

Studies on Sensory Deprivation: II. Part 5. Experiments on the Time Perception

著者	Kato Takayoshi, Saito Shigeru
journal or publication title	Tohoku psychologica folia
volume	22
number	3-4
page range	79-85
year	1964-03-30
URL	http://hdl.handle.net/10097/00123730

STUDIES ON SENSORY DEPRIVATION: II.

PART 5. EXPERIMENTS ON THE TIME PERCEPTION

by

Takayoshi Kato (加藤孝義)* and Shigeru Saito (斎藤繁)**

(Department of Psychology, Tohoku University, Sendai)

The effects of 48 hours sensory deprivation upon the estimation, production and reproduction of short time were examined, and the estimation of the duration of isolation itself, too.

In the reproductions of the short time could not be observed any clear influences of sensory deprivation, but its estimations were found to have some significant differences between control group and experimental group. In the estimation of the duration of isolation, there was a trend of under-estimation of the period, and the difference of the estimated value from the real time was large in cases of those Ss who used positively their own subjective time scales.

Experiments were performed for the double purpose. One was to examine whether there were any changes in estimation, production and reproduction of relatively short time intervals after 48 hrs. of sensory deprivation. The other was to relate Ss' time orientation which was reported by them at the end of isolation, with the structure of their own experiences during the isolation which were recalled in a form of an act gram after the experiments.

Exp. I. Estimation of Sound Duration

In this experiment, the effects of sensory deprivation on the estimation of sound duration was examined.

Procedure: Sound durations of 1, 2, 12, and 32 sec. were adopted as standard stimuli. These sounds had been recorded, and were, through a speaker, presented three times to each S in order of 2, 32, 1, and 12 sec. Just after one of these was presented, Ss were asked to reproduce the same duration with the key pushing. The sound duration estimated by S was measured automatically. This test was administered before and after sensory deprivation. Each length of standard stimuli was not informed to Ss.

Results: The means of estimated time of pre- and post-test for 4 standard durations are presented in Table 1. It is found that there is no exact tendency of over- or under-estimation in these values, but generally speaking, the values of post-test are nearer to the standard than that of pre-test, and all the values in post-test are larger than in pre-test except in the estimation of 1 sec. But

* Now at the Rehabilitation Center of Miyagi Prefecture, Sendai.

** Now at the Child Guidance Clinic of Miyagi Prefecture, Sendai.

Table 1. Estimation of sound duration.

Standard Group	1 sec.		2 sec.		12 sec.		32 sec.	
	pre.	post.	pre.	post.	pre.	post.	pre.	post.
Means	1.27	1.11*	1.87	1.94**	11.10	12.03**	29.24	32.40**
SD	0.44	0.29	0.60	0.30	2.56	1.84	6.57	3.70

* $0.05 < p < 0.1$ ** $0.25 < p < 0.3$ *** $0.05 < p < 0.1$ ** $0.01 < p < 0.025$

a statistically significant difference is found only for the estimations of 32 sec. ($P < 0.025$, by t -test).

It is also noticed that each estimated value is fairly near to the standard duration, which suggests that Ss were counting while the standard stimuli were presented.

Exp. II. Estimation of Light and Sound Duration

In the experiment, the batteries of light and sound durations were used as the standard stimuli, and the estimations of their durations and exposure intervals were examined.

Procedure: Series of Standard Stimuli are;

(1) Light (L_1)—Pause(P_1)— Buzzer—Pause (P_2)—Light (L_2)
 5 37 5 17 5 (sec)

(2) L_1 — P_1 — B — P_2 — L_2
 22 17 44 17 44 (sec.)

The series (1) and (2) were given once to Ss in the same order described above. After each series was presented, Ss were asked to estimate orally the duration of P_1 and P_2 for series (1), and of L_1 , Buzzer and L_2 for series (2). If this kind of experiments was performed repeatedly, it might be accompanied with various difficulties, so the experiment was done only in post-test and its results were compared with those of control group, and it is also known that the estimation of duration is affected by many subjective variables, such as expectancy, prediction etc. Therefore, much attention paid to avoid such factors and obtain as genuinely recalled estimation as possible. That is, Ss were asked only to estimate the intervals between light and buzzer in series (1), and the durations of L_1 , B and L_2 in series (2).

Moreover, in carrying out the experiment, due considerations were given to keep the durations of stimuli constant and the durations of pause not constant in series (1), while to make the durations of pause equal and durations of stimuli not equal in series (2). The object of this procedure is to investigate whether there are any differences in estimation between sound and light, i. e. between buzzer and light of the same duration in series (2).

Results: As shown in Table 2, experimental group and control group are significantly different from each other in their estimations of pause (series 1) and of buzzer duration (series 2) but not different in their estimation of light durations.

It is also worth mentioning that each value of the experimental group is smaller than that of the control one, but except the values of L_2 .

Table 2. Estimation of light-and-sound durations. (sec.)

Standard Group	P ₁ (37)		P ₂ (17)		L ₁ (22)		B(44)		L ₂ (44)	
	Exp.	Cont.	Exp.	Cont.	Exp.	Cont.	Exp.	Cont.	Exp.	Cont.
Means	10.1	20.3*	5.6	15.0**	21.6	22.1	26.5	35.0*	28.8	27.1
SD	5.8	10.3	1.7	6.7	5.3	7.2	8.7	7.5	10.8	6.5

* $0.1 > p > 0.05$; ** $p < 0.1$ (n=8)

Further, the significant difference was recognized between the estimations of buzzer duration and of light duration in control group (5% by U-test). But, in experimental group no difference was found between them.

Exp. III. Time Estimation by Personal Perseveration

It is assumed that a motor inhibition increased, because Ss were not able to move all the time. Therefore, the following questions were examined ; Does the motor inhibition influence the person's perseveration? And does the change of person's perseveration influence the estimation of time?

Procedure: The task of Ss was to produce their subjective 1 min. by tapping work. In the task, Ss were strictly instructed to work the tapping with their optimal speed.

The work was administered after Ss had affirmed the tapping speed of their own optimal level, and it was done three times with their eyes shut. The mean values of subjective 1 min. and the mean numbers of tapping in the pre-

Table 3. Production of 1 min. by tapping work.

Categories Group	Numbers tapped		Estimated time	
	Means	SD	Means	SD
Pre-test	* (times) 151	83.1	* (sec.) 76.0	34.0
Post-test	168	104.0	64.2	32.0

* $p = 0.01$, CR=35.67, 51.95 (n=7)

be caused by the facts that all Ss could not help depending only upon recalled evaluation which was determined only upon recalled evaluation which was determined by their impression of the works, because they could not use counting. Ss would feel the intervals of work are longer than that of real time because of consciousness of fatigue and fulfillment of the working.

In the symbol cancellation work for which the same time duration was allotted as for tapping one, Ss expressed after the work that they could not do work only a train or two. As the result seemed an unexpected one for them, the estimation of time was probably influenced by that impression for the work.

Exp. V. Evaluation of the Term of Sensory Deprivation

Each S was isolated in the experiment room for about 48 hours and deprived of all means to see objective time process while he was confined in it.

In the circumstances, it is interesting to know how Ss would have a time consciousness for the term of isolation.

Procedure: Before Ss entered into the experiment room, some experiments were carried out on them and they received medical examination. Then, they were told to take off their wrist-watch. Therefore, when they entered the room, they had only a vague time consciousness, for example, they vaguely felt it was *ante meridiem* or *post meridiem* and they could not know exact time of the day.

The time ranging from the entrance into the room to just before the releasing of the isolation, was to be evaluated as the isolation term in the room.

Results: The results are shown in Table 5 and 6, and the following findings are clearly established: (1) In the estimation of the elapsed time during

Table 5. Evaluation of the term of sensory deprivation.

Ss	Actual value (h)	Evaluated value (h)	Difference (h)
MG	49	43	- 6
UD	49	34	-15
KT	48.5	21.5	-27
TZ	50	48	- 2
ON	42	11	-31
FS	49	47	- 2
SG	50	66	+16
AB	49	47	- 2
NG	46	44	- 2
GT	49	29	-20

sensory deprivation, there is a striking tendency to underestimation. Nine Ss of ten underestimate it. (2) Each S was asked to reproduce his own experience, on the blank paper, about his behaviors while he was in the room.

Table 6. Differences from real time. (n=10)

Categories \ hour	0 ~ 12	13 ~ 24	25 ~ 36
Under-estimation	5	2	2
Over-estimation	0	1	0

Ss whose reproduction is worse, have estimates very near the real time, while those who reproduce their behavior better have large deviation of time estimation from the real time. The reason for the former case may be that these Ss estimate the term by the instruction of Experimenter given at the beginning of the experiment. That is, all Ss were instructed that they were to be isolated for about 48 hours. Accordingly Ss might be able to adjust his evaluation to the real time.

The reason for the latter may be that they were virtually dependent on his own subjective time consciousness. Therefore, their time estimations denote large deviation from the real time.

(3) It is observed that for the time duration all Ss had larger deviation when they were awake than asleep during sensory deprivation. (4) Types of time estimations are various, and the individual differences are striking.

Discussions

In the present research, five experiments were designed and all of them were related to the estimations of short time except 5th experiment. Although the statistical significances were not always found between the estimates in the pre-test and those in the post-one, it can safely be said that these were some obvious effects of sensory deprivation on the time estimation. But, as mentioned above, it would be superficial to think that the effects of sensory deprivation are related directly to the time estimation. It could be thought the time estimation is closely dependent upon experimental condition, procedures and subjective variables etc. For example, in the method of reproduction there could be no difference of mean values between pre- and post-test related with short time estimated, but in the method of evaluation, there were found some differences. Such a fact seems to be due to the differences of experimental conditions that in the above mentioned four experiments Ss could do counting freely, if they desired, but in the fifth experiment, on the contrary Ss could not make

use of counting even if they desired. The influences of sensory deprivation must be complicated with these various conditions.

Now, in the long time estimation, a striking deviation from the real time was observed on some Ss. These Ss were also those who reproduced better their actgrams during isolation. Others who showed little deviation, were those who failed to reproduce their own actgrams. This paradoxical result is interpreted as follows: On one hand, the former Ss could positively make use of their experiences during isolation as internal cues. Therefore, their estimation revealed rather large discrepancy from the real time, though they recalled better their own behaviors during isolation. On the other hand, the latter Ss were not ready for using internal cues, and poor recalling of their behaviors followed and accordingly they could not help relying their bases of estimation on the instruction given at the beginning of the isolation, which resulted in a rather exact estimation.

It was seen also that Ss had larger deviation when they were awake than asleep during the term. This might be due to the fact that they had the measuring scale for the sleeping time through daily experiences.

(Received January 10, 1964)

Zusammenfassung

Der Einfluss von sinnlicher Entziehung der 48 Stunden auf die Schätzung, Produktion und Reproduktion von der kurzen Zeit und die Orientation der Zeit in der Situation wurde geprüft.

Die Reproduktion von der kurzen Zeit bewies keine Beeinflussung durch die sinnlichen Entziehung, bei der Schätzung aber wurden einige Unterschiede zwischen experimenteller Gruppe und kontrollierter Gruppe gefunden. Über die Orientation der Zeit wurde eine Tendenz der Unterschätzung betrachtet, und die Abweichung von der rechten Zeit war grösser bei jenen Vpn, die subjektive Skala positiv benutzten.