

tensity, if regarded from a nativistic point of view, is itself an element of consciousness, whereas, to the empiricist, it is a complex of sensational elements, chiefly motor. In either case there is nothing gained by naming it 'attribute' of sensation. For if abstract irreducibility and distinctness be seriously maintained as the sole criteria of the psychic element, analytic psychology has no place and no use for the 'attribute' of sensation.

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IS THE MEMORY OF ABSOLUTE PITCH CAPABLE OF DEVELOPMENT BY TRAINING ?

The experiments the results of which I am going to report here were made in Berlin during the time from March to October, 1895, jointly by Dr. Victor Heyfelder and myself. I did not publish them earlier, because I expected to make a complete investigation into the memory of absolute pitch. After having given up this intention I shall describe those experiments separately.

The theoretically important question is: whether human beings are to be divided into two classes, one of them enjoying a memory of absolute pitch, the other wanting it, or whether there is but a gradual difference in memory of absolute pitch, some people needing more, some less practice to obtain an equal facility.

Should the former be true, we would have to assume that the first class possesses a physiological property, the lack of which prevents the others from acquiring that mental faculty. But it would be very difficult to say what kind of physiological property it might be.

In favor of the latter is the fact that everyone has a certain amount, however small, of memory of absolute pitch, being able to recognize and discriminate, *e. g.*, the sounds of a violin and a bassviol merely through the pitch.

Kries' indeed will not grant that this already may be called a memory of absolute pitch. But I do not see any reason for refusing this name in any case where the individual is *unable* to determine the pitch with an average error *less* than a certain interval, *viz.*, a third. That there is no such reason is proved by our experiments, which show that individuals with not more memory of absolute pitch than above described by *systematical* and *sufficiently lasting* practice may be trained to meet the conditions of Kries. It may be mentioned

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that the *possibility* of such training by Kries and many others has been *denied*.

We used for our experiments tuning forks as well as a piano. In both cases we named the pitches not by their musical names, but by their vibration rates, a table of which we had lying before us. We began with few pitches and from time to time added some new ones, as is to be seen in the tables. Each tone was repeated as often as wished.

On the piano we began with 10 pitches at intervals of a sixth. When the number of different pitches reached 20, the intervals were major thirds; when 39, whole tones.

TONE PRODUCED BY TUNING FORKS; MARCH TO MAY, 1895.

	HEYFELDER.				MEYER.				
	Correct Judgments %.	83	78	70	56	75	71	67	59
Number of Judgments.	136	365	457	91	137	364	460	92	
Vibration Rates.	100	$\frac{2}{5}$	$\frac{2}{4}$	$\frac{2}{1}$	$\frac{4}{1}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{1}{7}$	$\frac{8}{8}$
	122	$\frac{1}{3}$	$\frac{2}{7}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{1}{2}$
	150	0	0	$\frac{1}{2}$	0	0	$\frac{1}{6}$	$\frac{2}{3}$	$\frac{1}{2}$
	188	$\frac{1}{4}$	$\frac{2}{6}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{6}$	$\frac{2}{6}$	$\frac{1}{2}$
	220	0	0	$\frac{1}{3}$	$\frac{1}{3}$	0	$\frac{2}{6}$	$\frac{1}{2}$	$\frac{1}{2}$
	300	$\frac{1}{5}$	$\frac{2}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{2}{5}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{2}$
	400	0	$\frac{2}{5}$	$\frac{1}{2}$	0	$\frac{2}{5}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{2}$
	450	$\frac{1}{6}$	$\frac{2}{5}$	$\frac{1}{2}$	0	$\frac{1}{5}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{2}$
	680	0	$\frac{2}{4}$	$\frac{1}{2}$	0	0	$\frac{1}{7}$	$\frac{1}{3}$	$\frac{1}{2}$
	800	0	0	0	0	0	0	$\frac{1}{3}$	$\frac{1}{2}$
	960	$\frac{1}{6}$	$\frac{2}{8}$	0	$\frac{1}{4}$	$\frac{2}{8}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{2}$
	1200	0	0	$\frac{1}{3}$	0	0	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{2}$
	1600	$\frac{1}{10}$	0	$\frac{1}{2}$	0	$\frac{1}{5}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{2}$
	2400	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{2}$
	3200	0	0	0	0	0	0	$\frac{1}{3}$	$\frac{1}{2}$
	4000	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{3}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{2}$

The fractions give the relation of right to wrong cases.

TONE PRODUCED ON THE PIANO; JUNE TO OCTOBER, 1895.

Number of different pitches.	HEYFELDER		MEYER.	
	Number of judgments.	Correct judgments %	Number of judgments.	Correct judgments %.
10	69	81	69	86
12	46	72	46	85
14	46	70	46	65
16	69	75	69	61
18	92	74	92	66
20	368	73	368	59
39	736	64	736	60

Even when we had the choice of 39 pitches, more than one-half of our judgments were correct, and errors surpassing the neighboring pitch on either side were quite rare.

We did not continue those experiments further, because the value of the acquired facility did not seem to us to correspond to the expense of time. Now, after several years have passed we have lost the greater part of what we had acquired, by the want of continued practice.

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