Now, Professor James kindly says that my observations "show how strong stimuli may produce more definitely localized re-actions than weaker ones. The baby grasped at bright colors with the right hand almost exclusively." So far clear enough. But whenever the same stimulus, say a piece of common newspaper, was used in two experiments, at ten and at fourteen inches distance respectively, the same "more definitely localized re-action" took place in the second case; but in this latter case the stimulus which produced this "more definitely localized re-action" was fainter, being farther away, and the other conditions being the same in the two experiments. The child always used the right hand for long distances, even when the objective amount of stimulus remained the same. The least inference, I think, is that the intensity of the stimulus is not, at any rate, the exclusive cause of the more definite re-action. Greater intensity might account for the use of the right hand in some cases, but we certainly cannot hold at the same time that lesser intensity accounts for it in others.

The new element must represent the influence of former experience. I see no way to avoid this alternative. This is what I mean by "memories," merely a sort of a conscious modification which alters future re-actions. A purely physiological modification would not suffice, for it would have its full force also in cases which involved no effort. Now, we may hold that such "memories" are exclusively of afferent nerve processes, or that they involve also a conscious modification due to efferent nerve processes. If the former, we may attribute them to the "promptitude," "answer," etc., of right-hand-movements, as Professor James suggests, or to former movements of the eyes, involved in the visual estimation of distance (which I am astonished he does not suggest). The first alternative, which Professor James asks my ground for rejecting, is inadequate for the following reasons. If such memories of afferent processes be of movements with effort, they are already right-handed, and the question is only thrown farther back; but, if they be of efferent movements, then their motor influence would be perfectly indifferent, as I said in my former letter. My experiments show this. If there had been differences in "promptitude," etc., the child certainly would have shown preference for the right hand in effortless movements during the latter six months of the first year. But, on the contrary, it was only when making violent effort that there was any preference at all. Even after she developed such preference in cases of effort, the use of her hands when no effort was required continued to be quite indifferent. Does this not indicate that the traces left by former afferent processes of the same sense are not sufficient?

Moreover, in the absence of all feeling of the efferent current, what could sensations of "promptitude," etc., be but the consciousness of better adaptation and co-ordination of movements? But at this stage of life all the child's movements are ataxic, that there seems to be no practical difference between the two hands in regard to the lack of the tactile delicacy in which pathological cases show motor ataxia to consist.

If we seek for the needed "memory" among the sensations of eye-movements in the case where the stimulus is weaker (more distant), it is possible that we may find an afferent element which brings up the intensity of the hand-memories to the necessary pitch. There may be a connection between the centres for feelings of eye-movement and feelings of hand movement, so that their united "dynamogenic" influence is the same as the high intensity of the color stimulus. But, while freely admitting such a possibility, it only pushes the question farther back again; for how do we know that these eye-memories do not involve consciousness of the efferent process which innervates the eye-centre? And, besides this, there is another element in the hypothesis that afferent elements from other senses may furnish the "kinesthetic co-efficient," for a given voluntary movement; namely, that such activities of the other senses invoked took place along with movements of the attention, which might, and probably do, contribute an efferent element to consciousness. This possibility I have never seen anywhere recognized.

In this case my experiments show conclusively that eye-movement memories did not re-enforce the intensity of the arm-movement memories; for, when the distance was more than fourteen
Editor's Summary

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