operation, was very much greater, and reached a level much above that reached by any control. This, and the fact that the other yoked control showed no increase at all after the onset of stimulation, indicates that the main effect of stimulation on the rate of operation in the subject is not caused by a general increase in activity.

The birds were killed on the fourteenth day of life, and their brains sectioned. All the subjects had correctly placed electrodes, but it was clear, as the tip of each track showed incipient healing over 0·5–1 mm, that the electrode tips had lifted during the last few days of life over this distance (within the medial forebrain bundle) from the original placement because of skull growth. This may explain the sudden and marked increase in rate on day 8 in the case of *E*6, rather than the lengthening of the train of pulses to 0·75 sec on that day. A seventh experimental bird, which never began to self-stimulate, was also the only *E* in which the electrode lay outside (and anterior to) the medial forebrain bundle.

The rates of stimulation, at their highest (260 pecks/10 min), are comparable with some reported maximal rates for equivalent areas in the rat (400 operations/10 min for the septal area[9]; 150/10 min for the medial forebrain bundle[10]). Moreover, the figures for the chick are not for highly trained animals, and are lowered by being averaged over 10 min because even the longest bouts of operation were not longer than 6–7 min and most were considerably shorter. Between bouts chicks slept and fed.

The fact that each peck resulted in a train of pulses, and that pecks were often given in rapid repetition, resulting in almost continuous stimulation while the pecks continued, makes it clear that all experimental birds would have worked for, and perhaps preferred, trains of considerably greater length (2–3 sec) than 0·5 sec, as is often true of the rat[11]. (This has been confirmed in later choice experiments, in which continuous stimulation was impossible. Trains of 0·1 sec would not maintain self-stimulation, and were consistently rejected in favour of 0·5 or 1·0 sec. Some chicks preferred 2·0 sec to 0·5 or 1·0 sec.)

The chicks gave, in association with self-stimulation, calls of a type also given to a variety of sources of stimulation which chicks tend to approach (for example, the imprinting object, food or signs announcing food[8]).

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[1] Olds, J., and Milner, P., *J. Comp. Physiol. Psychol.* **47** 419 (1954).
[2] Olds, J., Travis, R. P., and Schwing, R. C., *J. Comp. Physiol. Psychol.*, **53**, 23 (1960).
[3] Olds, J., *Physiol. Rev.*, **42**, 554 (1962).
[4] Lilly, J. C., and Miller, A. M., *J. Comp. Physiol. Psychol.*, **55**, 73 (1962).
[5] Stark, P., and Boyd, E. S., *Fed. Proc.*, **20**, 328 (1961).
[6] Boyd, E. S., and Gardner, L. C., *Science*, **136**, 648 (1962).
[7] Bateson, P. P. G., *Biol. Rev.*, **41**, 177 (1966).
[8] Andrew, R. J., *Anim. Behav.*, **12**, 64 (1964).
[9] Valenstein, E. S., and Meyers, W. J., *J. Comp. Physiol. Psychol.*, **57**, 52 (1964).
[10] Keesey, R. E., *J. Comp. Physiol. Psychol.*, **55**, 671 (1962).
[11] Valenstein, E. S., and Valenstein, T., *Science*, **145**, 1456 (1964).

Effect of Self-instruction on Perceptual Judgment

A MENTAL set, or "expectancy", may exercise a selective influence on the perception of ambiguous stimuli[1]. Such a set can be induced by a bodily need such as hunger, or by verbal instructions. The present study investigates whether an instruction which an individual gives to himself has more effect on subsequent perception than an instruction which he receives from an external source. There were three independent groups of subjects.

(1) In the self-instruction or reasoning group (RG), the subjects were presented with this conditional statement: "If the line on the left is longer than the line on the right, then the line on the right is red". A red line on their right was then exposed. The subjects were then asked what they could say about a concealed line on their left, and they all replied that it must be longer. They were then shown a red line of the same length on their left, and asked to judge its length relative to that of the previously exposed line. If they said it was longer, they were asked whether it actually looked longer.

Table 1. FREQUENCY OF JUDGMENTS

	RG	IG	CG	
Longer	12	4	1	17
Equal	3	11	14	28
	15	15	15	45

(2) In the external instruction or information group (IG), the procedure was similar but instead of being invited to make an overt inference from a conditional statement, the subjects were told that the line on the left would be longer than the line on the right.

(3) In the control group (CG) the subjects were merely asked to judge the relative length of the two lines.

The two lines, strips of red 'Sellotape' fixed on white cardboard, were both 15 cm long and 0·5 cm wide. They were displayed on end in the same horizontal plane separated by 20 cm on a desk in front of the subject.

It was predicted that the frequency of perceptual judgments that the left line was longer would vary as follows: RG > IG > CG. A sample of forty-five subjects was selected at random from the student population of the University of London and assigned in rotation to the groups ($n = 15$ in each group). The subjects were tested individually and there was no time limit on any phase in the task.

Table 1 shows the number of subjects in each group who judged the left line as either longer than or equal to the right line. Three subjects, one in each group, judged it as shorter and were included in the equal category.

The prediction, RG > IG > CG, was confirmed with a high degree of significance (Kendall's $S = 330$, $P = 0{\cdot}00005$, one-tailed), but it will be noted that the difference between RG and IG is mainly responsible ($P = 0{\cdot}005$, one-tailed, Fisher's exact test), the difference between IG and CG being negligible. Eleven out of twelve subjects in RG, and three out of four in IG, who judged the left line longer, said it actually looked longer.

The results are consistent with Bruner's "hypothesis theory" of perception[1], but they suggest that self-instruction is much more potent than external instruction. They are also consistent with the theory of "cognitive dissonance"[2,3]. The subjects in RG had committed themselves to an overt inference and might have been reluctant to contradict themselves in their perceptual judgments. The subjects in IG had not committed themselves—they were passive recipients of information. Their perceptual judgments would not have entailed self-contradiction; they would only have entailed contradicting the experimenter. Whether the results of this exploratory study were caused by perceptual or cognitive factors, they corroborate the notion that a belief, in which there is personal involvement, may distort our knowledge of reality.

It should finally be noted that all the subjects in RG were self-instructed from having made a logically invalid inference. Previous research[4,5] has shown that intelligent adults can be made peculiarly susceptible to this particular fallacy in a test situation.

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[1] Bruner, J. S., *Psychol. Rev.*, **64**, 123 (1957).
[2] Festinger, L., *A Theory of Cognitive Dissonance* (Stanford University Press, Stanford, 1957).
[3] Brehm, J. W., and Cohen, A. R., *Explorations in Cognitive Dissonance* (New York, Wiley, 1962).
[4] Wason, P. C., *Quart. J. Exp. Psychol.*, **16**, 30 (1964).
[5] Wason, P. C., in *New Horizons in Psychology* (edit. by Foss, B. M.) (Harmondsworth, Penguin Books, 1966).