

Reflex Speech. By GEORGE M. ROBERTSON, M.B., Assistant Physician, Royal Asylum, Morningside.

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This subject will be best studied by first considering the evolution of reflex action on the lines laid down by Herbert Spencer.* Reflex action is first displayed in its crudest form in the contraction which occurs when the amœba is touched, but not till there is a differentiation between the tissue which conducts and the tissue which responds to a stimulus, can reflex action be said to be thoroughly developed.

If one of the limbs of a cuttle-fish be severed and a sucker on the detached limb touched, it immediately contracts; here we have a nerve fibre conducting a stimulus to a peripheral ganglion centre, which reflects the stimulus to a muscle. This act is evidently not effected by any intelligence, is unconscious, and consists of a single movement, the result of a single stimulus.

Complicated movements may, however, take place in pure reflex acts of this description, as when the toe of a decapitated frog is pinched and a convulsive jump results. This variety of reflex merges into that in which sensation, with consciousness, is present, though probably not as an essential component, as in the plantar reflex and sneezing. And this form in its turn passes into the instincts, which are only complex reflexes, there being a complicated stimulus with complicated results, accompanied by sensation and consciousness; but the action is not the result of intelligence. Thus the young fly-catcher, which within a few seconds after its entry into this world snaps at and captures an insect, cannot possibly have done so as the result of intelligence, nor can movements of such delicacy and range have been purely voluntary in so young an animal. What knowledge could this young fly-catcher have had of the nutritious properties of a dark object passing over its retina of which it had no previous experience? And could we have gauged the distance and co-ordinated our movements so as to have grasped an object with the same precision as the fly-catcher, without any practice?

The architecture of the beaver, however, seems to display

* "The Principles of Psychology."

great intelligence; but that this is not so, and that the animal mainly follows a blind instinct, is shown by the fact that if a beaver be confined within a house it will construct dams of chairs and sofas when, of course, there is absolutely no use in doing so.* When, however, instincts become more complex and more specialized, varying as the stimulus varies, they come to have an air of intelligence about them; and, in fact, this is indeed the basis of intelligence—the adjustment of the inner tendencies to outer phenomena.

In this introduction I have attempted to show the almost insensible gradations between such a simple and obviously non-intelligent act as the contraction of the amoeba and actions which seem to denote the possession of a high degree of intelligence, that one may the more readily grasp the non-intelligent and reflex character of speech in certain conditions which would not be apparent on superficial observation. It is all the more needful to do so, as we have got into the habit of regarding speech as necessarily the outcome of only the highest degree of intelligence.

We will now study the development of reflex speech by next considering the lines on which all reflexes are developed.

Granting contractility to living matter, the earliest reflexes—almost subject to physical laws—are probably produced by the molecular change caused by an impact; and as the organism will probably be more liable to impacts on one part of its body than the rest, the function of contraction about the part struck will be more perfect than elsewhere by the greater frequency of contraction there. The constant molecular change produced by contraction at this part will also in time produce a differentiated structure, and as evolution proceeds we have a muscle here. The force of the impact will also travel in special directions, and in the lowest organisms these will probably only be lines of discharge, the molecules of which are in a state of high mobility; but in more highly evolved animals these are nerves.† With this differentiation of the tissues much more special movements can take place; and as the useful variations became perpetuated, and there came the evolution of the various senses, there would be opened up the possibilities of movements of a wide range of character and complexity. Complex reflexes and instincts may be traced

* "Mental Physiology," Carpenter.

† "The Brain as an Organ of Mind," Bastian.

along the lines of evolution to the above simple contraction, but after the organism has become highly developed new reflexes can be opened up by another means—by the perpetuation of voluntary movements which have become habits. Thus, to take as an example the reflex closure of one's eyes when anything suddenly approaches, it is not too much to believe that at a distant period non-evolved man had to perform this action voluntarily as a protection to his eyes. In course of time this voluntary act would become a habit, and after many generations it is not improbable, from what we know of heredity, that it should be handed down to the descendants at an earlier age as a habit, developed in them without experience; that is, as a reflex or instinct.* This mode of development is the principle which obtains in reflex speech; but man has not yet been evolved to the extent of having speech transmitted to him as an instinct, for, of course, speech has not been practised anything like the length of time that the habit of shutting the eyes has been.

In order that any voluntary action induced by a sensation may become reflex, one must train the nervous discharge to keep strictly along certain lines by always producing the same sequence of events. Thus, whenever there is a certain special sensation the same action must always follow it; and in course of time, by frequent repetitions, this action follows the sensation with very little effort of will, and, finally, it may dispense with all attention whatsoever. Nerve-force travels along the lines of least resistance, and having been trained to pass along certain routes frequently, these lines offer less resistance to it than any other.

Now, in the case of speech, are the above laws ever obeyed? Is it not true that we are often asked a particular question, that is, we receive a certain sensory stimulation, and we give a particular answer, that is, we respond with a certain special action, and that exactly the same stimulation and exactly the same response follow one another invariably and recur day after day for years? To offer an example, are we not daily asked the question, "How are you to-day?" and do we not almost invariably reply "Very well, thank you?" Have we not got here in perfect simplicity everything needful for the production of a reflex—a certain sensory stimulation, an invariable muscular response, and great frequency of occurrence? It is, perhaps, unnecessary

* "The Expression of the Emotions," Darwin.

to point out that we are not dealing with the sounds of speech—that is only an accident of the situation; the true response consists in certain co-ordinated movements of the diaphragm, labial, lingual, and other muscles; but, fortunately, it so happens that we are easily able to separate and recognize the different movements by the different sounds produced as the air is forced out of the lungs. It will be convenient, therefore, to speak of these movements by the sounds or words they produce.

At first—that is, during childhood—the reply, “Very well, thank you,” was the result of great voluntary effort, and was an operation showing considerable intelligence. Soon, however, it became a habit, and the muscles, without any effort, now fall into their proper sequence of contraction; but it is still an operation which is guided by a higher power. Cut off this higher power, this intelligence, as one would the head of a frog to test its reflexes, and one has in certain cases the same sequence of events continuing; but now the act is purely a reflex or automatic one. The absence of this intelligence and volition is the crucial test of the existence of reflex speech, and the presence of intelligence can always be discovered by observing if the reflexes are inhibited to suit altered and special conditions, this being, as before said, the basis of intelligence. Thus if one asks a person obviously suffering agony, “How are you to-day?” and he answers, “Very well, thank you,” one perceives that a higher power has not stepped in to alter the reflex to suit special circumstances, but that the nervous discharge has followed its accustomed channels. The sensory stimulation has produced a non-volitional and non-intelligent act, quite on a level with such obvious reflexes as suddenly closing the eyes or starting on hearing a loud noise. Such reflexes are, of course, only possible with questions and replies of a general, and not complex nature, and which are constantly in use. Special questions and complicated replies require the exercise of the intelligence, and occur so seldom that they never become automatic.

Reflex speech is present when the mind is in a perfectly healthy condition, though under these circumstances it is obscured; accidental conditions, however, often display it, as when the individual is excited or confused, and especially when absent-minded. Under these conditions answers are given which are perfectly appropriate to the questions, being, in fact, the usual reply, but which display their com-

pletely automatic nature in not being true—not suiting the special circumstances of the case. Thus one asks an absent-minded person, “How are the family to-day?” or “How is your brother Tom?” and he answers, “Very well, thank you,” or “They are all well, thanks,” and immediately afterwards he will exclaim, “What *have* I been saying! Why, my father is laid up with gout,” or “Tom has broken his arm.”

All reflexes, including the speech-reflex, are controlled to some extent in health; and just as the plantar reflex becomes exaggerated when there is a transverse lesion of the cord cutting off the higher inhibiting power, so the speech reflex becomes exaggerated when control is taken off it. It is found exaggerated in several forms of insanity; in varieties of melancholia to some extent, where the attention is so centred on the individual's own feelings that few sensory stimuli reach it; in secondary dementia, where volitional power and intelligence are weakened, to a greater extent; but probably it is more marked in senile dementia than in any other variety of insanity, for here there is a gradual decay of the intellectual fabric from the top downwards, and volition and intelligence high in the order of evolution decay soon, the lower functions being comparatively healthy.

I will now proceed to give some examples of reflex speech, the first being from the case of a man named A. R., who was a healthy old man till he had several attacks of apoplexy. During the last fortnight of his life he had absolutely no intelligence, was dirty in his habits, and never spoke a single word unless he was spoken to, except on one occasion, which will be mentioned. He did not at any time ask even for a drink or for something to eat; and, in fact, if food were placed beside him, so defective was his intelligence he did not touch it, and it had to be put into his mouth. So little use, moreover, was speech to express his thoughts or feelings that, though subjected to a long and extremely painful operation, during which it was apparent he suffered greatly, he uttered not a sound, except a very occasional grunt. A man with less intelligence expressed in his actions it is impossible to imagine, and one would fancy not at all like a subject to show even speech, far less reflex speech; still, it is not so. I will now repeat some of our conversation, reported verbatim, which occurred at different times.

“How are you?”—“Oh, just about the ordinar’, thank ye.”

“How are you feeling to-day?”—“Oh, pretty weel, thank ye.”

“How’s all with you?”—“I’m doin’ pretty weel.”

“How are you to-day?”—“I’m pretty well to-day, thank ye.”

“You’re not so well to-day?”—“I don’t think I am.”

“How’s the wife this morning?”—“Oh, she’s very weel, I’m thinkin’.”

“Would you like to get up?”—“Yes, sir, I would.”

“Will you take your hands away?”—“Yes, I’ll do that.”

Granting no intelligence, this series is an example of simple reflex or automatic speech, and the following facts prove that the answers were not in the least intelligent. He was suffering from a serious illness all the time he repeated that he was very well. He knew nothing about his wife’s condition, although he stated that she was well, and though he promised to move his hands he did nothing of the sort. One morning I elicited a beautiful response from him. As I approached his bedside and nodded a greeting to him he exclaimed, “Good-bye.” The circumstance of my approach and nod called for a greeting of some sort, and I obtained a greeting—the fact that it was an improper one and did not suit—the special circumstances demonstrate all the more conclusively that it was purely automatic. The usual stimulus for reflex speech is the sound of speaking, though reflexes excited by the sense of sight are also common, the above being an example.

This speaking machine was capable, however, of greater efforts than the above, for on one occasion I ordered the patient in the next bed to be given a bath, and hearing me, he said, “It’s the best thing you can do, I’m thinkin’.” Now it is absurd to fancy that this man could have considered the propriety of giving a bath to his neighbour.

His wife came to see him on another occasion, and he gave absolutely no signs of recognition. Still, when she said on leaving, “Good-bye, Sandy; I’ll come and see you again,” he replied, “If ye’ll just let me know when you’re comin’, I’ll be glad to see you.” This is a common enough reply to give to a stranger on his departure, and it is probably often spoken in a more or less automatic fashion.

These examples are probably sufficient to demonstrate the automatic nature of this patient’s speech, and we will now pass to the next case—a man named Ross—also a case of senile dementia, with restlessness and excitement. This

patient was dirty in his habits, would not touch food if it was placed beside him, never made a single request for food or anything else, and would not do the simplest thing that was asked him. He was almost as stupid and non-intelligent as the former case, the main point in his favour being that he spoke, and this sometimes incessantly. His language, however, was a nonsensical jargon, quite incoherent, and contrasting very much with the clearness of his reflex replies. If he was able to think, it is evident, from the example of his speech about to be given, that he was unable to express himself in language, and that he suffered from that variety of aphasia in which the words are jumbled together. The facts point to the belief, however, that he did not think, and that the words, the accidents of the situation as I have described them, were the results of a general motor convolitional excitement, expressed in the non-articulatory muscles by the incessant restlessness, fumbling and pulling of the bed-clothes, and the kicking of them off, as obviously non-intelligent and non-volitional as the unintelligible sequence of his articulatory acts. The following is an example of his talk in the course of less than a minute:—

“If you would just come be—with the way—what now! —Oh, dear, dear!—Oh! that is whole the cloth—That’s what!—Oh, dear, dear me!—An it is the other macock or macockiness—See!—Who is what?—that—is it?—Oh, age!”

In the midst of this jargon it is instructive to notice the only intelligible thing—a reflex phrase—“Oh, dear, dear me!”—which in this partial disintegration of the speech-centre has withstood destruction as well as single words have done, showing that a reflex phrase may be regarded as a compact organized unit. As regards this patient’s reflex speech, the following may be taken out of a very long collection:—

“Well, Ross!”—“Weel, sir?”

“Well, Ross!”—“Weel, sir, what is it?”

“How are you?”—“Very well, sir.”

“Well, Ross, how much money are you worth?”—“Well, I cannot tell you that.”

“Take your fingers away from there!”—“I’ll soon do that.”

“Take your fingers away from there, sir!”—“Oh, yes, yes.”

“What’s the time of day?”—“I canna tell ye.”

"It's a fine day, Ross."—"It is that."

"It's a wet morning."—"Oh, no, not now."

"It's a rainy day."—"Yes, it is."

"Ross!"—"I hear, sir."

"You're an old rascal."—"Yes."

"Did you have a nice dinner?"—"Oh, yes, sir."

"Are you glad to see me?"—"Well, yes, I am."

"You're a big fool."—"Oh, yes, that's right."

"How are you this morning?"—"Oh, very well, thank you."

"It's a fine day."—"Aye, indeed it is."

"You're a troublesome old wretch."—"Oh, not at all—
not at all."

These replies, if not regarded as automatic, would necessitate the existence of a considerable amount of intelligence, which the man certainly did not possess. If the result of intelligence, and controlled by his volition, why is it that one moment he says it is a fine day and the next that it is a wet? Why does he answer so often falsely, and why does he not act as he says he will?

What must strike every reader is the marked reflex contrast between the clear and intelligent replies, and the incoherent nonsense he was in the habit of speaking. This is quite analogous to the difference between the useful and rational reflex closure of the eyes, or the sudden defensive attitude which he assumed when threatened with violence, and the absolutely useless movements he constantly performed. This plainly demonstrates the fact that volition and intelligence being lost, voluntary movements must suffer, whereas reflex movements, which occur quite independently of volition and intelligence, do not suffer in the slightest. Intelligent speech, also, is a sign of high development, as it necessitates ideation, whereas reflex speech, since it exists without ideation, is lower on the scale of evolution, and as a result resists destruction longer, being more strongly organized. What struck me forcibly in this case as showing the highly organized condition of reflex speech and its persistence when intelligent speech had totally disappeared, occurred when the patient was being bathed, the following being all that was intelligible amidst groans and shouts:—

"Oh, good gracious!—Oh, don't do that!—Oh, stop that now!—Hats, I canna be bothered with you!—Oh! oh!—
—Oh, you devil!"

The attendant could not understand the mixture of the seeming intelligence and stupidity of this patient. He would

hear me have the following conversation with him on my morning visit, and conclude that he had some intelligence:—

“Good-morning, sir.”—“Good-morning.”

“It’s a nice day.”—“Aye, it is.”

“How are you to-day?”—“Oh, I’m very weel.”

“You’re not well to-day?”—“Oh, I don’t know.”

“Good-bye, Ross.”—“Good-bye, sir.”

Immediately afterwards he would ask him to take a drink, to sit up, or to keep his bedclothes on, and the man taking not the slightest notice of him, he concluded that he had no sense. He once told me, “Doctor, you get him to answer very well; I can’t get him to speak to me,” the reason being, of course, that I took pains to elicit reflexes.

In all the instances as yet given the reflex path has been correctly followed, and the reflexes exactly suit the special stimuli. In the following examples there has resulted a reflex phrase, but the special stimulation has not been differential, or there has been irradiation in the path, and the reply is unsuitable to the question. This is not very common, and this fact again shows how well organized the path of reflex speech is.

“You’ll be busy now?”—“Very well, thank you.”

“It’s a rainy day.”—“No, I’ll no do it.”

“What is the matter with you?”—“Not at all.”

“What day is this?”—“Oh! but that is not right.”

The cycle of reflexes, however, is limited, and after one had pumped this man for one or two days one got all that was new out of him, and after that he repeated his stock phrases over and over again.

Many more examples from other cases could be given, but they mainly go over the same ground as these two, and more could be said about reflex speech, including its analogies and its pathology, but I will now conclude with a brief summary of what has been advanced.

1st.—That actions seemingly the result of great intelligence may be in reality mainly automatic and reflex.

2nd.—That in speech we have all the causes acting which tend to develop reflexes.

3rd.—That in health reflex speech is commonly inhibited, but that in exceptional circumstances it is well displayed.

4th.—That in some mental diseases reflex speech exists in an exaggerated condition.

5th.—That the path of reflex speech is a well organized one, and strongly resists destruction.