

Studies on Sensory Deprivation: I. Preliminary Studies, Part 3. Rorschach Performance in Sensory Deprivation

著者	Sato Isao, Ohyama Masahiro
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STUDIES ON SENSORY DEPRIVATION I.
PRELIMINARY STUDIES,
PART 3 RORSCHACH PERFORMANCE IN SENSORY DEPRIVATION

by

Isao S a t o (佐藤 功) and Masahiro Ō y a m a (大山正博)*
(Tohoku University)

A. General Effect of Sensory Deprivation in Rorschach Performance*

Purpose of the Study

The aim of this study was to investigate the effects of sensory deprivation reflected on Rorschach performance. There were two predicted effects, that is, the perceptual, cognitive aspect and the specific behavioral aspect of individuals which were observed during 48 hours of sensory deprivation. And then our main attention was focussed to discover how the predict effects were in accordance with several signs, such as ego strength, adaptability, degree of adjustment, function of ego control reflected on Rorschach performance.

Subjects: The subjects consisted of 10 male students. 8 subjects of them had retest after about two months.

Procedure

Following the other tests, subjects who lay face up in bed under indirect sunbeam were given the Rorschach test. Those tests were word association, two point tactual discrimination, some medical examinations, and judgment of vertical line. The complete series of Rorschach cards was given them 20 or 30 minutes after the end of sensory deprivation situation.

Results

1. Number of Total Responses (R), Reaction Time per Single Response (T/R), and Reaction Time of Initial Responses (T/RI).

Number of Total Responses (R): There were a marked increase of R in subjects constituting an experimental group of sensory deprivation condition "E1" in comparison with control group "C1."

The difference of R between both groups was the 10 per cent level of confidence (by T test). R in retest of sensory deprivation group "E2" showed a tendency to decrease and came near the level of R in the retest of control group "C2." There was no significant difference between the first test "C1"

*This part was written by M. Ōyama.

Table 1. The Number of R T/R, and T/RI.

Group	S	R			T/R			T/RI		
		1	2	Δ	1	2	Δ	1	2	4
Sensory Deprivation Group	S1	31	43	+12	35	24	-11	18	11	-6
	S2	31			31			10		
	S3	13	10	-3	45	23	-22	28	9	-19
	S4	20	22	+2	33	26	-7	17	11	-6
	S5	40	27	-13	37	48	+11	6	9	+3
	S6	69	55	-14	36	33	-3	18	14	-4
	S7	27	33	+6	47	45	-2	25	7	-18
	S8	25	26	+1	68	82	+14	40	57	+17
	S9	32	15	-37	48	77	+29	21	31	+10
	S10	40			35			97		
	\bar{x}	32.8	28.7	-3.2	41.4	44.7	+1.1	28.0	18.3	-2.8
Control Group	1	27	33	-4	47	33	-14	14	27	+13
	2	17	21	+4	36	32	-14	22	8	-14
	3	25	24	-1	45	27	-18	17	8	-9
	4	18	17	-1	36	25	-11	18	9	-9
	5	31	31	0	49	29	-20	11	7	-4
	6	20	25	+5	36	38	+2	35	21	-14
	7	21	19	-2	50	54	+4	22	23	+1
	\bar{x}	22.7	22.8	+0.1	42.7	32.6	-10.1	19.8	14.7	-5.1

and the retest of control group "C2."⁽¹⁾

Reaction Time per Single Response (T/R): No marked difference could be observed between both groups, that is, C1 and E1. On the other hand T/R under the condition of retest C2 showed a shortening tendency in the series of C1-C2.⁽¹⁾

Reaction Time of Initial Responses (T/RI): Now, viewing the result of T/RI, T/RI in E1 was in some degree longer than that in C1, while T/R in retests of both groups was shorter than that in each of the first tests, E1 and C1.

The fact that R increased significantly in E1 may mean that most subjects would relax suitably just after sensory deprivation situation and became rather talkative to the tester. The effects of those relaxations were found also in the tendency of longer T/RI and we might guess that tendency did not mean repression, but time-delay cognitive aspects of subjects.

2. Location of Responses.

Whole Responses (W): The whole responses were examined at first. The

Table 2. The Number and percentage of Area of Responses, W D Dd and S.

	S	W			W%			D			D%			Dd			Dd%			S			S%		
		1	2	△	1	2	△	1	2	△	1	2	△	1	2	△	1	2	△	1	2	△			
Sensory Deprivation Group	S1	6	5	- 1	19	12	- 7	22	32	+10	71	74	+ 3	2	6	+ 4	6	14	+ 8	1	0	- 1	3	0	- 3
	S2	11			36			15			49			5			17			0			0		
	S3	9	9	0	69	90	+31	4	1	- 3	31	10	-21	0	0	0	0	0	0	0	0	0	0	0	0
	S4	11	8	- 3	55	36	-19	9	14	+ 5	45	64	+19	0	0	0	0	0	0	0	0	0	0	0	0
	S5	20	8	-12	50	30	-20	17	17	0	43	63	+20	2	2	0	5	7	+ 2	1	0	- 1	3	0	- 3
	S6	17	11	- 6	25	20	- 5	33	32	- 1	48	58	+10	14	10	- 4	20	18	- 2	5	2	- 3	7	4	- 3
	S7	17	21	+ 4	63	64	+ 1	7	12	+ 5	26	36	+10	3	0	- 3	11	0	-11	0	0	0	0	0	0
	S8	13	7	- 6	52	27	-25	10	14	+ 4	40	54	+14	2	3	+ 1	8	11	+ 3	0	2	+ 2	0	8	+ 8
	S9	18	8	-10	56	53	- 3	14	7	- 7	44	57	+13	0	0	0	0	0	0	0	0	0	0	0	0
	S10	15			38			18			45			4			13			2			5		
	\bar{x}	13.7	8.6	- 4.2	46.3	32.1	- 5.8	13.9	16.1	+ 1.6	8.0	52.0	+ 8.5	3.3	2.6	- 2.2	8.0	6.2	- 1.0	0.9	0.5	- 3.7	1.8	1.5	- 1.2
Control Group	1	13	9	- 4	48	39	+ 9	12	11	- 1	44	48	+ 4	2	2	0	7	9	+ 2	0	1	+ 1	0	4	+ 4
	2	12	19	+ 7	71	90	+19	5	2	- 3	29	10	-19	0	0	0	0	0	0	0	0	0	0	0	0
	3	7	9	+ 2	28	38	+10	15	13	- 2	60	54	- 6	2	0	+ 2	8	0	- 8	1	2	+ 1	4	8	+ 4
	4	12	10	- 2	67	59	- 8	6	5	- 1	33	29	- 4	0	1	+ 1	0	6	+ 6	0	1	+ 1	0	6	+ 6
	5	16	17	+ 1	52	55	+ 3	12	13	+ 1	39	42	+ 3	3	1	- 2	10	3	- 7	1	0	- 1	3	0	- 3
	6	4	6	+ 2	20	24	+ 4	14	18	+ 4	70	72	+ 2	2	0	- 2	10	0	-10	0	1	+ 1	0	4	+ 4
	7	16	17	+ 1	76	89	+13	5	1	- 4	24	5	-19	0	0	0	0	0	0	0	1	+ 1	0	5	+ 5
	\bar{x}	11.4	12.4	+ 1.0	51.7	56.2	+4.6	9.9	9.0	- 0.9	42.8	37.1	+ 5.5	1.3	0.5	- 0.4	5.0	2.5	- 2.4	0.3	0.9	+ 0.6	1.0	3.8	- 2.8

numbers of W ranged from four to sixteen in C1, from six to twenty in E1. Compared with the results in E1 and C1, the numbers of W in E1 increased some more than C1. The above-mentioned relation showed a reverse tendency in E2 and C2, that is, there was clear-cut decrease of E2. But there was little difference between C1 and C2.⁽¹⁾

Usual Detail Responses (D): There was no statistically significant difference between E1 and C1, but D in E1 tended to increase and to yield D still more in E2. Accordingly, the difference between E2 and C2 became much larger than that between E1 and C1.

Such an increasing tendency as the difference between C1 and C2 could not be found in E1-E2 series.⁽¹⁾

Unusual Details (Dd) White Space Responses (S) and Unusual Details (Dd): No statistically significant difference in Dd could be observed between E1 and C1, but Dd in E1 had a little tendency to increase. On the other hand, Dd showed the reducing tendency in E2. The reducing tendency was observed in C1-C2 series, too.⁽¹⁾

White Space Responses (S): The numbers of S were scarce in both groups. S was shown only by 40 per cent of subjects in E1, 29 per cent of them in C1. Therefore, there were hardly found any difference between both groups with respect to the number of S. We presumed beforehand the increasing of $W-(\mp)$, and $Dd-(\mp)$, and moreover the decreasing of $D+(\pm)$ as the effects of sensory deprivation, but such tendencies were not ascertained.

3. Determinants.

Movement Responses (M,FM,m).

Human Movement Responses (M): In C1-C2 series, M and M per cent showed the direction of decrease, so we expected the extreme increase or decrease of M and M per cent in E1 but no difference was found between E1 and C1 and in E1-E2 series, too.⁽¹⁾

Animal Movement Responses (FM): While there was a statistically significant increase of C2 in C1-C2 series at 2.5 per cent level of confidence and FM per cent also indicated clearly a similar tendency, the inter-group's difference in FM and FM per cent was not found.

Form Responses (F): There was no difference found between E1 and C1, nor between E1 and E2. But a decreasing trend was found in C1-C2 series, and its difference was statistically significant.⁽¹⁾

Form Color (FC), Color Form (CF), and pure Color (C) Responses.

Form Color Responses (FC): The clearest trend in all determinants was that FC was high enough, higher for E1 than for C1, to produce a significant

Table 3. The Number and percentage of M and FM.

Group	S	M			M%			FM			FM%		
		1	2	Δ	1	2	Δ	1	2	Δ	1	2	Δ
Sensory Deprivation Group	S1	7	7	0	23	16	-7	3	3	0	10	7	-3
	S2	4			13			7			23		
	S3	3	1	-2	23	10	-13	1	1	0	8	10	+2
	S4	2	3	+1	10	14	+4	1	1	0	5	5	0
	S5	5	7	+2	13	26	+13	5	2	-3	13	7	-6
	S6	4	2	-2	6	4	-2	8	2	-6	12	4	-8
	S7	4	6	+2	15	18	+3	1	1	0	4	3	-1
	S8	2	1	-1	8	4	-4	2	6	+4	8	23	+15
	S9	3	1	-2	9	7	-2	5	0	-5	16	0	-16
	S10	4			10			0			0		
	\bar{x}	3.8	3.5	-0.2	13.0	12.2	-4.1	3.3	2.0	-1.4	9.6	7.3	-2.4
Control Group	1	2	1	-1	7	4	-3	3	9	+6	11	39	+24
	2	2	1	-1	12	6	-6	1	4	+3	5	19	+14
	3	3	2	-1	12	8	-4	2	3	+1	8	13	+5
	4	2	1	-1	11	6	-5	0	2	+2	0	12	+12
	5	8	10	+2	26	32	+6	2	1	-1	6	3	-3
	6	3	2	-1	15	8	-7	3	5	+2	15	20	+5
	7	8	8	0	38	42	+4	2	4	+2	10	21	+11
	\bar{x}	4.0	3.6	-0.4	17.2	15.1	-2.1	1.7	4.0	+2.1	7.8	18.1	+10.3

difference at 5 per cent level of confidence (by T test). Moreover, the numbers of FC E1 in reduced in E2. We could find a statistically significant difference between E1 and E2 at 5 per cent level of confidence (by T test). On the contrary, FC was high enough, higher for C2 than for C1, to yield significant difference at 2.5 per cent level of confidence (by T test). Thereupon, we examined the difference in CF and C between E1 and C1, in series of E1-E2, C1-C2, but they remained almost unaltered.⁽¹⁾

Other Determinants: None of inter-group's differences were significant about so-called texture or surface responses (Fc, cF) and acromatic color responses (FC', C'F). Other determinants were too scarce to be treated with as subjects to discuss.

As subjects were prescribed to keep as quiet in bed as possible for sensory deprivation situation, it may be said that all their motions were restrained relatively but control was not absolute. According to sensory-tonic field theory of Werner, H. et al., especially the results in the experiments of Meltzoff, J. Singer, J. L. and Korchin, S. J., Meltzoff, J. and Litwin, D.,⁽⁴⁾ it was mentioned that the restrain of motion would show the increase of M. Though we also

Table 4. The Number of Response classified into F, FC, CF, and C.

Group	S	F			FC			CF			C		
		1	2	△	1	2	△	1	2	△	1	2	△
Sensory Deprivation Group	S1	14	22	+ 8	5	3	- 2	0	1	+ 1	0	0	0
	S2	14			3			0			0		
	S3	4	4	0	1	2	+ 1	2	1	- 1	0	0	0
	S4	11	13	+ 2	2	1	- 1	0	0	0	0	0	0
	S5	12	13	+ 1	8	0	- 8	1	1	0	1	0	- 1
	S6	43	39	- 4	5	2	- 3	1	1	0	0	0	0
	S7	10	9	- 1	2	4	+ 2	3	4	+ 1	3	3	0
	S8	10	13	+ 3	6	4	- 2	2	1	- 1	0	0	0
	S9	14	10	- 4	5	1	- 4	0	1	+ 1	0	1	+10
	S10	29			2			0			0		
	\bar{x}	16.1	15.3	+ 0.7	3.9	2.1	- 1.0	0.9	1.2	+ 0.1	0.4	0.5	0
Control Group	1	14	2	-12	1	3	+ 2	1	1	0	2	0	- 2
	2	10	8	- 2	2	3	+ 1	1	1	0	0	0	0
	3	15	13	- 2	4	4	0	0	0	0	1	+ 1	
	4	15	10	- 5	1	2	+ 1	0	0	0	0	0	0
	5	18	15	- 3	2	4	+ 2	0	0	0	0	0	0
	6	9	10	+ 1	2	4	+ 2	0	0	0	0	0	0
	7	6	4	+ 2	1	2	+ 1	3	0	- 3	0	0	0
	\bar{x}	12.4	8.9	- 3.5	1.8	3.1	+ 1.3	0.7	0.3	- 0.4	0.3	0.1	- 0.1

expected such tendency, we could not find that tendency or any difference between sensory deprivation situation and control situation. On the contrary, there was found even the trend of decrease in the average number of M in

Table 5. The Number of FC, CF, FC' and C'F

	S	Fc			cF			FC'			C'F		
		1	2	△	1	2	△	1	2	△	1	2	△
Sensory Deprivation Group	S1	1	5	+4	1	1	+1	0	0	0	0	0	0
	S2	3			0			0			0		
	S3	0	1	+1	0	0	0	1	0	-1	0	0	0
	S4	2	2	0	1	0	-1	0	2	+2	0	0	0
	S5	7	4	-3	0	0	0	0	0	0	1	0	-1
	S6	4	7	+3	0	0	0	3	0	-3	0	0	0
	S7	2	3	+1	1	2	+1	1	1	0	0	0	0
	S8	2	1	-1	0	2	+2	4	0	-4	0	0	0
	S9	0	1	-1	0	0	+0	0	0	0	0	0	0
	S10	4			0			0			0		
	\bar{x}	2.5	3.0	+7.5	0.2	0.3	+0.3	0.9	0.3	-0.7	0.1	0	-0.1

E1 as compared with it in C1. In general our results, about M indicated the reducing tendency in the retest, but this was not the case with M of E2. Therefore, there may be the sinking of function to produce M responses.

The fact mentioned above may show that subjects adapted themselves naturally to the situation restraining their motions and they progressed the level of relaxation, therefore, they were in the decreasing state of psychological energy. On the other hand, however, there might be the possibility of replacing M with FM. In any case, the primitive motion-responses displayed an increasing tendency in E1 as compared with C1.

It is not clear whether the productivity of F in E1 was, from the beginning, just the same with the productivity of F in E2 or the latter was under the affection of E1. But there was a remarkable difference in contrast to the statistically significant reducing tendency in C1-C2 series at 2.5 per cent level of confidence (by T test).

The fact that the numbers of FC grew larger significantly in E1 did not mean the increasing tendency of well-constructed responses in quality. As subjects just after sensory deprivation condition tried to take as much advantage of clue as possible, the productivity in E1 grew higher than that in C1. But they failed to organize such clue and represented the reducing F+ per cent and might not be able to show the increases of the relative emotional responses aroused from the inner stimulus as CF,C. Moreover, the delay of T/RI in E1 may be interpreted as follows; it ascribed to lack of inner readiness to catch the outer stimulus on the part of subjects and to the delay of the cognitive process caused by it.

4. Contents.

Though there were not particular change about contents the appearing of

Table 6. The percentage of H and A.

	S	H%			A%		
		1	2	Δ	1	2	Δ
Sensory Deprivation Group	S1	35	35	0	32	40	+ 8
	S2	26			52		
	S3	23	10	-13	23	40	+17
	S4	20	14	- 6	40	41	+ 1
	S5	10	30	+20	58	56	- 2
	S6	12	7	- 5	42	39	- 3
	S7	33	27	- 6	19	27	+ 8
	S8	12	12	0	28	42	+12
	S9	13	13	0	31	33	+ 2
	S10	33			40		
\bar{x}	22	1.7	- 1.2	36	40	+ 6.0	

Table 7. The Number of Responses of each Subject in each category.

Group	S	H			Hd			A			Ad			At			Exp			Sex			Fire		
		1	2	Δ	1	2	Δ	1	2	Δ	1	2	Δ	1	2	Δ	1	2	Δ	1	2	Δ			
Sensory Deprivation Group	S1	2	3	+1	8	11	+3	6	9	+3	4	7	+3	2	1	-1	0	0	0	1	0	-1	0	0	0
	S2	5			3			14			2			0			0			0			0		
	S3	2	1	-1	0	0	0	2	3	+1	1	1	0	1	0	-1	0	0	0	0	0	0	0	0	0
	S4	2	1	-1	0	2	+2	5	5	0	2	4	+2	1	2	+1	0	0	0	0	0	0	0	0	0
	S4	1	4	+3	0	2	+2	16	8	-8	7	4	-3	5	0	-5	0	0	0	0	0	0	0	0	0
	S6	2	2	0	5	3	-2	23	23	0	6	3	-3	2	0	-2	1	1	0	0	0	0	1	0	-1
	S7	6	8	+2	2	1	-1	3	5	+2	1	4	+3	2	0	-2	0	0	0	2	1	-1	0	1	+1
	S8	2	1	-1	1	2	+1	5	2	-3	1	7	+6	2	1	-1	1	1	0	0	0	0	1	0	-1
	S9	3	2	-1	0	0	0	9	4	-5	1	1	0	3	1	-2	0	0	0	0	0	0	0	0	0
	S10	8			2			11			5			1			0			1			1		
	\bar{x}	3.3	2.8	+0.2	2.1	2.6	+6.2	14	7.3	-1.2	3.0	3.6	+1.0	1.9	0.5	-1.6	0.2	0.2	0	0.5	0.1	0.2	0.3	0.1	-0.1

At in E1 was clear whereas it showed a decreasing tendency in E2. At was represented by 9 subjects out of 10 of E1 and by 4 subjects out of 8 in E2.

With regard to H per cent, A per cent, the former showed the reducing tendency in E2 but the latter was higher in E2. We guessed that, under sensory deprivation, the contents of lower quality might increase, but such tendencies were not the case. Under such condition passive for stimulus, the increase of At might mean that subjects failed to introduce the outer objects as materials into image or still remained at the insufficient stage to put them into use, and they selected unconsciously their own bodies as the concrete objects to imagine.

5. The other Scores.

Experience balance also showed no particular tendency. Extravertive appearance in experience balance was found in 6 subjects out of 10, i.e., 60 per cent, in E1 and in E2 reduced its appearance to 4 subjects out of 8, i.e., 50 per cent.

Compared C1 with E1 with respect to $\Sigma c:FM+m$, in general, Σc gained a superiority over FM+m in E1, whereas in C1 FM+m dominant. But both Σc and FM+m of C1 were lower than those of E1. When we compared E2 with E1, we could observe a clear change of F+ per cent. In E2, form level (F+ per cent) was improved from the average score of 56 per cent to 72 per

Table 8. The Values of SumC, $\Sigma c:M$, and $\Sigma c:FM+m$.

Group	S	$\Sigma c : M$		$\Sigma c:FM+m$	
		1	2	1	2
Sensory Deprivation Group	S1	2.7 : 7.2	3.8 : 7.0	2.3 : 3.0	9.5 : 4.0
	S2	1.5 : 4.0		3.0 : 7.0	
	S3	3.5 : 3.0	2.0 : 1.0	2.0 : 1.0	1.0 : 1.0
	S4	1.2 : 2.0	0.8 : 3.0	4.5 : 2.0	5.5 : 1.5
	S5	5.2 : 5.0	1.5 : 7.0	8.5 : 6.0	5.5 : 2.5
	S6	4.7 : 4.0	2.0 : 2.0	4.0 : 8.0	7.5 : 3.5
	S7	10.0 : 4.0	10.7 : 6.0	5.0 : 4.0	7.0 : 1.0
	S8	5.0 : 2.5	3.5 : 1.0	2.0 : 3.5	1.5 : 6.5
	S9	3.0 : 3.0	1.5 : 1.0	5.5 : 6.0	1.0 : 0
	S10	12.5 : 4.0		4.5 : 0	
Control Group	1	5.0 : 2.0	4.0 : 1.0	2.5 : 4.5	2.5 : 11.5
	2	2.0 : 2.0	1.0 : 1.0	1.5 : 1.0	3.5 : 4.0
	3	2.0 : 3.0	6.7 : 2.0	1.0 : 2.0	2.0 : 3.0
	4	0.5 : 2.0	1.1 : 1.0	0 : 0.5	1.5 : 2.5
	5	1.0 : 8.0	2.7 : 10.0	1.5 : 2.0	0.5 : 1.0
	6	1.0 : 3.0	2.5 : 2.0	3.0 : 3.0	7.5 : 6.0
	7	4.2 : 8.0	1.0 : 8.0	1.0 : 2.5	2.5 : 4.0

cent. 7 subjects out of 8 in E2 became higher in F+ per cent than in E 1. On the other hand, the average score of F+ per cent reduced from 86 per cent to 71 per cent in C1-C2 series.⁽²⁾

Table 9. The value of F+%, $\frac{\text{VIII}+\text{IX}+\text{X}}{\text{R}} \times 100$, and FC-(CF+C).

Group	S	F+%			$\frac{\text{VIII}+\text{IX}+\text{X}}{\text{R}} \times 100$			FC-(CF+C)		
		1	2	△	1	2	△	1	2	△
Sensory Deprivation Group	S1	63	82	+19	26	42	+16	+5.0	+2.0	-3.0
	S2	64			29			+3.0		
	S3	25	75	+50	38	60	+22	+3.0	0	-3.0
	S4	55	85	+30	14	23	+9	+2.0	+1.0	-1.0
	S5	33	92	+59	38	41	+3	+6.0	-2.0	-8.0
	S6	67	92	+25	36	22	-14	+4.0	+1.0	-3.0
	S7	70	33	-37	37	39	+2	-4.0	-2.0	+2.0
	S8	90	85	-5	32	27	-5	+4.0	+2.0	-2.0
	S9	36	40	+4	38	20	-18	+5.0	+1.0	-4.0
	S10	59			33			+2.0		
	$\bar{\times}$	56.0	71.7	18.1	31.8	34.8	+1.3	+3.0	+0.7	-2.8
Control Group	1	57	0	-57	26	30	+4	-8.0	-2.0	+6.0
	2	80	63	-17	41	33	-8	0	+1.0	+1.0
	3	100	92	-8	32	33	+1	+4.0	0	-4.0
	4	93	100	+7	34	35	+1	+1.0	+2.5	+1.5
	5	89	80	-9	32	35	+3	+2.0	+5.5	+3.5
	6	100	90	-10	45	44	-1	+2.0	+5.0	+3.0
	7	83	75	-8	29	33	+4	-5.5	+2.0	+7.5
		$\bar{\times}$	86.0	71.4	-14.3	34.1	34.7	+0.6	-0.6	+2.0

Discussion

There remained a basic question difficult to solve as to whether sensory deprivation had been influencing the subjects by the time Rorschach performance was done. However, we examined our data and then concluded that in Rorschach test each subject recovered from the direct influences of sensory deprivation adaptation, and was in the state of being ready to readjust himself to the real situation because the deviations of aspects of control system were found. We also could not solve the difficulties in the sure procedure of knowing the affects of sensory deprivation. It was very dangerous to compare simply the sensory deprivation group with the control group as the standard group because it may be that there existed basic differences of both groups from the first. In order to avoid the danger more or less, subjects were retested after about two months and we examined the changes in the series of experimental group and compare them with those in C2.

Something remained to be studied to judge more clearly the results gained from our experiment because Rorschach test was available only once. Consequently, we tried to get clearer results from the relations between the behavioral aspect of each subject in sensory deprivation and the Rorschach protocols.

Summary

The present study aimed at studying the change of Rorschach performance in sensory deprivation. Subjects of experimental group were 10 male students. They were administered Rorschach test just after sensory deprivation, and 8 subjects out of them were tested again after two months. Their data were compared with those of control group. The major conclusions of the present study may be illustrated as follow :

1. R, T/R, and T/RI

R	T/R	T/RI
E1 > F2	E1 < E2	E1 > E2
E1 > C1	E1 ≐ C1	E1 > C1
C1 ≐ C2	C1 > C2	C1 > C2

2. Location

W	D	Dd
E1 > E2	E1 < E2	E1 > E2
E1 > C1	E1 > C1	E1 > C1
C1 ≐ C2	C1 ≐ C2	C1 > C2

3. Determinants

M&M%	FM	FM%
E1 ≐ E2	E1 ≐ E2	E1 ≐ E2
E1 ≐ C1	E1 > C1	E1 ≐ C1
C1 > C2	C1 < C2**	C1 < C2
F	FC	CF & C
E1 ≐ E2	E1 > E2*	E1 ≐ E2
E1 > C1	E1 > C1*	E1 ≐ C1
C1 > C2**	C1 < C2**	C1 ≐ C2

4. Contents

At
E1 > E2
E1 > C1
C1 ≐ C2

* at the 5% level (T test)

** at the 10% level (T test)

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Zusammenfassung

Dieser Versuch wurde angestellt, um die Veränderung der Rorschachsausführung unter der Bedingung von "sensory deprivation" zu untersuchen. Die Versuchspersonen waren 10 Studenten. Der zweite Versuch an ihnen wurde in der gewöhnlichen Bedingung nach zwei Monaten angesetzt. Die Daten der experimentelle Gruppe wurden mit denjenigen der Kontroll-Gruppen verglichen. Wir kamen zu folgenden Hauptresultaten:

1. R, T/R, und T/RI

R	T/R	T/RI
E1 > E2	E1 < E2	E1 > E2
E1 > C1	E1 ≐ C1	E1 > C1
C1 ≐ C2	C1 > C2	C1 > C2

2. Erfassungsmodus

W	D	Dd
E1 > E2	E1 < E2	E1 > E2
E1 > C1	E1 > C1	E1 > C1
C1 ≐ C2	C1 ≐ C2	C1 > C2

3. Erlebnismodus

M & M%	FM	FM%
E1 ≐ E2	E1 ≐ E2	E1 ≐ E2
E1 ≐ C1	E1 > C1	E1 ≐ C1
C1 > C2	C1 < C2**	C1 < C2
F	FC	FC & C
E1 ≐ E2	E1 > E2	E1 ≐ E2
E1 > C1	E1 > C1*	E1 ≐ C1
C1 > C2**	C1 < C2**	C1 ≐ C2

4. Inhalt

At
E1 > E2
E1 > C1
C1 ≐ C2

* Unterschiede im 5% igen Wahrscheinlichkeitsgrad (T test).

** Unterschiede im 10% igen Wahrscheinlichkeitsgrad (T test)

B. Specific Effect of Sensory Deprivation on Individual Subjects*

In the preceding paper written by Ôyama, M. the general effect of sensory deprivation on the Rorschach performance was examined. Now, in order to study the specific effect of sensory deprivation, this paper is concerned with the singularity of Rorschach responses of individual subjects. Many authors have indicated the important role of individual differences or personality configuration in determining isolation behavior: for example, J.H. Mendelson, Ph. E. Kubzansky, P.H. Leiderman, D. Wexler & p. Solomon (4), S.I. Cohen, A.J. Silverman, B. Bressler & B. Shmavonian (1), L. Goldberger & R.R. Holt (3), and L. Goldberger (2). They noticed the relationship between the sensory deprivation effects and each subject's personality structure. They considered isolation situation to be an unstructured and more or less stressful one, in which normal reality contact suffered significant interference, the subjects were deprived of the environmental stimuli and the task defined clearly, and the normal activity (particularly, the motion activity) was relatively restricted. They suggested, however, the general effect of such situation was not the same for each subject, and was a specific one, according to each subject's personality structure or the strength of ego control. This implication is considered to be important.

In our study, several indexes were chosen from Rorschach test scores after the S.D. as the measure of strength of ego control, and by these indexes the individual differences were classified. Thus on this basis, the relationship between the individual differences or personality configurations and the specific effects was examined. These indexes were practically $F + \%$, $FC - (CF + C)$, and M , and S_s who showed constantly high values of these measures were evaluated as well-integrated persons, while S_s of low values were evaluated as poor-controlled persons. Table 1 shows typical cases for each group.

Our hypothesis that the subject's behavioral patterns during S.D. varied with the strength of ego control, were examined by comparison between the scores of Rorschach test after S.D. and the records of behavioral observations or the interview records for each typical case. These ratings of total activity of S_s were made on a scale ranging from A (minimal) to C (marked) at an hour experimental interval, and these results were shown in Fig. 1. These ratings were based upon the description of records of the observer's direct visual observation of the subject's body movement through the half-mirror window of the S.D. room and of the S 's sound materials collected by the microphone.

* This part was prepared by Sato, I.

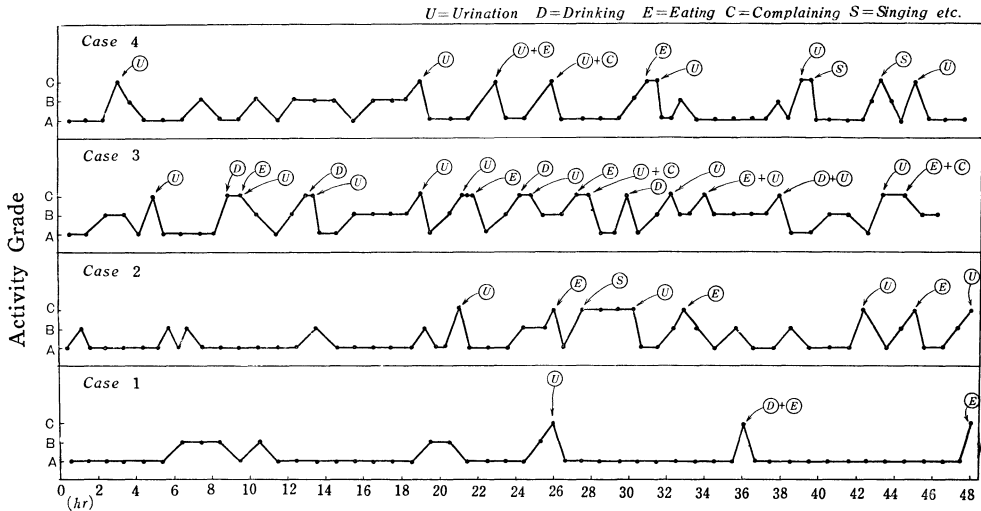


Fig. 1. Activity grade of each subject during sensory deprivation.

Table 1. Typical cases classified by ego control indexes.

	Case No.	ego control indexes		
		F + %	FC - (CF + C)	M
Well-integrated	1	63	5.0	7
	2	67	4.0	4
Poor-controlled	3	25	3.0	3
	4	25	2.0	2

In Fig. 1, the activity grade A indicates the state of immobile posture, grade B the state of rest with a slight motion of limbs, yawning, and sighing, and grade C the active behavioral patterns as follows: eating, drinking water, urination, singing songs, giving a whistle, complaining.....

(a) Well-integrated group

(i) Case No.1. S₁ (aged 28, male graduate student)

(1) Results of behavioral observation and interview records

As shown in Fig. 1, this subject kept for a fairly long time in the state of immobile posture (rest with relaxation) (activity grade A), or otherwise at times showed a slight motion of limbs or the rolling over on his side (activity grade B). The demands of eating were made twice: 36 hours and a half and 47 hours after the beginning of S. D. He had only one call for urination: 26 hours after the beginning of S. D. Thus frequency of both eating and urination was extremely small. This subject spent the experimental period in calm and constant state.

In the interview immediately after S.D., he stated as follows: "I refrained from eating, because of distortion of the time orientation during the S.D., I could sleep for a long time but with no dream. When I was a waking I thought of such an uncertain matter as happy events of the past and a journey. Now, I am surprised that the time was elapsed too shorter."

(2) Results of Rorschach test after S.D.

As shown in Table 2 this subject was a highly intelligent man, full of objectivity, well-adaptive to real situation, and careful. In addition, he seems to be fruitful in inner creativity, maintains well-control to internal-external emotionality, and no specific response was found to be noted, but his verbalization was naive and smooth. His experience balance was extremely introversive.

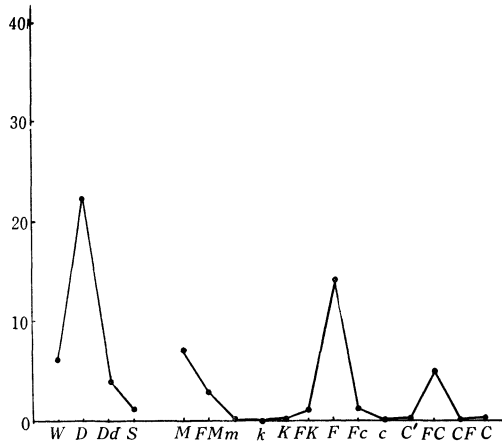


Fig. 2. Psychogram of case No. 1.

Table 2. Summary scoring table of case No. 1.

Total R	31	F + %	62.8	$\Sigma c:Fm+m$	2:3
T/R ₁ A. V. all cards	18.3''	W:M	6:7	$\frac{VIII+XI+X}{R}\%$	25.8
T/R ₁ A. V. achr.	21.8''	FM:M	3:7	CR	10
T/R ₁ A. V. chr.	14.8''	FC:CF+C	5.5:0	H+A:Hd+Ad	8:12
W-D-Dd-Dm	D	$\frac{FC+CF+C}{Fc+c+C'}$	$\frac{5.5}{2}$	H%	35.3
W:D	6:22	F:FK+Fc	14:1.5	A%	32.1
F%	45.1	$\Sigma C:M$	2.75:7	P%	8.6

(ii) Case No.2. S₆ (aged 20, a male undergraduate student)

(1) Results of behavioral observation and interview records

As shown Fig.1, this subject maintained for a long time a state of rest in relaxation in the same way as case No.1. (activity grade A), (the most part of it was presumed to be sleeping from results of EEG), if not so, he kept almost quiet, but showed more actively his bodily motion than case No.1. (activity grade B). He had demands of eating three times: 26 hours, 33 hours, and 45 hours after the beginning of S.D. and of urination four times: 21 hours, 30 hours, a half and 42 hours, and a half and 47 hours after the beginning of S.D., and then the frequency of both the demands was normal.

It was extremely characteristic that at the middle period (ranging from 27 hours to 30 hours after the beginning) this subject was relatively for a long time singing songs, giving a whistle, and humming (activity grade C). At the interview, he reported as follows: "I didn't feel so painful as I had expected. Even at the end, I thought that this experiment would last much longer and I would be able to suffer this situation for two days more. Of course, I felt a little pain, in the beginning, but gradually found myself in the rest state from the middle period. Maybe I was asleep for half the time in S.D., I guess I had a dream, but now can't remember it. When I was awake, I thought of my home, what I had to think about in order to contribute this experiment, and how other person spent this experimental period in this room. And as my diversion, I was counting the numbers and singing songs."

(2) Results of Rorschach test after S. D.

Table 3 shows the subject's high intelligence level, marked productivity of responses, his belonging to the type of reality-adaptor, who was very vigilant. In regard with the emotionality, this subject showed an intense impulse, high sensibility to external stimuli, and well-controlled to them, and extratensive in experience balance.

In respect of the content of his responses, it was found to be a relatively low value of H%, the increased value of CR.

The case studies on two subjects were evaluated a well-integrated type from the ego control index, were described. The total scores of Rorschach test showed that they were well-integrated reality-adaptors, as simultaneously the records of behavioral observations and interview records did. Both subjects showed deep sleeping, in a comfortable state in the experimental situation.

It is interesting that subject who was estimated as introversive refrained from eating and adapted himself to the experimental situation even without bodily movement, and for subject who was diagnosed as extratensive had a normal frequency of eating and urination, and seemed to adapt himself to the situation, in making the several active behavioral patterns as singing songs and counting the numbers for diversion.

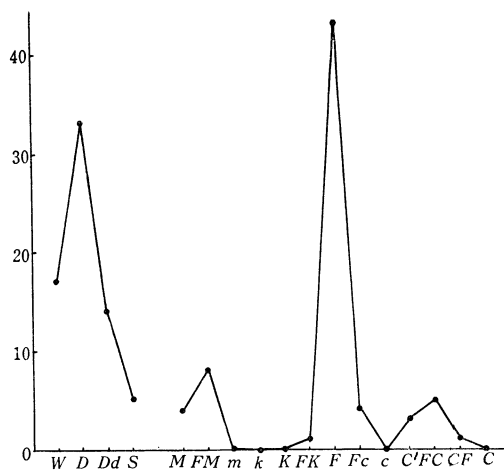


Fig. 3. Psychogram of case No. 2.

Table 3. Summary scoring table of case No. 2.

Total R	69	F + %	67.4	$\Sigma c:Fm+m$	8 : 8
T/R ₁ A. V. all cards	17.4''	W : M	17:4	$\frac{VIII+XI+X}{R}\%$	36.2
T/R ₁ A. V. achr.	14.2''	FM : M	8 : 4	CR	19
T/R ₁ A. V. chr.	20.6''	FC : CF+C	5 : 1	H+A:Hd+Ad	25 : 11
W-D-Dd-Dm	D	$\frac{FC+CF+C}{Fc+c+C'}$	$\frac{6}{7}$	H%	11.6
W:D	17:33	F : FK+Fc	43:5	A%	42.0
F%	62.7	$\Sigma C : M$	4.7:4	P%	15.9

(b) Poor-control group

(i) Case No.3. S₃ (aged 34, a male graduate student)

(1) Results of behavioral observation and interview records

Fig. 1. indicates that this subject showed the state of tension relatively for a long time, especially moving his limbs or rolling over his side, yawning a sigh, and moaning (activity grade B). He had demands of eating five times: 10 hours, 22 hours, 28 hours, 34 hours, and 44 hours, after the beginning of S. D. and demands of drinking water also five times: 9 hours, 13 hours, 24 hours, 30 hours and 38 hours: Frequency of urination was eleven: 5 hours, 10 hours, 13 hours, 19 hours, 21 hours, 25 hours, 28 hours, 32 hours, 34 hours, 38 hours and

43 hours. Especially, from the post-period of S.D., he sometimes began to complain (activity grade C). As a whole the state of his irritation was observed. At the interview, he said: "My estimation of time was wholly disturbed. At the beginning of S.D., I lay asleep for a short time, but did not think I had dreamed. When I was awake, I attempted to think about a particular matter, but in fact I couldn't. I felt fatigued and a stitch in my side, so it was painful for me to spend the period of this experiment."

(2) Results of Rorschach test after S.D.

For this subject, his total responses were very scarce and T/R_1 was rela-

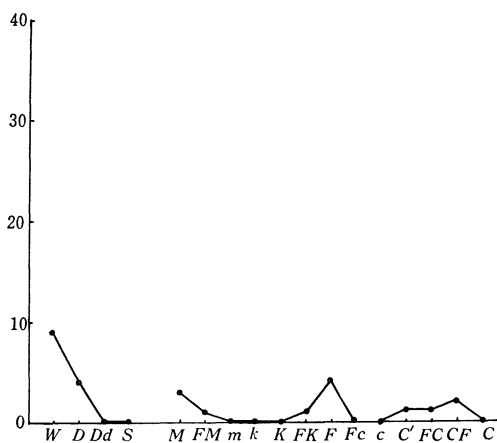


Fig. 4. Psychogram of case No. 3.

Table 4. Summary scoring table of case No. 3.

Total R	13	F+%	25.0	$\Sigma c:Fm+m$	2:1
T/R_1 A. V. all cards	28.4''	W:M	9:3	$\frac{VIII+IX+X}{R}\%$	38.4
T/R_1 A. V. achr.	33.2''	FM:M	1:3	CR	8
T/R_1 A. V. chr.	23.6''	FC:CF+C	2:2.5	H+A:Hd+Ad	4:1
W-D-Dd-Dm	W	$\frac{FC+CF+C}{Fc+c+C'}$	$\frac{4.5}{0}$	H%	22.9
W:D	9:4	F:FK+Fc	4:2	A%	22.9
F%	30.7	$\Sigma C:M$	3.5:3	P%	38.4

also tended to promote the expression of his emotionality. His experience balance was ambiequal (Table 4).

tively long. Therefore, these results indicated a marked reduction of his productivity and the decline of his intelligence level. He seemed to be of the type of unrealistic, abstract thinking and lack of adaptability to the real situation. In emotionality, he was relatively sensitive to external stimuli and its control was considerably poor. therefore, his mental state was extremely unstable and he

(ii) Case No.4. S₄ (aged 20, a male undergraduate student)

(1) Results of behavioral observation and interview records

As case No. 3, this subject showed an unstable state with the motion of limbs, with sighs and yawnings (activity grade B). He had demands of eatings and dinking water three times: 23 hours, 31 hours, and 45 hours, after the beginning of S.D. and of urination seven times: 3 hours 19 hours, 23 hours,

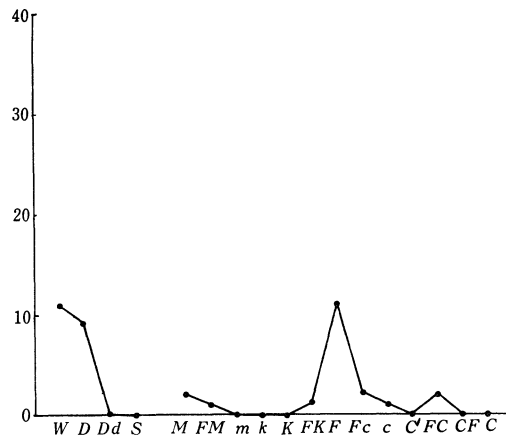


Fig. 5. Psychogram of case No.4.

Table 5. Summary scoring table of case No.4.

Total R	20	F+%	54.5	$\Sigma c:Fm+m$	4.5 : 2
T/R ₁ A. V. all cards	16.8''	W:M	11:2	$\frac{VIII+IX+X}{R}\%$	14
T/R ₁ A. V. achr.	6.8''	FM:M	2 : 2	CR	9
T/R ₁ A. V. chr.	26.8''	FC:CF+C	2.5 : 0	H+A:Hd+Ad	7 : 2
W-D-Dd-Dm	W	$\frac{FC+CF+C}{Fc+c+C'}$	$\frac{2}{3.5}$	H%	20
W:D	11:9	F:FK+Fc	11:3.5	A%	40
F%	55	$\Sigma C:M$	1.25:2	P%	30

26 hours, 31 hours, 39 hours, and 45 hours. After the middle period of S.D., he began to complain and then changed to humming at the post-period (activity grade C). From the interview records it was found that he was very tired.

(2) Results of Rorschach test after S.D.

Although his intelligence level seemed to be normal, his productivity of responses was lower. This subject showed the pattern of unrealistic, abstractive thinking, a lack of inner creativity, a persistent tendency to repress and the poor ego control level as case No.3. Especially, in emotionality, he showed a poor sensibility to external stimuli but a lowered level of ego control and thus he was, as a whole, of the type of being susceptible to influences from external stimuli. His experience balance was coartated (Table 5).

In summarizing it was found that from the Rorschach score both the subjects who were evaluated as poor-controlled personality were presumed as of unstable type of relatively lacking adaptibility to the reality and ego control, and susceptible to influence from the outside, and according to the records of behavioral observation and interview they spent the experimental period with tension and active bodily motion. And the data about complaining and a high frequency of urination indicated their uncomfortable state in which they were always irritated, bored and felt a repugnance to the experimental situation.

(c) Discussion

From Rorschach scores administered immediately after the experiment, the subjects were classified typically into the well-integrated personality and the poor-controlled personality. The relationship was examined between their characteristics reflected on Rorschach scores and the specific effects of sensory deprivation on each subject's behavioral patterns. The subjects who spent the period of experiment comfortably, quietly, and would sleep well for a long time showed the well-integrated type with their objective, abundant, and productive thinking in the Rorschach protocols. They controlled well their emotionality to outer stimuli, and they maintained a stable state. On the other hand the Rorschach scores of the subjects who spent the experimental period nervously and unpleasantly, represented a remarkably predominant tendency of abstract thinking, and also a lowering tendency of their ego control level for outer stimuli.

Moreover, a list of subjects was made by the previously mentioned indexes and the relationship between the result and the specific behavioral pattern of subjects in sensory deprivation were examined.

In the first place, Table 6 shows the values of each index in 10 subjects. If one examines a general tendency of behavioral patterns that subjects of each type showed, one finds 2 subjects out of 3 in poor-controlled group passed uncomfortably the experimental period as mentioned above, and the other one showed a behavioral pattern which was relatively stable. Three subjects, including two subjects mentioned above, out of 4 in well-integrated group maintained relatively a stable state but the other one a fairly unstable state. Three subjects in the middle

group were sometimes singing songs or showed a fairly active behavioral pattern, having relatively many times calls for urination and defecation.

The differences of behavioral patterns among the groups was not significant, but one observed some tendencies to indicate the specific effect of the experimental situation as the following authors.

Goldberger reported: "In brief, they (the adaptive reactors) showed all the ingredients that we generally associated with the concept of ego strength The second type of subjects—the maladaptor— was associated with a more heterogeneous assortment of personological correlates. The common denominator of them, however, appeared to be some form of general personality maladjustment" (3).

Mendelson et al. described: ". . . . from the psychiatric interview and psychological test, subject 1 (who could relatively for a long time endure the experimental situation) is inferred as self-conscious, introspective, and involved in chronic self-searching. Subject 2 (who became anxious and required the stop of experiment) is guarded, defensive and relatively unable to look into himself without considerable fear and anxiety." (4)

Table 6. Values of ego control indexes for each subject.

	Ss No.	F+%	FC-(CF+C)	M
Well-integrated	1	63	+5.0	7
	6	67	+4.0	4
	8	90	+4.0	2
	2	64	+3.0	4
Medium	5	33	+6.0	5
	7	70	-4.0	4
	10	59	+2.0	4
Poor-Controlled	3	25	+3.0	3
	4	55	+2.0	2
	9	36	+5.0	3

In the next place, there were other problems of examining Rorschach scores in regard to these three groups. Table 7 shows the numbers of responses in subjects of each group on the basis of standards about main categories. As shown in the Table 7, no significant differences in T/R₁ could be observed among three groups, but, R in the well-controlled group and the medium group was more than R in the poor-controlled group. The poor-controlled group showed dominant W % while the well-integrated group dominant D % cent. Concerning determinants it was found that F%, the numbers of M, Fm, FC, Fc, and A% in the

well-integrated group had a tendency of becoming higher than poor-controlled group. Because of scarce data, however, it was insufficient to show clear differences.

Table 7. Presence of a determinate quantity of responses in each main category.

	Ss No.	$R \geq 25$	$\frac{T/R}{\leq 25}$	$D > W$	$W > D$	$F+ \% \geq 60$	$M \geq 4$	$FM \geq 3$	$FC \geq 5$	$CF \geq 2$	$Fc \geq 2$	$H \% \geq 25$	$A \% \geq 40$
Well-integrated	1	+	+	+	-	+	+	+	+	-	-	+	-
	6	+	+	+	-	+	+	+	+	-	+	-	+
	8	+	-	-	+	+	-	-	+	+	+	-	+
	2	+	+	+	-	+	+	+	-	-	+	+	+
Medium	5	+	+	+	-	-	+	+	+	-	+	-	+
	7	+	+	-	+	+	+	-	-	+	+	+	-
	10	+	-	-	+	-	+	-	-	-	+	+	+
Poor-Controlled	3	-	-	-	+	-	-	-	-	+	-	-	-
	4	-	+	-	+	-	-	-	-	-	+	-	+
	9	+	+	-	+	-	-	+	+	-	-	-	-

It seems to remain a question as to whether these differences in Rorschach score were responsible for the individual differences themselves of subjects or for the specific effect of S.D. on each subjects. In this respect a further examination may be required in future.

Summary

From this case study, the relationship between the characteristics reflected on Rorschach scores and the specific effects of sensory deprivation on each subject's behavioral pattern was examined. The main results were as follows: the subjects who spent the experimental period comfortably, quietly, and seemed to sleep well for a long time showed the well-integrated type with their objective, abundant and productive thinking in the Rorschach protocols. They controlled well their emotionality to outer stimuli, and they maintained a stable state. On the other hand, the Rorschach scores of the subjects who spent the experimental period nervously and unpleasantly, represented a markedly predominant tendency of abstract thinking and also a lowering tendency of ego control level for outer stimuli.

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Zusammenfassung

Die spezifische Wirkung von der sinnlichen Entziehung (sensory deprivation) auf die Merkmale in der Rorschach-Ausführung wurde untersucht, und aus den Ergebnissen folgt: Die Versuchspersonen, welche gütig(gemächlich)die experimentelle Periode verbrachten und lange genug schliefen, zeigten ganz integrierte Reaktionsformen mit dem objektiven produktiven Denken in Rorschach-Protokollen. Dennoch zeigte sich, in Rorschach Protokollen der Versuchspersonen, welche unbehaglich und gereizt die Zeit verbrachten, die Tendenz zur beträchtlichen Aufsteigerung ihres abstrakten Denkens und zur Herabsetzung ihres Regulations-Niveaus von dem Ich zu äusserlichen Reizen.