

# THE INTELLECTUAL RESPECTABILITY OF MUSCULAR SKILL<sup>1</sup>.

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## I. WHAT IS INTELLECT?

THE word intellect has been used in many senses, of which at least two are important in this connexion<sup>2</sup>. It may cover all forms of cognitive events, in which case intellection becomes merely the equivalent of cognition. On the other hand, it may designate the processes of elaboration which the mind applies to its material, and in particular that kind of elaboration which leads to conceptual thinking. The point of view which this paper seeks to justify is that, in both these senses of the word 'intellect,' muscular skill has a higher intellectual value than is usually assigned to it, and that this value is susceptible of being increased considerably.

<sup>1</sup> The substance of this paper was read to the British Psychological Society on 12 March, 1921.

<sup>2</sup> Cf. Baldwin's *Dictionary of Philosophy and Psychology*.

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We may first inquire whether such skill can be justifiably described as intellectual.

Bodily skill, or the ability to deal with the world by means of one's muscles, joints and tendons, carries with it a specific and unique kinaesthetic knowledge. This knowledge can obviously be called intellectual in the first sense mentioned above. Yet it is as incapable of perfect translation into the terms of another sense as is music into colours or words, for as we shall see, it possesses scarcely any words in its own right. Many persons therefore require to make a mental effort in order to realise that, in spite of its comparative wordlessness, kinaesthetic knowledge may form a basis for conceptual thinking, thereby establishing a primary claim to be called intellectual in the second sense of the term. The peculiar nature of such knowledge, however, raises certain difficulties when it is dealt with from the psychological aspect. These will be described later.

Kinaesthesia is usually accorded scant respect by the world of intellectuals, as we know them today. Classed with the 'lower' senses, it is contrasted with the 'higher' senses of sight and hearing<sup>1</sup>. Though such a division seems justified at present its utility is possibly over-estimated<sup>2</sup>.

### II. SOME PROBLEMS STATED.

It is now possible to suggest a number of questions which arise from these considerations. Some attempt at answering them will be made in this paper.

(1) Do not most educated persons regard the intellectual value of kinaesthesia as slight?

(2) Is such an attitude justified, in the light (*a*) of primitive man's early development<sup>3</sup>, (*b*) of certain present tendencies in social behaviour?

(3) What are the chief factors which have brought about this attitude?

(4) Is the discovery of these factors likely to help in predicting future developments in man's mentality?

(5) Is an intellect, the foundations of which do not include contributions from the 'higher' senses of sight and hearing, necessarily inferior

<sup>1</sup> Cf. E. B. Titchener, *Textbook of Psychology*, New York, 1911, 114 f.

<sup>2</sup> Perhaps Professor Nunn feels this when he writes kindly of the 'humbler' senses. Quoting Miss Margaret McMillan, who says "The patience of the poor is not all patience. It is largely insensibility," he adds, "To such children a shower-bath, with its powerful appeal to dull senses and flaccid muscles, may mean a veritable beginning of intellectual and moral enlightenment" (*Education, its Data and First Principles*, London, 1920, 164).

<sup>3</sup> The chapters on "Tactile and Motor Impressions," in F. Wood-Jones's *Arboreal Man* (London, 1918; 157-173), are full of suggestions upon this subject.

to that of the normal person? If so, in what respects? May it on the other hand, even be supernormal in some directions?

(6) Would it be possible to increase the present intellectual value of kinaesthesia by extending man's conscious appreciation of the different modalities and qualities of the group of sensations which compose it?

### III. SOME CHARACTERISTICS OF KINAESTHESIS.

As is well known, when muscles contract, the sensory nerve endings in both the muscles and the tendons are excited. When parts of a limb move, the joints are stimulated. The sensations from these various organs, together with those arising from the different tensions of the skin surface involved, fuse to form in consciousness a whole which introspection alone is almost powerless to analyse, but which partially breaks up in certain pathological conditions, allowing the respective rôles of these different factors to be studied separately<sup>1</sup>.

It seems unnecessary to remind psychologically-trained readers of the importance of distinguishing the subjective from the objective aspect of motor activity. Yet the difference is often forgotten. Evidently Professor Knight Dunlap considers it advisable to emphasize the necessity of remembering the distinction:

When I speak of 'muscular sensation' I mean the *peculiar aspect of the actual muscle-contraction which is perceived by the owner of the muscle, and by him alone*<sup>2</sup>. The contraction has visible aspects, and tangible aspects, which may be perceived by several people: in addition it has this 'kinaesthetic' aspect<sup>3</sup> which can be perceived by one person only<sup>4</sup>.

This reminder is timely, for our thinking runs a risk of being confused by the stress which is usually laid upon what motor activity would *look like* to an external observer rather than what it feels like to its initiator, and upon what it *does* to external objects rather than upon what it *is*. Its physiological aspects and its behaviour-effects are subjects for consideration quite distinguishable from its subjective or strictly psychological aspects.

#### (a) *The loose connexion of kinaesthesia with language.*

In the following pages no attempt will be made to discuss the old and important question, whether kinaesthetic *images* really exist, or if all so-called images of kinaesthesia are in fact actual, though faint,

<sup>1</sup> A detailed account of the kinaesthetic senses is given by Titchener, *op. cit.* 160-182.

<sup>2</sup> Italics mine.

<sup>3</sup> Not only the muscles, of course, possess this kinaesthetic aspect.

<sup>4</sup> *Psychobiology*, 1920, II, 1, 33-4.

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sensations<sup>1</sup>. For the sake of convenience, however, and for no other reason, the words 'image' and 'imagery' will be used in the ordinary way.

Man's memory of his own movements as they felt to him at some earlier time is a subject of which comparatively little study has been made. To speculate why might lead to interminable discussion of a host of possible causes. Prominent among them, however, is the difficulty of finding comprehensive and comprehensible ready-made names by which these experiences could be described to others. Almost as impressive is the fact of their faintness, vagueness and comparative unimportance in the lives of many leaders of thought, whose intellect has often been erected almost exclusively upon foundations provided by those aristocrats of sense, sight and hearing. Yet it is not a biological necessity that man should be endowed with these two senses. One can conceive him as existing without them, and, in consequence, attributing more importance and paying greater respect to kinaesthesia<sup>2</sup>; even as she who writes:

The delicate tremble of a butterfly's wings in my hands, the soft petals of violets curling in the cool folds of their leaves or lifting sweetly out of the meadow-grass, the clear, firm outline of face and limb, the smooth arch of the horse's neck and the velvety touch of his nose—all these and a thousand resultant combinations, which take shape in my mind, constitute my world<sup>3</sup>.

And the chief denizens of this world must inevitably be the experiences of touch and kinaesthesia, for Helen Keller never heard a sound in her life, and the vision which illuminated her early days flickered out in a year, leaving but a few faint gleams in her memory. Yet, she tells us:

With the dropping of a little word from another's hand into mine, a slight flutter of the fingers, began the intelligence, the joy, the fullness of my life.

My world is built up of touch sensations, devoid of physical colour and sound, but without colour and sound it breathes and throbs with life. Every object is associated in my mind with tactual qualities which, combined in countless ways, give me a sense of power, of beauty, or of incongruity, for *with my hands I can feel the comic as well as the beautiful in the outward appearance of things*. Remember that you, dependent on your sight, do not realise how many things are tangible...."

The hardness of the rock is to the hardness of wood what a man's deep bass is to a woman's voice when it is low. What I call beauty I find in certain combinations of all these qualities, and is largely derived from the flow of curved and straight lines which is over all things<sup>4</sup>.

<sup>1</sup> For a modern discussion of this subject, the reader may be referred to M. F. Washburn, *Movement and Mental Imagery*, New York, 1916, 48-61.

<sup>2</sup> Throughout the paper the simultaneous occurrence of cutaneous sensation with kinaesthesia is assumed.

<sup>3</sup> Helen Keller, *The World I Live In*, p. 6.

<sup>4</sup> *Ibid.* pp. 5 and 7.

The ludicrous, too, is felt by her in "the bulge of water-melons, the puffed-up rotundities of squashes." But her amazing insight—the word is not permissible here, but we have no other—into realms which seem to many to be explorable only through sight and hearing, may easily distract attention from an important consideration. Helen Keller was educated by and obtained her language from persons whose knowledge of their own world had been received chiefly through the channels of sight and hearing. It seems clear, therefore, that the terms of her language, while often merely analogical, are just as often almost meaningless if regarded as descriptions of fact. The words 'ruddy' and 'dissonance'; the statement "I know how budding trees look" can have no direct sensuous meaning for her<sup>1</sup>.

Perhaps we may be allowed—though it seems scarcely permissible—for one brief moment to adopt towards this life-history the detached attitude of the scientist. At once a speculation forces itself forward. Only by the devoted efforts of her teacher and friends was her mental development made possible; yet to what extent did this assistance cause her mind to deviate from the path which we may imagine that it might have taken for itself, under impossibly ideal circumstances of protection and companionship?

Let us suppose for a moment that, while being sheltered from the rigours of life, she had developed ideas both simple and complex about her world chiefly upon the basis of kinaesthesia, and with no reference whatever to sight or hearing. We may now further imagine her, having constructed a mental world quite different in quality from that of the ordinary person, to have been entrusted completely and exclusively with the bringing-up of another child, also lacking vision and hearing, who, in turn, had become the educator of still another. Gradually these references to sight and hearing, as analogical as our own attempts to picture the waves of wireless telegraphy, would have faded away, leaving a structure of knowledge which would be the unique possession of the congenitally blind-deaf; unique not only in the nature of its fundamental sensation material, but also in the degree of perfection attained by its functions. Moreover, in many of those adjustments to environment in which these attainments entered into competition with those of any ordinary human being, they would have proved to be superior.

<sup>1</sup> "... a venturesome spirit impels me to use words of sight and sound whose meaning I can guess only from analogy and fancy" (p. 45).

*(b) The significance of individual differences in kinaesthetic imagery.*

The evidence derived both from the comparison of the introspection of different individuals, and from experiment, makes it clear that the kinaesthetic imagery of different persons is characterised by very considerable variations. Some people appear to possess kinaesthetic imagery of a degree of excellence comparable with the common cases of well-developed visual memory. Yet up to the present there have been few to collect the details of such gifts. The earlier *questionnaires* gave their answerers comparatively little opportunity to record this kind of imagery. Even if they had done so, the 'motile'—to use a somewhat old-fashioned phrase—would have found it difficult to express himself in words, except of course when describing the processes of speech or writing. Important as these inquiries undoubtedly are, they teach us almost nothing concerning the mental life of the 'muscular man,' and much more investigation is needed into the kinaesthesia of the larger musculature and of the body as a whole.

Until more is known about the characteristic individual differences in kinaesthetic memory, we must content ourselves with speculations based upon other spheres of imagery, aided by our casual self-knowledge. With this warning in mind, the somewhat bold speculation may be made, that kinaesthetic memories may differ in their vividness, clearness, 'constancy,' or unchangeableness, readiness for use and ability to carry meaning.

The task of assessing all these characteristics would not be easy. It is obviously more difficult than in the spheres of sight or hearing. For the person who describes visual imagery may command all the subtle shades of significance with which centuries of language and literature have provided him; for the recorder of auditory memory the whole notation of music and the rich resources of physics are ready to help him to hammer out as thinly as possible, and then to nail down, the edges of his meanings. But where is the notation of action; where shall we seek for the grammar, the syntax and the theory of harmony of bodily movement? Perhaps some beginnings of them lie in the basal ideas, many of them as yet scarcely explicit, of manual training, of eurhythmics, of folk-dancing and of 'motion study.' Certainly their material lies tantalisingly hidden in the minds and bodies of Anna Pavlova, of Annette Kellermann, of C. B. Fry and W. T. Tilden. But whether these happy mortals, when they move, are making poetry without knowing it; how far their perfection is the result of hard-won synthesis and to what

extent it is a delicate natural polish which self-analysis would crack; of these things we—and possibly they—know almost nothing.

But while we marvel delightedly at the grace of their movements, perhaps feeling in ourselves the while feeble and faint tendencies to copy them, the sight suggests another psychological question. May the pre-eminence of these persons be closely connected with their ability, on seeing a new movement, to register and subsequently to recall it directly through their kinaesthesia, and not through the aid of any intermediate imagery, like that of sight? May it be that the number, vividness, clarity, readiness and meaning-carrying capacity of their kinaesthetic images enable them to learn a new movement in swimming, dancing, fencing or skating as easily as a first-class visualiser may take in details of a picture after one brief glimpse, or as Mozart wrote down from memory the *Miserere* of the Sistine Chapel after hearing it twice?

This seems to be possible, for before a new co-ordination of movements can be learnt by most ordinary people they find it necessary to overcome something very like a pronounced physical and mental resistance against placing their limbs or body in this particular position. They feel as if, in order that the new movement shall be learnt, it were necessary to blast a path through some stratum of high resistance in the neuromuscular system. Often, moreover, once this newly taken-up bodily position has been abandoned, many unfortunates can evoke no genuinely kinaesthetic memory of it, and so, in order for it to be learnt, it has to be assumed a wearying number of times. As a stepping-stone to these new achievements they resort to visual or verbal aids, or use both together; they picture the arm or leg in a certain position before putting it there, or they anxiously mutter, quietly or audibly, some exhortation given by their teacher, "follow through," "watch the side-line," "bend the knee," "right shoulder forward."

It is almost certain, however, that at least some persons, endowed with well-marked kinaesthesia, remember their new movement from the very beginning in the same 'language' in which they will eventually wish to express it, in the wordless language of kinaesthesia. And in doing so they ensure their greater success in more than one way. Obviously they save their own and the instructor's time. But loss of time is not the only annoying feature of a *bureau de change*; the value of the foreign currency with which one emerges is always less than that paid in, by the amount charged for changing. And this depreciation of meaning, when knowledge gained in one sense-sphere is translated into the language of another—so vividly realised when one reads the 'meaning' of

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a great symphony which a concert-programme description vainly attempts to convey, or hears the musical 'representation' of a sea-scene—is at least as great in the case before us.

In order to illustrate these and other facts, some examples from my own experience may perhaps be admissible. By way of preface, I will mention that the variety, range, readiness and plasticity of my visual imagery seem to be inversely matched by the paucity, narrowness and 'stickiness'<sup>1</sup> of my kinaesthetic equipment<sup>2</sup>. The following observations are taken from my notebook, with a very few minor corrections of obscurities due to the clumsy wording of notes written hastily:

At noon to-day I finished an elementary lesson in figure-skating, during which I had found considerable difficulty in getting the 'feel' of the various muscular coördinations—chiefly concerned with feet, knees and hips—as described and exemplified by the instructor. At 6.30 the same evening, while writing these notes, I tried to recall, in kinaesthetic imagery, the morning's lesson on the 'back outside edge.' In spite of all my efforts, the recall persistently came in the following terms:

A very clear visual image of the instructor, seen facing me at the distance of a foot. The clearest part of the image was the top of his head, the next clearest his face and his smile, and the upper part of his body. The image pushed itself into consciousness almost to the exclusion of everything else, and the utter inability of such an experience to assist, in any way, a person learning to skate is too obvious to require further emphasis.

With an effort on my part there then came another visual image of the instructor's skating-boot executing a back outside edge. This boot, if not firmly held in check, began to focus itself into details such as the pattern of lacing, scratches, and an occasional patch on the side. At no time did even a visual image of my own boot come into consciousness, probably for the very good reason that I had been forbidden by the instructor to look at it.

The only kinaesthetic imagery which could be recovered at this time (i.e. 6½ hours after the lesson) was a very faint and feeble image of scratching the ice with the toe of the skate; i.e. an image of a movement which I had been expressly forbidden to make.

At another time it was recorded that "any number of visual images of the instructor in any position can be obtained and these must be re-translated mirror-wise into visual images of my own body before they are of any use."

A further extract from notes written on the same evening as those first quoted may make another point clear.

In trying to remember a particular skating movement which involves keeping the right shoulder back, I 'see' my own shoulders much more easily than I can

<sup>1</sup> This characteristic is described on pp. 171–2.

<sup>2</sup> How far such lopsidedness of imagery development is attributable to heredity, to environment or to both is a psychological question which often arises in a practical form. It is usually ignored or begged.



'feel' them in the right position. I visualise quite clearly my right shoulder when it is held back, including even the part of the (brown) coat which covers it, quite regardless of the anatomical impossibility of seeing my right shoulder when my eyes are looking over my left. When the instructor shows me how to execute a new movement, I am naturally inclined merely to admire him passively as a moving picture (after one evening's skating I had continual visual images of him in all kinds of skating positions before I went to sleep) but, unless I force myself to do so, I get no muscular imagery while I am watching him demonstrate a movement.

How then do I learn to skate at all? In so far as any progress is made, it appears to be<sup>1</sup> through visualising myself and others performing the movement in question. The images are very clear though not vivid; they are like a clear well-taken carbon photograph, or like a sketch made with an H.B. pencil, and therefore gray. When taking a lesson I tend to look on at the whole performance as a passive spectator, just as if I were watching a stage dancer, and only occasionally do I remind myself that it is my lesson, and that therefore I must do something more than merely looking on.

It is very easy for me to attend to the look of the performance; it is correspondingly hard to attend to the 'feel' of it<sup>2</sup>; it is as if the nervous energy had to blast its way through some resistive stratum of the brain. This illustration of blasting one's way is perhaps supported by the fact that the 'feel' of a new movement, when it does arrive, often comes quite suddenly. Perhaps Dr Montessori may be describing some similar experience when she writes of the "writing explosion"; the sudden discovery, often attended with great excitement, by her little pupils that they are able to write.

In learning a dance there is, too, the same tendency to attend to the look and not to the 'feel' of it. In order to learn any new dance I must go behind the demonstrator and see the position of the person's feet, just as if they were my own. I must then place my feet in the same position (imaged visually if the demonstrator is absent) attending very carefully to the 'feel' of the position.

Lastly, I might mention that though my muscular memory for movement is so poor, vague, unready and 'sticky,' so to speak, my sense of balance appears to be normal; e.g. I have noticed that keeping my balance in a new position, or deliberately falling from a new position, presents few difficulties to me.

I should not be surprised to discover that the apparent paucity of my kinaesthetic images is due, to a considerable extent, to their 'stickiness' or general agglutination, by which words I mean to indicate:

(a) The lack of clear-cut differentiation between different combinations of imaged movements, especially if they are somewhat similar. It seems to me, as a visualiser, comparable to the lack of differentiation which would exist in the visual imagery of an uneducated person, attempting to recall, let us say, a series of differently shaped human skulls which he had seen; while in the imagery of a visualising anthropologist these distinctions would be prominent. I imagine that in a first class athlete, especially in one who plays well several somewhat similar games, e.g. tennis, lawn tennis and

<sup>1</sup> (Note added subsequently): "Or rather, 'one important factor appears to be.'"

<sup>2</sup> This reminds one of the fact that, on injury to the post-Rolandic convolutions of the brain, a patient may lose his power of attending to his touch sensations while retaining that of attending to everything else. Might it be that in the case of the person whose kinaesthetic imagery is undeveloped some corresponding part of the brain has never been properly 'opened up'? (Cf. footnote <sup>2</sup> on page 172).

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badminton, this differentiation (which of course, is one of the first necessities for thinking) has gone on to a much greater extent than in myself. Perhaps it is comparable to a good actor's power of speaking the same sentence successively in several different dialects of the same language.

(b) The fact that my kinaesthetic images seem—if it is not unsafe to use a pictorial metaphor—difficult to coax out of their holes. Perhaps it is that they are not only faint, but extremely fleeting (like the visual images which Dr Rivers describes as forming part of his experience when awake<sup>1</sup>), and that only after many efforts can one get a grip on them.

These examples<sup>2</sup> may help the reader whose imagery tends predominantly towards the visual or the kinaesthetic type to realise the great difference between the kinds of mental apparatus with which different persons may attempt the same task. The utter irrelevance and futility of many of the visual images recorded in the notes are worthy of special attention. Some of these images were not only useless but their presence may have obstructed any incipient attempts to learn in the direct way. For example, visualising the upper part of the instructor's body seems scarcely likely to have assisted in any way whatever; visualising one's own skating-boot may have been a little more helpful, though this is doubtful.

It is, however, impossible to be satisfied with any simple belief that visualisation is valueless in learning muscular coordinations. Many visiles cherish those diagrams and pictures which, though they are sometimes execrable, both in conception and in execution, often form almost the only intelligible information in many books which profess to describe how to play any particular game. After a glance at such illustrations the visile may carry away, once and for all, the gist of a wordy explanation which may never have been clear even to its writer.

<sup>1</sup> *Instinct and the Unconscious*, Cambridge, 1920, p. 11 f.

<sup>2</sup> When I wrote these notes, I was unacquainted with Professor Washburn's book, *Movement and Mental Imagery*. In connexion with my own ease of attending to the 'look,' and difficulty in attending to the 'feel' of a muscular performance, her discussion of the relation of differences in imagery-type to "individual differences in the appeal of certain kinds of stimuli to attention" (p. 43 f.) is helpful, while Professor Wood-Jones's statement (*op. cit.* p. 171): "It is perhaps not beyond possibility that the full lodgment of all pictured movements (his term for kinaesthesia) is not yet permanently effected in all human brains, and that the process is still in progress" is hopeful.

#### IV. THE 'INTOLERANCE' OF PERSONS WITH PREDOMINANT KINDS OF IMAGERY. THE UTILITY OF VISUAL IMAGERY IN LEARNING MUSCULAR COORDINATIONS.

It is very common to meet with athletes who maintain stoutly that books are of no use in learning a game. If by this be meant merely that books are useless if not supplemented by diligent practice, the remark is so obvious as to be uninteresting. If it means that many existing books on games are bad, the psychologist's interest in it becomes a little keener. But in the mouths of some people the assertion illustrates a most interesting and important psychological phenomenon; the mutual intolerance, arising from ignorance, of people with different types of mentality.

This fact was not missed by Galton, who writes of those men of science to whom visual imagery was unknown:

They had no more notion of its nature than a colour-blind man, who has not discerned his defect, has of the nature of colour. They had a mental deficiency of which they were unaware, and naturally enough supposed that those who affirmed they possessed it, were romancing<sup>1</sup>.

This attitude is often very strikingly shown (though its results and implications are, probably, not yet sufficiently realised by psychologists and others) by visiles towards motiles, and *vice versâ*. The visile often finds it almost impossible to realise how a motile can ever recall in any terms other than visual images an experience which, it would seem to the visile, 'ought' to be naturally recalled in such imagery. The motile has similar difficulties of comprehension. (It is more correct to write that these difficulties would arise in the improbable event of such thoughts occurring to either of these persons.)

For those readers whose predominant imagery does not happen to belong so exclusively to one of these two classes, a few examples may illustrate the importance of this intolerance. Perhaps I may be allowed to begin with the type to which my own mind conforms; the visile. For me visualisation, not only of obviously pictorial experiences, but even of abstract and general meanings, in the form of similes, metaphors, analogies and semi-diagrammatic pictures<sup>2</sup>, is so ubiquitous that I frequently forget that many other people do not visualise with the same degree of facility or viciousness. It is unfortunately a somewhat common

<sup>1</sup> *Inquiries into Human Faculty*, London, 1883, p. 85.

<sup>2</sup> There is, usually no *conscious* attempt to picture such meanings. They simply 'are there.' Sometimes they are adequate to the meaning, often they are mere caricatures of it. But like most caricatures they usually cause me to realise with especial intensity some salient point, and not always one which is welcomed.

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experience for me to realise, after having lectured to a class for some considerable time, that I have made no attempt to transfer to the black-board any of the mental diagrams which I have been using. Such outward behaviour might perhaps be interpreted by others as indicating poverty rather than profusion of visual imagery in a lecturer's mind. On the contrary, however, visual imagery of diagrams is so prevalent with me that I have often to remind myself that in order to transmit even an approximately faithful rendering of my meaning to others, I must make my thinking 'visible.'

Many visualisers too, never realise, or refuse to believe that complicated behaviour and thinking may go on in others without the slightest trace of visual imagery. From conversation with some of my friends who have predominant kinaesthetic imagery it seems to me certain that a similar forgetfulness of the peculiarities of others characterises many motiles, especially those for whom kinaesthetic processes,—in particular, perhaps, those of language and gesture—seem to be so prominent in their thinking that they even write of the "fiction of visual imagery<sup>1</sup>." In fact, the possibility of any real *rapprochement* of the visible and motile seems at present to be remote, for the following reason. While the visualiser's power to express to another person his experience of visual imagery is limited only by his capacity for psychological observation and for using his mother tongue, which has chiefly been developed to describe the seen world, the motile is less fortunate, in that very few of his characteristic inner experiences<sup>2</sup> are expressible in language at all<sup>3</sup>. For the function of many words relating to bodily movement is merely to describe its visible aspects, seen by others or by its initiator. Some words, moreover, refer less to the bodily movement itself than to that of some instrument moved by the person, or, even more remotely, to some object propelled by this instrument. English out-door games illustrate especially well this tendency for the reference of the term to creep farther and farther away from the initiating limbs. For instance, I take it that such a term as a 'late cut' in cricket may conceivably refer to any or all of the following separate events:

- (a) the genuinely personal experience; kinaesthetic, visual, tactual, etc., of the batsman;

<sup>1</sup> The question is discussed in greater detail in this *Journal*, 1920, XI, 1, 77-79.

<sup>2</sup> I venture to call the reader's attention once more to the significance of this word 'inner,' which was emphasised on p. 165.

<sup>3</sup> Or, as a behaviourist might perhaps express it, speech habits are not closely connected with the functioning of the muscles, joints and tendons.

- (b) the movement of the body and arms and of the bat, before and after it strikes the ball (1) as seen by the batsman, (2) as seen by the spectators;
- (c) the behaviour of the ball after its impact with the bat.

An indispensable preliminary to the construction of any satisfactory psychology and any really expressive language of kinaesthesia will be a distinct separation in thought of all those events which occur outside the agent's skin from those which take place inside this envelope. Until that is achieved the motile will remain, as he is at present, inarticulate. For of the recognised phrases describing action many bear a spectacular or behaviouristic rather than a psychological meaning, describing the experience of the looker-on, not of the performer, while not a few carry a depressingly complex and unanalysed mixture of both.

It is probably the ability of the motile to recall a new movement 'in his muscles,' after having performed it but a few times, and connected with this, his inability or disinclination to visualise how his body looks when placed in the position required, which leads him to say that reading books on a game is of little use in learning it. If by this is meant that one cannot learn a game without performing the muscular actions which it requires, it is a platitude. But if, on the other hand, the motile means that for him photographs, diagrams, and diagrammatic pictures, to say nothing of the slowed-up cinematographic representation, and the tri-dimensional wire model of a movement, are of little or no use to him, he expresses very clearly his difference from the visile. For from a really intelligently drawn diagram the latter can often learn in a flash what he has been trying for weeks to discover from watching an actual demonstration. Eventually, of course, he must translate this visual experience into kinaesthetic memories of the movements as they were actually carried out by himself. In this respect therefore, he is at a disadvantage; comparable, perhaps, with that of a person who knows a language but cannot think in it. But whether in the highest flights of any branch of games, the use of a good book does not become essential for rapid progress is still a question well worth asking.

#### V. IS A 'LANGUAGE OF KINAESTHESIS' POSSIBLE?

We must now inquire whether such a language of kinaesthesia is conceivable, and if so, how it might arise. An attempt will be made to sketch an approach to this problem, and to speculate how, neglecting for the moment practical difficulties, such a language might conceivably be formed.

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To the utmost possible degree it should be rid of analogical references to other senses. Sight has one language, hearing has another. Cross-references, such as the colour of a voice or the key of a landscape are, statistically speaking, so rare that they do but call attention to the normal self-sufficiency of these two notations. Kinaesthesia, then, would have to renounce its present bad habit of borrowing terms from the other senses, and botching make-shift tools out of them. Ideally, a visual or auditory term, used in a description of motor experience, would appear unambiguously in its own right.

Supposing it to be possible to furnish descriptive words for different kinaesthetic experiences, it would then be necessary to discover elementary or *quasi*-elementary movements of groups of muscles which are of fundamental and outstanding importance in some branch or branches of industry or physical exercise. Here one can offer only tentative suggestions as to how this might be done. Search might be made amongst existing manuals of drill and physical training, of eurhythmic exercises and of physical culture systems<sup>1</sup>. Anatomists and physiologists might give valuable information concerning those important bodily movements which, structurally and functionally, are relatively simple. In this way there might be isolated from others, so that they could be fairly strictly defined, a hundred simple, elementary and typical attitudes of body and limbs. Persons could then be taught to take up these positions again and again, carefully and attentively, until the descriptive names given to them had associated themselves with definite kinaesthetic experiences.

Such a plan does not seem wildly impossible. In fencing, golfing, cricket, figure-skating—to take only a few cases—definite ‘stances’ are learnt. In the last-named exercise, ‘new’ positions and movements appear to be deliberately composed of definite elementary groups which have been previously given standardised names and consciously realised in experience. All such lessons involve the isolation, from thousands of possible muscular combinations, of some, which for a particular purpose, are ‘fundamental.’ Perhaps some day, with the assistance of anatomy and physiology, it may be possible to define more strictly the fundamental groups for any special purpose.

Supposing, then, that the important elementary or essential experiences in the world of kinaesthesia had been isolated and labelled, so that agreement exists concerning their meaning; the next step would be to

<sup>1</sup> The writer's present acquaintance with the Ling and other systems is insufficient to justify any opinion being recorded here concerning the extent to which a scientifically satisfactory beginning has been made in this direction.

classify them more scientifically—for of course some degree of classification will have taken place already—into categories. Just as in the language of sight there are divisions of words into those representing colours, forms, directions, sizes, etc., so there might be a subjective or psychological classification of man's most important movements. While gross divisions of the movements, corresponding to limbs, fingers, etc., will already have been achieved, it is obvious that some compromise between such a classification and that based upon anatomy and physiology may be necessary. The most useful final grouping might conceivably be guided exclusively by anatomical and physiological considerations.

At this point the reader will naturally and justly inquire why, if such a badly-needed kinaesthetic language is theoretically possible, it is not already in existence. He may draw the conclusion that there must be some insuperable difficulty which this essay has not taken into account. This may be the case. But, until recently, one valid reason for the non-existence of any satisfactory objective analysis, classification, and standardisation of human movements (and, therefore, of human kinaesthetic experiences) was that usually no two persons could agree not only as to the exact motions which ought to be made for any particular purpose, but even concerning the movements which they themselves had made a moment previously<sup>1</sup>. For most human movements are so very complicated, rapid and individually different that even an unusually favourable combination of natural aptitude and special training in observation cannot ensure a faithful account of them.

#### VI. THE IMPORTANCE OF 'MOTION-STUDY' IN THIS CONNEXION.

But the last few years have seen a great increase in the number and variety of successful attempts experimentally to record the behaviour both of man and of animals. One of the most interesting branches of this work is that known as 'motion-study.' It has developed, and is still improving, apparatus which, freezing in mid-air, so to speak, the path of any movement, records it permanently by means of a photograph or tri-dimensional wire model, painted in a special way to represent not only the direction of any component movement but also its relative and absolute velocity<sup>2</sup>. Such models will make it impossible in future for

<sup>1</sup> Disputes as to whether a particular golfer moved his head at a certain moment are not unknown in club houses. Unfortunately it is quite likely that the person whose evidence is of least value in this connexion is the player himself.

<sup>2</sup> For description and photographs see F. B. Gilbreth, *Motion Study*, New York, 1911; *Fatigue Study*, London, 1916; *Applied Motion Study*, London, 1919. A concise account of motion-study, with illustrations, is given in Chapter I of C. S. Myers's *Mind and Work*, 1920, pp. 2-35.

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there to be two opinions concerning the exact orbit which any limb has described in executing a set of movements.

It seems therefore not inconceivable that as a result of careful motion-study of various occupations there may be built up notations both of objectively seen movements, and of the kinaesthesia corresponding to them. The words used would then refer (*a*) to the objectively demonstrated movements—photographed, cinematographed or ‘motion-modelled,’ (*b*) to the kinaesthesia experienced when these movements, and these movements only, are made.

The advantages of such an objectively ‘checked’ language are clear. A name given to a kinaesthetic experience would relate to the ‘inner’ feeling of some movement, set of movements or attitude the nature of which had been objectively demonstrated so that its meaning would be constant for everyone. Such a movement could be carried out again and again until its ‘feel’ became unmistakable. Related movements might be given related names. Movements common to several occupations might be analysed out and their relations to these different functions studied, as Mr Gilbreth has suggested. In the hands of skilled and educated teachers, the supplementary teaching of movement by pictures, diagrams, models, and the slowed-up cinematograph might then become really effective. Visual ‘representations’ of movement, obtained by the use of the apparatus of motion-study, would really represent and not caricature the motions which they profess to depict. This would inevitably lead to the detection of the less desirable methods of carrying out any movement, and therefore, again, to increased skill, or kinaesthetic knowledge. Not only would the status of such knowledge be raised, but also the status of those people who, through their teaching, aid in its acquisition and development.

### VII. IMPROVEMENT OF THE SOCIAL AND INTELLECTUAL STATUS OF KINAESTHETIC KNOWLEDGE.

In a psychological discussion of this subject it is obviously relevant to comment upon the present disparagement, by an influential section of the community, of kinaesthetic knowledge. The tradition that knowledge worth having is almost exclusively confined to that which has reached us through our eyes and ears has been confirmed and hardened by the powerful mechanisms of class distinction and class tradition, and by generations of a certain type of teacher in school and University. To such influences the ordinary man owes his view of culture. From most people, therefore, the motiles, as compared with their socially-



established brothers, the visiles and audiles, seldom get fair play. The two latter groups, themselves recognised as belonging to a kind of *intelligentsia*, not infrequently fall into the bad habit of regarding with some contempt all persons whose motor activity is expressed through channels other than the socially-approved ones of speech and writing<sup>1</sup>. A vicious circle is thus made; many intelligent persons are never encouraged to contemplate the study of such non-verbal occupations, and not a few are actively prevented from taking them up. This is one reason why the intelligent professional in sport, the intelligent teacher of hand-work, and the intelligent teacher of games are still so much of a rarity that when they do appear one never fails to remember them. If the knowledge obtainable through kinaesthesia were increased and transmitted to others in the best and quickest ways by teachers who were themselves good performers, their social status would rise. But this is the less important consideration; their intellectual status would be improved too. By increasing their kinaesthetic experience, they would not only have gained deeper knowledge of a comparatively new aspect of their world, but such knowledge might form basic material for the elaboration into concepts which characterises intellect in the second sense of the term; the process by which we acquire the knowledge of truths as distinguished from the knowledge of facts.

I have attempted elsewhere<sup>2</sup> a crude analysis of the process of thinking. Its essence seems to be the recall of past experiences, abstraction of their relevant aspects, their comparison, re-comparison with some aim in view, combination of the results of this comparison into a 'new' conclusion, and the expression of this conclusion in action, gesture, speech or writing. All this happens so regularly when its raw material is formed by visual or auditory experiences that many people are apt to forget that this series of processes may be carried out just as successfully upon the basis of touch and kinaesthetic memory<sup>3</sup>. Few would have the hardihood to object that in such a case the processes were not intellectual. If they did, Helen Keller, with her university degree and her literary achievements, would provide the answer.

<sup>1</sup> Mr Bertrand Russell has placed on record his suspicion that what people should mean by intellect is simply "certain habits in the use of words," and his lack of "mystical reverence for these habits" (*Mind*, XXIX, N.S. No. 116).

<sup>2</sup> This *Journal*, 1920, XI, 71-4.

<sup>3</sup> May it be that really superlative excellence in games or manipulative labour is distinguished from mere 'goodness' by a much greater degree of development of the process of working up the raw kinaesthetic material into new combinations; a particularly good example of 'kinaesthetic intellect'?

## VIII. SOME FURTHER SPECULATIONS.

The relation of these considerations to the doctrine of *Bewusstseinslagen* or "conscious attitudes" is obvious and interesting. It seems certain that the thinking which goes on in the possessors of a rich and pliant kinaesthetic memory tends to be strongly influenced by such conscious attitudes, perhaps to the discouragement of visual and auditory images. How far the left wing of behaviourism is constituted by psychologists with this type of mentality, whether, consciously or unconsciously, they condemn the visual-auditory intellect in much the same way that many intellectuals condemn the kinaesthetic variety; to what extent and in what ways these different kinds of mental apparatus may assist in the formation of those different attitudes towards life which are called introvert and extrovert respectively; the rôles which different kinds of imagery play in aesthetic appreciation, in the causation and the cure of mental disorders,—all these problems are related to this subject.

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