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ABSOLUTENESS OF AN ABSOLUTE JUDGEMENT ON THE TONE INTENSITY

by

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PROBLEM

The term 'relative judgement on single stimuli'⁽¹⁾ means that an absolute judgement is influenced by just formerly perceived series of the same class of stimuli and very often suffer contrast effect. This fact was found by C. C. Pratt and J. G. Needham concerning the judgement of tone intensity⁽²⁾. As this effect seems to come out through the formation of rough standard by the formerly perceived tones and through the automatic comparison with it, so that N. E. Cohen asserted that the absolute judgment is in reality not absolute but relative⁽³⁾. However, it were G. E. Müller and J. Martin in 1899 that at first noted the relativity of absolute judgment in the experiment on weight comparison⁽⁴⁾. They explained it through the unconscious comparison with average weight, which is constructed automatically from former series of stimulus. Afterwards Brunswick⁽⁵⁾ and Th. Ziehen⁽⁶⁾, expressed almost the same interpretation. Köhler⁽⁷⁾ supposed similar formation of psychological level which has relation with the homogeneous level, that is formed by the group of memory-trace in brain. S. Abe acknowledged the relativity of absolute judgment, because present psychological tension or anticipatory attitude is used as standard to compare⁽⁸⁾. However, G. E. Müller, Köhler and many others have experimented or discussed the absolute judgment in the successive comparison of two stimuli through the method of constant stimuli. S. Abe observed the absolute judgment on the single stimulus, but his method was not applied to the single stimulus. Pratt, Needham and Cohen have employed, on the contrary, the method of single stimulus or the method of absolute judgment. They have constructed some stimulus series and let the subjects to judge on the single stimulus one after another and observed the absolute judgment on the standard stimulus, which is presented at last. Nevertheless, they found the absolute judgment as relative. According to the writer's opinion, it is doubtful whether the absolute judgment caused by the method of single stimuli is always relative. Are the absolute judgments influenced by the judgments on the immediately foregoing stimulus series always? If they found so much contrast effects of the judgment on the foregoing stimulus in the absolute judgment, then it seems apparently to be an absolute judgment, but in reality it is a relative judgment. But the absolute judgment might be in some measure absolute in reality too. In other words, are there no such judgment as is difficult to be influenced by the group of judgment on the foregoing stimulus series? According to the writer's view, it seems their procedure and used stimulus inadequate, although they used

the method of single stimuli. If certain psychological level is automatically formed through the judgment on the foregoing stimulus series and the level used as unconscious standard through which comes out contrast effect, that is the absolute judgment becomes relative, then is it not because of the construction of foregoing stimulus series? If we construct the foregoing stimulus series not as a group of homogeneous stimulus with standard stimulus as in the constant method in the traditional psychophysical method, but heterogeneous stimulus, and if also construct the stimulus in the series also heterogeneous one another, then the integrated psychological level would be difficult to be formed, which is used as standard in the unconscious comparison. It is expected then that the relativity of absolute judgment especially the contrast effect of the absolute judgment which Needham found would hardly, or only seldom comes out. Standing on such expectation, Ohwaki carried out 1951 an experiment on the perception of weight⁽⁹⁾. He constructed series of heterogeneous stimulus. In consequence, he only seldom found really the contrast effect in the absolute judgment. Now we want to demonstrate it furthermore about the perception of tone intensity.

PROCEDURE

Oscillator was employed to produce the tone stimulus which were regulated in various intensities through the attenuator. The stimuli were transmitted to the right ear through the receiver. Our thanks are due to Dr. Yujiro Koike, Professor of electric communication engineering, Tohoku University, about the employment of apparatus.

The experiments were carried out in the sound-proof room of psychological institute of the University. The tone of 500cps was used as the standard stimuli in the first and the second experiment and 1,500cps in the third and the fourth experiment. The duration of presentation of tone was 3 seconds and the intervals of 30 seconds were placed between the every tones. These two stimuli of high and low frequencies were selected because it lay in the suitable range for good sensitivity and resonance of receiver. Incidentally, the 1,100 cycles were employed in Needham's experiment on contrast effect and 1,000 cycles were used in Lauenstein's experiment on the assimilation of memory traces.

Each stimulus series is constructed from seven tones which have 3db intensity differences one another. In the first and the third experiment each series of stimuli had more intensity than the standard. On the contrary, in the second and the fourth experiment all the serial tones had smaller intensity than the standard.

In the comparison experiments of every experimental series the frequencies of seven series tones are equal to the standard tone. Therefore, in this experimental series (comparison experiment), series effect of absolute judgment is expected to appear, as Needham and others have shown it.

In the principal experiments of every experimental series, frequencies of the seven serial tones have higher or lower ones than that of the standards tone: that is, there are higher as well as lower frequency tones than that

of the standard tone. They are not only different frequency tones to the standard tone, but they are different to each other. In this way we tested how the first absolute judgment on the intensity of the standard tone changes in the second absolute judgment, which was made on it after the judgements of intensity on the seven serial tones. If the judgments on serial tone influence on the following absolute judgment about standard tone, the second absolute judgment would change from the first absolute judgment. Moreover it changes to the other direction, which is contrary to the direction of judgment in the serial tones. In other words, the contrast effect from the serial tones would come out.

On the contrary, if almost no psychological level is constructed by the judgments on serial tones, then the intensity judgment on the standard tone changes in some measure from the first judgment, big changes into the contrary direction as the so-called contrast effect would not come out, but it would show only little change in the same direction. For example, if the first absolute judgment on the standard tone was "stronger", then the second absolute judgment would not change into the judgment of contrary direction "weaker", but remain in the judgment in the same direction: "a little stronger" or at most "the same".

The categories of judgments on tone intensity are five: "clearly stronger",

Table 1
The First Experiment
(Intensity of series tone is stronger than that of the standard tone.)

Principal Experiment		
	cps	db
Standard tone	500.....	30
Series tone	260.....	21
	340.....	6
	420.....	15
	500.....	3
	580.....	12
	660.....	9
	740.....	18
Comparative Experiment		
	cps	db
Standard tone	500.....	30
Series tone	500.....	21
	500.....	6
	500.....	15
	500.....	3
	500.....	12
	500.....	9
	500.....	18

Table 2
The Second Experiment
(Intensity of series tone is weaker than that of the standard tone.)

Principal Experiment		
	cps	db
Standard tone	500.....	30
Series tone	260.....	39
	340.....	54
	420.....	45
	500.....	57
	580.....	48
	660.....	51
	740.....	42
Comparative Experiment		
	cps	db
Standard tone	500.....	30
Series tone	500.....	39
	500.....	54
	500.....	45
	500.....	57
	500.....	48
	500.....	51
	500.....	42

Table 3
The Third Experiment
(Intensity of series tone is stronger
than that of standard tone)

Principal Experiment		
	cps	db
Standard tone	1500	30
Series tone	1260	21
	1340	6
	1420	15
	1500	3
	1580	12
	1660	9
	1740	18
Comparative Experiment		
	cps	db
Standard tone	1500	30
Series tone	1500	21
	1500	6
	1500	15
	1500	3
	1500	12
	1500	9
	1500	18

Table 4
The Fourth Experiment
(Intensity of series tone is weaker
than that of standard tone.)

Principal Experiment		
	cps	db
Standard tone	1500	30
Series tone	1260	39
	1340	54
	1420	45
	1500	57
	1580	48
	1660	51
	1740	42
Comparative Experiment		
	cps	db
Standard tone	1500	30
Series tone	1500	39
	1500	54
	1500	45
	1500	57
	1500	48
	1500	51
	1500	42

“stronger”, “neither stronger nor weaker” (or “it is not certain”), “clearly weaker”. The order of presentation of seven serial tones are determined by a random method; it is different in each experiment each day as well as each subjects. Subjects are seven graduate and undergraduate students of psychology. They know nothing about the object of experiment.

Subjects are instructed to judge the tone intensity always according to the first impression and never judge on the ground of comparison with former tone. In other words, we informed to judge after the direct sensation.

Before the beginning of the experiment we presented during two days each tone stimulus in a random order, which is to be used in all experiments afterwards, and let subjects judge their intensity. And then after at least one day, the main experiment was carried out.

In the following table one could understand easily the frequency (cps) and intensity of tone stimulus, which were employed in the four sorts of experiments.

As we determined the order of presentation of serial tones after the random method so each tone were distributed equally in every order of presentation.

The order of principal experiment and comparison experiment was changed alternately according to the experiment day. Each subject finished all experiments in eight days. One pair of principal experiment and comparison

experiment was conducted, of course, in the course of a day.

The db is measure of attenuation of voltage, the more voltage is attenuated the more weakened the tone intensity. If we express this in formula,

$$\text{db} = 20 \log \frac{E_2}{E_1}$$

E_1 and E_2 are voltage :

And 20 db means to lower the voltage into $\frac{1}{10}$, 40 db to $\frac{1}{100}$, and 60 db to $\frac{1}{1000}$.

THE RESULTS OF EXPERIMENT

We measured, as before said, the effect of judgment on the foregoing tone stimulus series to the following absolute judgment in the following way : we let the absolute judgment on the intensity of standard stimulus twice, e. g., at first before the judgment about the serial tones, in the second time after the judgment about them. And through comparing two judgments, by finding the times of shifting of judgment category we measured the grade of the effect. At the same time in contrasting the change in the absolute judgment on the standard stimulus after the judgments on the homogeneous (the same cps) tone series on one side (the comparison experiment), with the change of absolute judgment after the judgment on the heterogeneous (different cps) tone series (the principal experiment), we tested whether the absoluteness of absolute judgment would come out.

Now, we can make the grade of shifting into three steps, when a shifting appears between two absolute judgments about the standard stimulus. For example, when the judgment of "clearly strong" shifted to the judgment "strong", or vice versa, we classify it as "a few shifting". Then, for example, when the judgment "strong" shifted to the judgment "neither strong nor weak", or vice versa, we classify it as "shifting in some measure". At last, for example, when the first judgment "strong" shifted to the second judgment "weak", or vice versa, we classify it as "shifting in contrast". According to this classification we arrange the experimental results and show them in the Table 5. In the first as well as in the second experiment the absolute judgment on the standard stimulus in the principal experiment is influenced by the judgment on the serial tones very little. 50 per cent of them did not shift. No shifting in contrast came out or it came out extraordinary little. It was perceived in the principal experiment : e. g., after the judgment about the heterogeneous (different cps) series tone. On the contrary, in the comparison experiment, e. g., after the judgment on homogeneous (the same cps) tone series, most of the absolute judgment were shifting. The contrast shifting was a little oftener came out than in the principal experiment. In short, when the standard tone is 500 cps, its attenuation level is 30db, as in the first and second experiment, the judgments about heterogeneous series tones influence the following judgments about stimulus tone very little, even if the series tones are stronger or weaker. In other words, as we have expected

Table 5

		don't change	change		
			only a little	in some measure	in contrast
Ist Exp. -Day	principal exp.	7 (50.0%)	0	7 (50%)	0
	comparative exp.	2 (14.3%)	1 (7.2%)	7 (50%)	2 (14.3%)
IIInd Exp. -Day	prin. exp.	7 (50.0%)	0	5 (35.7%)	2 (14.3%)
	comp. exp.	4 (28.5%)	2 (14.3%)	5 (35.7%)	3 (21.5%)
IIIrd Exp. -Day	prin. exp.	3 (21.5%)	6 (42.8%)	5 (35.7%)	0
	comp. exp.	5 (35.7%)	3 (21.5%)	4 (28.5%)	1 (7.2%)
IVth Exp. -Day	prin. exp.	4 (28.5%)	3 (21.5%)	6 (42.8%)	1 (7.2%)
	comp. exp.	5 (35.7%)	2 (14.3%)	6 (42.8%)	1 (7.2%)

at first, it is proved that the judgments about heterogeneous series tones produces no series effect. This result coincides quite well with our experimental results of absolute judgment on the weight by Ohwaki in 1950.

The results of the third and the fourth experiment are somewhat different from that of the first and second experiment. The frequency of "not shifting" in the principal experiment was somewhat larger than that of comparative experiment. About the frequency of only a little shifting, and "shifting in the same measure", somewhat more in the former than in the latter. If one observes only this relation, one would consider that this results is contrary to the result of the first and second experiments, because it seems to be more shifting in the principal experiment than in the comparative experiment. However, the largest shifting never come out in the third experiment. In the fourth experiment it came out only once. In other words, whether it is smaller than that of the comparative experiment (the third experiment), or it is the same (the fourth experiment). In short, the large shifting is never more than that of the comparative experiment. But so much difference of shifting as in the first and second experiments does not appear. Why is it so? Its main reason is that, in the third and fourth experiment, the standard tone is 1500 cps, and that the each series tone is, in correspondence with the standard tone, higher than that of the first and second experiment. The standard tone 500 cps as well as each series tone in the step of 80 cps, in the first and second experiment were discriminated so easily and clearly by every subjects. On the contrary, about the standard tone 1500 cps and its series tones, not only to discriminate between their pitch and intensity is much harder than to discriminate them in the standard tone 500 cps and its series tones, but to discriminate their pitch themselves is considerably difficult. So reports most subjects. In other words, although we have presented series tone of different pitch, perception of them were not so clearly different as those in the first and second experiment. However its series effect does not contradict with the results of the first and the second experiment.

In order to make clearer the shifting of the absolute judgment about the standard stimulus, let us analyse the result of the absolute judgment about each series tones. Now, if we distribute the series tone in each experiment according to the order of presentation, and if we totalize each subject's judgments about it, we get the Tables 6, 7, 8 and 9.

Table 6
The First Experiment
(Series tone have higher intensity than that of the standard tone)

Order of tone presentation		1	2	3	4	5	6	7	sum.	
Principal Experiment (Series tone: the same cps)	Judgment									
		clearly strong	7	10	8	9	9	6	9	58
		strong	5	2	5	2	3	3	3	23
		neither strong nor weak	—	—	—	2	2	4	1	9
		weak	2	1	—	1	—	1	1	6
	clearly weak	—	1	1	—	—	—	—	2	
Comparative Experiment (Series tone: different cps)	Judgment									
		clearly strong	8	6	8	7	4	4	7	44
		strong	5	7	4	5	7	5	5	38
		neither strong nor weak	1	1	2	1	3	5	2	15
		weak	—	—	—	1	—	—	—	1
	clearly weak	—	—	—	—	—	—	—	0	

Table 7
The Second Experiment
(The intensity of series tone is lower than that of the standard tone.)

Order of tone presentation		1	2	3	4	5	6	7	sum.	
Principal Experiment (Series tone: the same cps)	Judgment									
		clearly strong	—	—	—	—	—	—	—	0
		strong	—	1	—	1	—	1	1	4
		neither strong nor weak	4	—	2	2	3	2	4	17
		weak	4	4	5	5	6	5	7	36
	clearly weak	6	9	7	6	5	6	2	41	
Comparative Experiment (Series tone: different cps)	Judgment									
		clearly strong	—	—	—	—	—	—	—	0
		strong	—	—	—	1	1	1	2	5
		neither strong nor weak	2	4	2	1	3	2	—	14
		weak	8	4	8	7	6	7	10	50
	clearly weak	4	6	4	5	4	4	2	29	

Now from the experimental results about the series tone as shown in these tables we can find three tendencies.

(1) In every experiment series, the judgments tend to concentrate on about two categories gradually, according to the progress of the order of presentation in comparative experiment. However, in the principal experiment on the contrary in spite of the progress of presentation, the judgment remains distributed in several categories and does not concentrate on two categories. This results demonstrate that in the comparative experiment, e. g., in the series tones of the same cps, contrary to the principal experi-

Table 8
The Third Experiment
(The intensity of series tone is higher than that of standard tone.)

Order of tone presentation		1	2	3	4	5	6	7	sum.	
Principal Experiment (series tone : the same cps)	Judgment	clearly strong	9	7	6	5	4	6	6	43
		strong	3	3	6	7	6	4	4	33
		neither strong nor weak	—	—	—	—	2	3	1	6
		weak	—	2	2	2	2	1	1	10
		clearly weak	1	—	—	—	—	—	2	3
Comparative Experiment (series tone : different cps)	Judgment	clearly strong	6	3	6	4	4	3	3	29
		strong	4	8	4	4	5	8	6	39
		neither strong nor weak	4	2	3	6	5	2	3	25
		weak	—	1	1	—	—	1	2	5
		clearly weak	—	—	—	—	—	—	—	0

Table 9
The Fourth Experiment
(The intensity of the series tone is lower than that of the standard tone.)

Order of tone presentation		1	2	3	4	5	6	7	sum.	
Principal Experiment (series tone : the same cps)	Judgment	clearly strong	—	—	—	—	1	—	—	1
		strong	1	1	1	1	2	1	1	8
		neither strong nor weak	4	2	3	3	2	3	2	19
		weak	4	4	4	5	6	3	8	34
		clearly weak	5	7	6	5	3	7	3	36
Comparative Experiment (series tone : different cps)	Judgment	clearly strong	—	—	—	—	—	—	—	0
		strong	—	1	1	1	—	1	—	4
		neither strong nor weak	1	—	—	2	3	—	1	7
		weak	6	8	8	6	3	7	8	46
		clearly weak	7	5	5	5	8	6	5	41

ment, e. g., series of different cps tone, in proportion to the repetition of presentation of the standard of the judgment about intensity becomes gradually stable and surer. But in the principal experiment, it is difficult and does not progress.

(2) Secondly, errors of judgments. If we compare the errors in the principal experiment with those in comparative experiment, we find always more errors in the principal experiment in the four experiments. This result proves that the standard judgment is more difficult to be produced in the principal experiment than in the comparative experiment. Then it is a matter of course that, in the principal experiment the absolute judgment about standard tone is difficult to be influenced by the perception trace of series tone, consequently the variation of judgment remains only a little, in other words its absoluteness is maintained comparatively well.

(3) The series tone in comparative experiment, e. g., the judgment about

the series tones of the same cps produces positive time error when the intensity of the series tone is high, that is in the first and third experiment: when the intensity is low, that is in the second and the fourth it clearly produces negative time error. Such integrated whole produced through combination and assimilation of groups of the perception trace of series tones exert, we can assume, contrast influence upon the absolute judgment of standard tone. In the principal experiment, e. g., about the series of heterogeneous tones, no such combination or assimilation is brought about, no integration of groups of trace is constructed. In consequence, the absolute judgment about the following standard tone is influenced only a little: therefore it is possible to maintain its absoluteness comparatively.

Progress of the changes of absolute judgment according to the repetition of experiment-day.

In the case of 500cps, as one sees in the Table 10, we cannot find any

Table 10

Progress of the change of absolute judgment according to the repetition of experiment day

(standard stimulus : 500cps, 30db)

		don't change	change		
			only a little	in some measure	in contrast
Ist Exp. -Day	principal exp.	3	0	2	2
	comparative exp.	2	2	0	3
IInd Exp. -Day	prin. exp.	3	0	4	0
	comp. exp.	2	1	2(2)	0
IIIrd Exp. -Day	prin. exp.	6	0	1	0
	comp. exp.	2	0	4	1
IVth Exp. -Day	prin. exp.	2	0	5	0
	comp. exp.	2	0	4	1

The parenthesized number means times of change in the other direction than in contrast direction.

progress to certain direction. The difference between principal and comparative experiment is most remarkable on the third experiment day. The judgment "don't shift" in principal experiment reaches its highest point on the third day, on the fourth Butday it decreases again.

In the case of 1500 cps, as one sees in the Table 11. the judgment "not shifting" is oftener in the third and fourth day than in the first and second day. Especially, it is oftenest on the third day. On the second and the third day the "shifting in contrast" never appear in either principal or comparative experiment.

From this result, we know that it is not favorable to repeat the experiment of absolute judgment more than three days.

Table 11
Progress of the change of absolute judgment according to the repetition
of experiment day

(standard stimulus : 500cps, 30db)

		don't change	change		
			only a little	in some measure	in kontras ⁺
Ist Exp. -Day	principal exp.	1	3	3	0
	comparative exp.	2	0	3(1)	1
IIInd Exp. -Day	prin. exp.	1	2	3	1
	comp. exp.	1	3	3	0
IIIrd Exp. -Day	prin. exp.	3	3	1	0
	comp. exp.	4	0	3	0
IVth Exp. -Day	prin. exp.	2	1	4	0
	comp. exp.	3	2	1	1

Individual Differences about the Shifting of Absolute Judgment

In the case of standard tone 500 cps, the individual difference between

Table 12
Individual difference about the change of absolute judgment
(standard stimulus : 500cps, 30db)

		Tr	K	H	A	Tu	S	O	sum.	
don't change	prin. exp.	2	1	2	1	2	4	2	14	
	comp. exp.	1	0	1	2	1	1	2	8	
change	only a little	prin. exp.	0	0	0	0	0	0	0	0
		comp. exp.	0	1	0	0	1	1	0	3
	in some measure	prin. exp.	1	2	2	3	2	0	2	12
		comp. exp.	2	2	1(1)	1	1	1(1)	2	10(2)
in contrast	prin. exp.	1	1	0	0	0	0	0	2	
	comp. exp.	1	1	1	1	1	0	0	5	

seven subjects as it is shown in Table 12, is considerably clear. Shift was the smallest in case of subject S. He never shift in the principal experiment. In subject S and O "shifting in contrast" never occurred in the principal as well as comparative experiment.

The absolute judgment of subject Tr and K "shifted in contrast" once in principal as well as comparative experiment. There is no difference between these experiments. On the contrary, the three subject H, A and Tu had "shifting in contrast" in comparative experiment. But they did not "shift in contrast" in any time in principal experiment. Among seven subjects four

subjects, H, A, Tu and S showed difference of series effect between homogeneous and heterogeneous stimulus series.

In the case of 1500cps, as it is shown in Table 13 even in the compara-

Table 13
Individual difference about the change of absolute judgment
(standard stimulus:500 cps, 30db)

		Tr	K	H	A	Tu	S	O	sum.	
don't change	prin. exp.	0	2	0	1	2	1	1	7	
	comp. exp.	0	2	1	3	2	2	0	10	
change	only a little	prin. exp.	2	0	1	3	2	1	0	9
		comp. exp.	1	0	1	1	1	1	0	5
	in some measure	prin. exp.	1	2	3	0	0	2	3	1
		comp. exp.	1	2	2	0	1	1	3(1)	10(1)
	in contrast	prin. exp.	1	0	0	0	0	0	0	11
		comp. exp.	2	0	0	0	0	0	0	2

tive experiment it appears no series effect, except subject Tr. "No shifting" of absolute judgment is found oftenest. In general, the individual difference remains markedly small than in the standard stimulus 500 cps.

CONSIDERATION

Although stimulus are falling within the same modality of sensation, if they are different one another, then the stimulus group scarcely bring about series effect. This fact suggests that between traces of perception in brain, it occurs a delicate selecting function. Through the autonomous selective function, the heterogeneous stimulus are, though they are the group of stimulus of the same class or modality of sensation, and close each other in time, not permitted to enter into the group of the homogeneous stimulus. Consequently, the series of the sensation of such heterogeneous stimulus seems to be difficult to construct the aggregate of traces.

The series effect of the foregoing sensory stimulus of the same sort is able to be explained by the gestalt theory: the so-called trace aggregation theory of W. Köhler, von Restorff, H, ⁽¹⁰⁾ Lauenstein, O. ⁽¹¹⁾ and Koffka, K. ⁽¹²⁾. It is also understood by the adaptation-level theory of H. Helson, ⁽¹³⁾ which attempts to express the level mathematically.

He assumes that all effects of stimulation, past as well as present, are pooled to form a single level with respect to given classes of stimuli. For the formation of pool of effects, there seems to be two conditions, that is, (1) stimuli belong to the same class of sensation, (2) they are as near as possible in time each other. However, our experimental results suggest that the two conditions are not yet enough. As the third condition, we must add to them another one, that the stimuli must belong not only to the same modality, but to the same quality of sensation.

Although our experiment is not yet enough to demonstrate it, it wants to give a suggestion to the necessity of more elaboration and analysis in the current theories of series effect and absolute judgment. And even here in the psychophysical experiment, we can find not the passive, but the active role of perceiver, although the activity itself is not conscious to the perceiver, but it functions automatically⁽¹⁴⁾. The wideness of individual difference should not be neglected also.

SUMMARY

When we perceive and judge a single tone about its intensity, if we have judged about the series of the same cps tones previous to that, then the intensity of these series tones unconsciously forms a standard of judgment. And this standard tends to influence on the following judgment of tone intensity, through it comes out an absolute judgment in the contrary direction: series stimulus call on a contrast effect. This is known especially through Pratt, Needham and Cohen. However would the series which is constructed from different cps tone each other call out such series effect also. To test this we constructed series of different cps tone, with different intensity (the principal experiment) on one side, and the other series, which is formed by the tones of the same cps, with different intensity (the comparative experiment) on the other side, and compared the series effect of them. The standard tone is 500 cps (the first and second experiment) and 1500 cps (the third and fourth experiment). Seven subjects have observed during four days. The results of experiments show that, the tone series of different cps tone are difficult in general to call out the series effect. But in the standard tone of 1500 cps we can scarcely find the difference between the two series. On the five hundreds standard tone we can find it clearly. In other words, the group of heterogeneous stimulus to each other, although they are belonging to the same modality of sensation and near in time each other, cannot produce the series effect. They are difficult to form one group or frame of reference. This result is completely coincide with the result of the Ohwaki's experiment about perception of weight in 1950. From these results we may assume that the stimulus trace in brain exerts automatically active and minute selective function between them.

In short, sensation functions not only to adapt, but to discriminate environmental stimulus. Relativity of absolute judgment, which is dependent upon the residual and background stimulus as frame of reference, might be the effect of the function of adaptation, while the absoluteness of absolute judgment must be mainly the effect of the function of discrimination.

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RÉSUMÉ

Quand nous apercevons un simple ton et jugeons de son intensité, si nous jugeons des séries des mêmes tons cps, alors l'intensité de ces série-tons forme par inadvertance un niveau de jugement. Et ce niveau tend à s'influencer sur le suivant jugement de l'intensité de ton. Il en résulte un jugement absolu en direction contraire : série-stimulus appellent un effet contraire. Cela est connu surtout par Pratt, Needham et Cohen. Est-ce que la série, pourtant, qui est construite de différents cps tons l'un à l'autre peut appeler aussi un tel série-effet? Afin de l'éprouver nous construímes des séries du différent cps ton, avec différente intensité (l'expérimentation principale) sur un côté, et un autre série, qui est formée par le ton du même cps, avec différente intensité (l'expérimentation comparative) sur un autre côté, et comparâmes leur série-effet. Le ton typique est 500cps (l'expérimentation 1re et 2e) et 1500 cps (l'expérimentation 3e et 4e). Sept sujets observèrent pendant quatre jours. Les résultats d'expérimentations montrent que, le série de ton du différent cps ton est difficile en général d'appeler le série-effet. Mais dans le ton typique de 1500 cps nous ne pouvons guère trouver la différence entre deux séries. Sur le ton typique de 500 cps nous pouvons trouver clairement la différence. En autres termes, le groupe des stimulus hétérogènes l'un à l'autre, quoiqu'ils appartiennent à la même modalité de sensation et

quoiqu'ils soient temporellement très proche l'un de l'autre, ne peuvent produire le série-effet. Il est difficile qu'ils forment un groupe ou une caisse de référence. Ce résultat est complètement coïncident avec le résultat de l'expérimentation d'Ohwaki à l'égard de la perception de poids, en 1950. De ces résultats, nous pourrions supposer que les traces de stimulus dans cerveau exerce une active et minute fonction sélective entre eux.

ZUSAMMENFASSUNG

Wenn wir beim Hören eines Tones und Urteilen nach seiner Intensität vorher eine Serie von Tönen von demselben Hertz gehört und über ihre Intensität geurteilt haben, dann bilden die Intensität dieser Serien-Töne unbewusst die Norm für die Urteile der folgenden Töne. Durch diese Wirkung kommt ein absolutes Urteil über folgende Ton-intensität nach der umgekehrten Richtung: Serien-Reiz rufen eine kontrastierende Wirkung heraus. Diese Wirkung ist vor allem durch Versuche von Pratt, Needham und Cohen gefunden worden. Können die Serien-Töne von verschiedenem Hertz aber auch solche Serien-Wirkung hervorrufen? Um diese Frage zu prüfen, haben wir Serien-Töne von verschiedener Frequenz mit verschiedenen Intensität (Hauptversuche) auf einer Seite, und eine andere Serie Töne von derselben Frequenz mit verschiedenen Intensitäten (Vergleichende Versuche) auf der anderen Seite, und Serien-Wirkung von beiden Serien verglichen. Der Grundton ist 500 Htz. (in den ersten und zweiten Versuchen) Sieben Vsp. haben, während vier Tage, beobachtet.

Die Versuchsergebnisse zeigen, dass die Serien-Töne von verschiedener Frequenz im allgemeinen eine Serien-Wirkung schwer hervorrufen. An dem Grundton 1500 Htz. aber fällt es uns schwer, den Unterschied zwischen zwei Arten von Serien zu finden. An dem 500 Htz. Grundton können wir im Gegenteil den Unterschied klar finden. Mit anderen Worten, die Gruppe von heterogenen Reiz gegeneinander, obwohl sie zu derselben Empfindungsmodalität gehören, können keine Serie-Wirkung produzieren. Sie bilden schwer eine Gruppe oder "frame of reference" zusammen. Diese Resultate stimmen mit denjenigen von Ohwaki's Versuche über Gewichts-Wahrnehmung im Jahre 1950 vollständig überein.

Aus diesen Resultaten können wir annehmen, dass Reiz-Residuum im Gehirn eine aktive und genau auswählende Funktion gegeneinander ausübt.