consciousness of relation*. Such a relation may exist either between our thoughts or within a single thought as one of its moments. For example, a subject may say "it was a question of an alternative". Or

"the thought contained 'a consequence' " or "an opposition", and so on. In specific cases it is often difficult to decide whether the relation forms a "moment" of a single thought, or whether it is a connecting-link between two thoughts. It is such *known* relations between thoughts that give continuity to the whole ramified experience of thinking. As in the case of the consciousness of rule, the relation is not simply meant but experienced.

Lastly, there is the type which Bühler calls "Intentions", where the act of meaning, rather than what is meant, is in the foreground. Thus a subject may make a rapid survey over a whole branch of knowledge. For instance, Külpe stated: "The picture (*Schilderung*) of the pre-Socratic philosophy, its relation to Socrates, how Plato fought against it, all this seemed to be included in the thought. . . . The thought did not come to formulation; in fact, I simply *thought* it." The same subject reported on another occasion: "I thought of the ancient scepticism (the word scepticism spoken internally); this included a great deal; the whole development in three phases was formally present".

The consciousness of rule, the consciousness of relation, and the intention have been termed types of thought. It would be more strictly true to call them "moments" or features of thought, which, by their greater or less prominence, give the thought a distinctive character. It is not asserted that they form the only types of thought or thought-moments. Nor can we say whether every thought contains them all. Every thought must, however, include an intention, and must refer to something meant.

The question now arises: how does this "something meant" appear in consciousness? The conventional answer is "by means of images". There are, indeed, instances where this occurs, but they are not the most important. There are, says Bühler, thoughts in which the object of thought is clearly defined in consciousness without any image, or even without any consciousness of rule or of relation. Subjects reporting these thoughts at first refer them to slight sensory elements, sensations of tension in the brow or the breast, and so on. Finally, however, they see that these sensations have nothing to do with the thoughts. We must conclude that thinking may contain an imageless modification of consciousness corresponding to the meaning of the thought. Whatever the meaning, it may appear in experience without an image. We may, in fact, "think" an object in the external world or an inference involving physical objects directly, without any "mental" intermediary. As Külpe said: "It struck me

that one could think of the objects of the external world such as material bodies . . . in immediate fashion without having to form images of them."³² This was of course the final rejection of presentationism, the fashionable hypothesis of the day, according to which one experiences not the world direct but the presentations engendered by it, or their reproductions. It is akin to the belief termed the "ideo-motor" theory, and more specifically the belief that an "idea" had to precede speech. Bühler's later argument in this paper seems to a modern reader to present unnecessary complications. But the point that the meaning must have its effect on the conscious experience of thinking but need not be represented imaginally turned out to be of considerable importance. This will appear especially when Titchener's criticism is considered.

Bilhier published two more papers which complete the picture. The first, to which reference has already been made, deals with the intermediate conscious processes between thoughts, which consist of "*knowing*", or *Wissen*, and which need not attain the dignity of thoughts. These processes may better be described as "known relations". The relations in question are between one thought and another, not between the meanings of the thoughts. They may be relations between thoughts and the *Aufgabe* or task. (See next chapter.) They serve to guarantee the unity of the thought process, thus giving it its teleological character, its direction towards an end. The "thread of the thought-process is the sum total of such intercalary processes. When they are absent we say we have lost the thread" (Bühler, 1908).

The third paper deals with the memory of thoughts. Here Bühler attempts to corroborate the independence of thoughts and their sensory accompaniment by demonstrating that thoughts and sensory processes do not follow the same laws. It is common knowledge that it is much easier to learn the sense of a passage of prose or poetry than to learn the exact words. The latter, says Bühler (and Külpe), is achieved by the association of sensory material. The former is an entirely different process. The difference is shown in a neat experiment where phrases were paired. Two of these pairs were:

Increase of population in modern times:

The future struggle between races. and

Homer and the Bible; The unity of the human species.

³² Quoted by Klein, 1938, pp. 368-9.

The instructions were to establish a connection in thought between the members of each pair. Twenty such pairs were read, after which the first member of each pair was given with the request that the subject should add the second. The average number of successes was between seventeen and eighteen, a far greater number than could be attained if nonsense syllables were used in the place of the phrases. The thought-connection between the two phrases is clearly a different thing from the association between sensory material, says Bühler. Occasionally a series of twenty pairs can be reproduced without error even on the next day. Sometimes the words are altered by the subject, showing once more that we have here not the sheer play of sensory association (Külpe). Thoughts are, in fact, to some extent independent of the particular verbal form in which they are cast. This was further demonstrated by reading a list of statements, some of them in the form of proverbs. Twenty such statements were given. Examples are:

When the calf is stolen, the farmer repairs the stall. Where the fox has his store, he does not rob. While the total series of twenty statements was being read, the subject was in ignorance of what was to follow. A further series was then read, with the instruction to say whether there had been anything in the first series like the statement now being read in the second, and to say how it was expressed. Examples of this second series are: Even mice bite dead cats. A clever thief keeps his nest clean. A doctor and a peasant know more than a doctor alone. Where there are doves, doves come.

One looks to the cask when the wine escapes into the cellar. The subject could indicate with great certainty the corresponding sentence in the previous series. He might alter the words while retaining the sense. "Jokers" were inserted in both series; that is to say, sentences with no corresponding sentence in the other series. When the subject came to these, no memory was aroused. This recognition, not of the words but of the thought, was again surprisingly easy—too easy, says Bühler, for the mental processes involved were too much abbreviated to be properly observed.

Other experiments were made with proverbs, of which from fourteen to thirty were read to the subject. An example is: "Work has bitter roots, sweet fruits." After the whole series was read, single words from the proverbs were given, with the request to complete the proverb. A series of twenty to twenty-four proverbs took an

hour, together with the resulting introspections. The whole proverb was in most cases given at once, though sometimes it was necessary to add a second word to aid memory. DURR completed twenty-seven out of a series of thirty proverbs!

Thus, once again, writes Bühler, the thought is independent of its sensory accompaniment. It is remembered in a way impossible for sheer sensory material. He remarks that for such thought-reproduction to take place, it is necessary to make the subject *think*. Had the sentence been of the nature of: "The table is an article of furniture", etc., where no thought is necessary, when the single words "table" and so on were repeated, the subjects would "either have forgotten nine-tenths of the sentences or else remembered them by some memory system". The proverbs make them think, if only to a slight extent, and the thought is remembered where sheer sensory material would be forgotten (Bühler, 1908a).

Summary of Experimental Results on Imageless Thought

This completes the survey of the Wurzburg experiments on imageless thought. Beginning with the negative observation that there are processes that refused to be forced into a sensationalistic scheme, we find Messer claiming somewhat prematurely that these processes are "thoughts" of an unformulated type. Ach claimed, on the other hand, to have discovered a kind of conscious event of which the previously observed imageless states form a subdivision. By characterizing what he had discovered as a *knowing (Wissen)*, Ach had, therefore, at the same time added a positive attribute to the hitherto negatively defined "conscious state". Or, stated the other way round, Ach had added a positive characteristic which was the class mark of a more inclusive division. With Bühler, the original Bsl. has almost dropped out, and indeed one feels that for consistency's sake Bühler would have done better to leave it out altogether. He speaks of it early in his first paper as occupying a peculiar position, and does not appear to mention it for the rest of his hundred and sixty pages. For him, the positive attribute added by Ach, namely the aspect of awareness, has become a characteristic of something contained in the only real thinking activity, namely the thought-element. At the same time the thought-element retains the aspect of impalpableness, of imagelessness, which so much struck the earlier workers in their observations of simpler processes. This supersession of the original, negative, idea of the *Bewusstseinslage* was clearly seen, some years after Bühler's papers, by Külpe, who, in a passage already quoted,

speaks of the *Bewusstseinslage* as "the new idea, compelled by the observation of the facts, making possible a circumlocution rather than a description; it also was inadequate",³³ and had to be supplemented with the idea of *knowing*, before thought could be properly described.

APPENDIX

Bühler on Act and Content in Thinking

Bühler acknowledges his debt to Külpe in the development of his theory. It is indeed difficult fully to understand the text without references to Külpe's work. See, e.g., Külpe, 1922, especially the last lecture, and Chapter II, paragraph 13. I find myself compelled to differ from Titchener (p. 145) who quotes Bühler as saying "knowledge (Wissen) is a new manifold of modifications of our consciousness" (Bühler, p. 361), and adds "covering the variety of thoughts as the general term sensation covers the variety of sensations". I am obliged to believe that Titchener failed to see the point of Bühler's questions: "Fragen wir uns nun, wie die Bewusstseinsmodifikationen, die in unseren unanschaulichen Wasbestimmtheiten des Meinens vorliegen, funktionell zu bezeichnen sind? Wie werden wir dasjenige nennen, was sich zu ihnen eben so verhält wie etwa 'das Empfinden' zu 'den Empfindungen'?" I translate literally, "Do we ask ourselves now how the modifications of consciousness, which are at hand in our imageless, qualitative determinations of meaning, are to be functionally described? How shall we name that which is related to them as, for example, 'the act of sensing', is related to 'the sensations'?" This must mean, in the Külpe-Stumpf terminology, that we are to look not for a general term but for a function or a functional aspect. The point is made clear by Külpe in a passage where he is warning his lecture audience not to assume, from the existence of such word-pairs as "Empfinden" and "die Empfindung", that in every case there is a psychic function and a content corresponding to two words of a pair. "Although, for example," he says, "to sense, to image (ideate), to think, are correlative with sensation, image (idea), thought, yet we need not assume a sensation-, imaging-, and thought-function directed towards sensation-, image-, thought-contents. . . . We must make a particular examination, in specific cases, to discover whether there is such a thing as a function of sensing, imaging, thinking" (p. 131).

I have quoted the least favourable passage from Külpe, who has shortly before drawn a clear distinction on the one hand between "the act of perceiving, of remembering . . . of meaning, of thinking (in the narrower sense)", as functions, and a corresponding list of contents, viz. "the sense impressions, the memory- and imagination-pictures, the thoughts" (p. 130). The clue of Bühler's treatment of the whole problem is to be found in a passage where he distinguishes between the qualitative determinations of what is thought, which are "modifications of consciousness", and the relation of thought to its object. "We shall be able to distinguish in every thought the qualitative determinations (Wasbestimmtheiten) of what is

33 The original lecture was published in 1912.

thought from the relation to the object" (p 349) I e we must distinguish the meaning-datum present in the activity of thinking from that about which the thinker is thinking Titchener has, it seems, not followed Buhler in making this distinction He is thus unable to understand the demand for a "functional designation", and is led to bring against Buhler the charge of making the "stimulus error" This charge Titchener voices in his next paragraph (p 145) We shall see later that the accusation depends on a misunderstanding of Buhler's real experimental achievement The passage in Külpe coming between those quoted shows that he is uttering a warning against the very mistake which Titchener accuses Buhler of making There is, says Külpe, an essential difference between an analysis of what is meant by a word and analysis of the state of affairs (Tatbestand) designated by a word The latter kind of analysis alone is psychologically useful That Titchener did not recognize what Buhler meant is the more strange in that he discussed the triple distinction, as made by Stout and Witasek, on p 63 of the same book One wonders whether it was this same misunderstanding that led to the Cornell series of experiments on thinking (see the next chapter)