

Some Considerations on the Productive Conditions of Hallucinations by Suggestion.

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SOME CONSIDERATIONS ON THE PRODUCTIVE CONDITIONS OF HALLUCINATIONS BY SUGGESTION

By

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In the first study, suggestively produced hallucinations were investigated in various sensory modalities. Any remarkable tendencies which correspond to various sensory modalities were not found in the quantitative aspects of hallucinative experiences. But characteristic tendencies were found in the temporal patterns of hallucinating. In the second study, the hallucinating tendency of the blind in each sensory modality was investigated. The production of hallucinations by suggestion in the blind was generally difficult as compared with the seeing. In the third study, the contents of suggestion were varied in the degree of differentiation. By the suggestion of undifferentiated or vague content, the hallucinations were frequently obtained.

The results were interpreted to confirm the following supposition: The production of hallucination by suggestion depends on the degree of differentiation or structuralization of sensory function on the side of subject and of suggestion on the side of stimulus material.

INTRODUCTION

It has been widely known that various interesting perceptual changes, illusions and hallucinations can be produced by suggestive procedure. Heat illusion (Scripture, 1893), visual, auditory, tactile, olfactory and electric illusions (Seashore, 1895), illusions of progressive weights and progressive lines (Binet, 1900), and many illusions of similar types were formerly reported. Since then many kinds of perceptual changes by suggestion have been reported (reviewed by Hariu, 1970). Today all scales for measuring the susceptibility to hypnosis also adopt as a necessary item an ability to experience suggestively produced hallucinations.

Age, sex, intelligence, personality traits, hypnotic induction, motivation, experimenter's factors (prestige, attitude or tone of voice), group pressure, etc. have been proposed as factors related to such production of perceptual changes or hallucinations. But if the suggestively produced hallucination can be regarded as a kind of perceptual organization, the productive conditions of it can be adequately discussed in the theoretical frames of perceptual organization in general. Sherif (1935), Ash et al. (1938), Coffin (1941) and Sherif & Cantril (1947) have already pointed out the effect of suggestion on perceptual organization.

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They also proposed that the more undifferentiated or unstructured (vague, indefinite, ambiguous or unstable) the objective frames of reference are, the more easily irrelevant frames such as suggestion intervene.

In this paper the productive conditions of hallucinations by suggestion were investigated mainly in relation to differentiation and structuralization of stimulus situation.

(I) SUGGESTIVELY PRODUCED HALLUCINATIONS AND SENSORY MODALITIES

PROBLEM

The degrees of differentiation and structuralization of each visual, auditory, olfactory and tactile sense are not the same. Olfactory or tactile sense are assumed to be, compared with visual or auditory sense, much more vague or less differentiated (reviewed by Maruyama, 1969). Therefore, characteristic differences in hallucinations are supposed to exist among these sensory modalities; olfactory or tactual hallucinations will be obtained more easily than visual or auditory hallucinations.

The purpose of this study is to investigate the following problems: 1) Are there any differences in the suggestively produced hallucinations among various sensory modalities? 2) If any differences are found, what kinds of differences are they?

METHOD

Subjects: Ten male subjects and ten female subjects aged from fourteen to fifteen years. These subjects were selected randomly from among one hundred and fifty junior high school students.

Procedure:

a) Suggestion of visual hallucination.

Ss were instructed to observe a 25×25 cm square screen located at the distance of 50 cm from subject's eyes and illuminated homogeneously from the light source placed behind the screen. The brightness of the screen was 210 cd/cm² and was kept constant by a voltage regulator. The screen was observed binocularly. Without the screen, nothing was visible from the subject's eyes in the observing box. The apparatus is shown in Figure 1.

Suggestions of visual hallucination were given by tape recorder as follows:

"Now your ability to discriminate things are going to be tested. . . . The first test is a test of your visual sensitivity. . . . It is tested how sensitively your eyes can discern things. . . . Please fix your eyes on the screen, . . . Now, at the center area of the screen a light disc of about five centimeters in diameter is presented. . . . The light disc is presented very, very faintly. So, if you do not watch carefully, you won't be able to see the disc. . . . Please look carefully at the screen. . . . If you see a light disc indistinctly, report to me at once by saying 'indistinctly!', . . . And if you see a light disc clearly, report it by saying 'clearly!' . . . Are you ready? . . . Now, please watch carefully on the screen!"

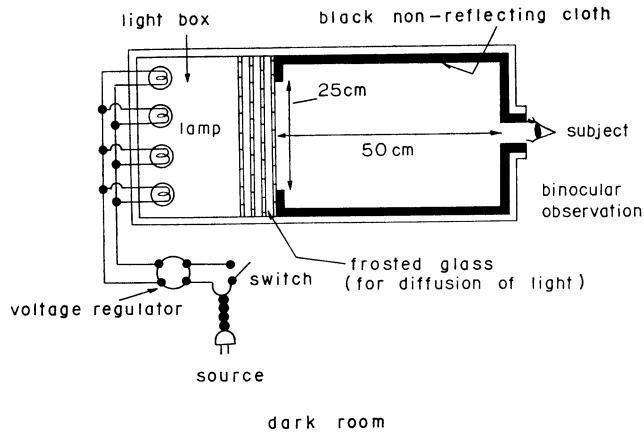


Fig. 1. Apparatus.

b) Suggestion of auditory hallucination.

The subject was seated quietly on a chair blindfolded. The noise level in the room was below 25 phon. In the experiment any actual sound of stopwatch was not given to the subject. The responses of the subject were recorded by an assistant who was sitting during the experiment at the distance of 5 meters from the subject. In this distance the subject was unable to hear any sound of the assistant's stopwatch.

Suggestions were given by tape recorder as follows:

"Now your auditory sensitivity is tested.... It is tested how sensitively your ears can discriminate auditory stimuli.... Now you will hear the sound of a stopwatch... The sound is very faint.... So, you have to listen very, very carefully.... If you hear the sound of the stopwatch indistinctly, raise one of your hands at once! If you hear the sound clearly raise both of your hands.... Now listen to the sound carefully!...."

c) Suggestion of olfactory hallucination.

The subject was seated on a chair blindfolded. The suggestion of positive smell hallucination of banana was given by tape recorder in the same way as in the suggestions of visual or auditory hallucination. In the experiment any actual odor of banana was not presented to the subject. He was instructed to respond by raising one hand if he smelled the banana indistinctly, and by both hands if clearly.

d) Suggestion of tactile hallucination.

The subject was seated blindfolded with his right forearm lying on the desk. Then the suggestion of faint touch on the arm by a feather was given. During the experiment any actual tactual stimuli were not given to the subject. He was instructed to report verbally the hallucinative experience by saying 'indistinctly!' or 'clearly!'.

Responses of each subject to the suggestions during three minutes were recorded.

RESULTS

1. Percentages of the subjects who had hallucinative experiences.

The percentages of subjects who experienced the suggestively produced hallucination are shown in Table 1 and Figure 2.

Table 1. Percentages of the subjects who had hallucinative experiences.

	Male n=10		Female n=10		Total n=20	
	n	%	n	%	n	%
Visual	7 (1)	70 (10)	7 (2)	70 (20)	14 (3)	70 (15)
Auditory	5 (0)	50 (0)	9 (3)	90 (30)	14 (3)	70 (15)
Olfactory	5 (1)	50 (10)	8 (2)	80 (20)	13 (3)	65 (15)
Tactual	8 (0)	80 (0)	9 (6)	90 (60)	17 (6)	85 (30)

() clearly hallucinated

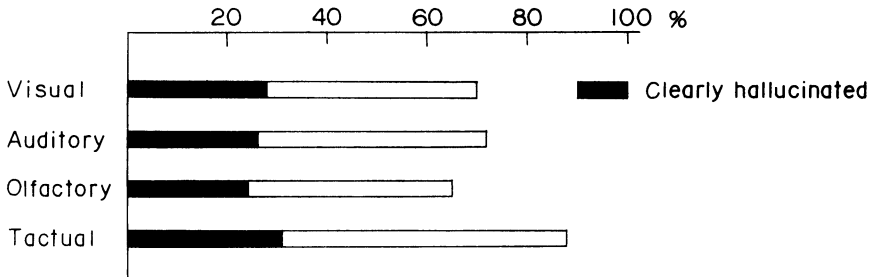


Fig. 2. Percentage of the subjects who had hallucinative experiences.

It was found that 65% (in the case of olfactory hallucination) and 85% (in the case of tactual hallucination) of the subjects more or less experienced hallucinations and 15% and 30% out of them had clear hallucinations. Differences in percentages among each sensory modality were found only in the case of female subjects. Percentage of female subjects who had clear hallucinations of touch is a little higher than that of the subjects who experienced olfactory and visual hallucinations ($CR=1.83$ $p<0.05$). But in the total (male and female) any significant differences in percentages were not found among the sensory modalities studied.

Table 2. Average frequencies of hallucinative experiences which was produced in each subject during three minutes. n=20

	Indistinctly		Clearly	
	Mean	SD	Mean	SD
Visual	1.7	1.49	0.3	0.63
Auditory	2.6	2.11	0.3	0.78
Olfactory	2.0	2.53	0.3	0.71
Tactual	2.3	1.87	0.8	1.66

2. Frequencies of hallucinative experiences.

Average frequencies of hallucinations which were produced in each subject during three minutes are shown in Table 2. The auditory hallucinations were most frequently produced and next was tactual. The third was olfactory. The frequency of the visual hallucinations was the least. Auditory hallucinations were

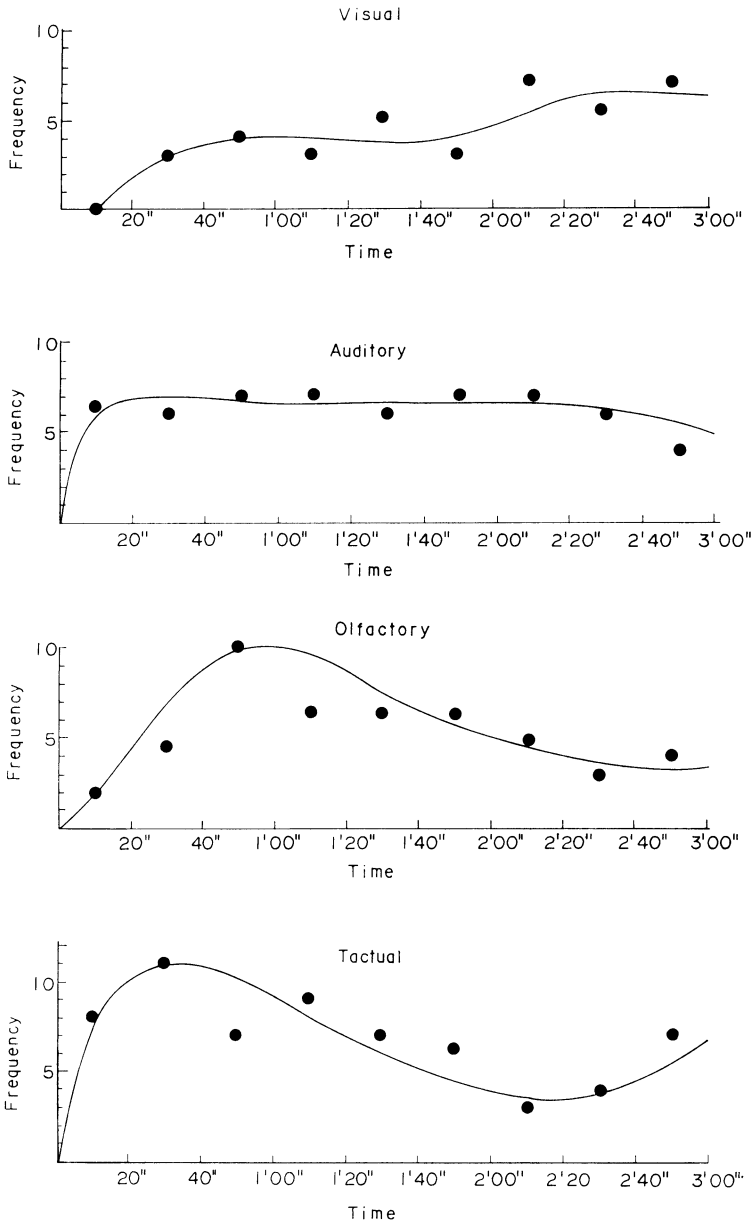


Fig. 3. Temporal patterns of hallucinating.

obtained significantly more frequently than visual and olfactory hallucinations (between auditory and visual $t=4.04$ $df=76$ $p<0.001$, between auditory and olfactory $t=2.69$ $df=76$ $p<0.01$). Also the frequency of tactual hallucinations was significantly higher than that of visual hallucinations ($t=2.69$ $df=76$ $p<0.01$). In the case of clear hallucinations only the tactual hallucinations were more frequently produced than others ($t=3.23$ $df=76$ $p<0.01$).

3. Temporal patterns of hallucinating.

Subject's hallucinations were accumulated in every twenty seconds. Figure 3 is the results of this treatment of the data.

DISCUSSION

It was supposed before the experiment that the olfactory or tactual hallucination should be obtained more easily than visual or auditory hallucination, because visual and auditory sensations are highly differentiated or structuralized in comparison with olfactory or tactual sensation. Hilgard also reported that the hallucinations of taste and smell were easier to obtain than those of vision and audition. Hilgard pointed out two reasons for this; the senses such as taste or smell are somewhat primitive and we are accustomed to some vagueness in discriminations based on them; they are also "organic" in that our own bodies produce substances that can stimulate taste and smell and so sensation, illusion, and hallucination become intermingled. As shown in Table 1, so far as the percentages of subjects who more or less experienced hallucinations are concerned, any significant differences were not found among the results from each sensory modality. In the frequency of hallucinations visual hallucination remained at the least as originally assumed but contrary to the expectation auditory hallucinations were obtained most frequently. Thus any characteristic tendencies expected before the experiment could not be confirmed here so far as the percentages of hallucinated subjects or frequencies of hallucination in each subject are concerned. However, as shown in Figure 3, some differences were suggested in the temporal patterns of hallucinating characteristic to each sensory modality. In the case of the more differentiated and structured sense such as vision it seems to take much time to organize perception by taking in an irrelevant cue such as suggestion, while in the case of the tactile hallucination irrelevant cues such as suggestion are effective immediately and perceptual organization needs little time.

(II) THE SUGGESTIVELY PRODUCED HALLUCINATION OF THE BLIND

PROBLEM

Because of the lack of visual cues the blind are obliged in discriminating the outer world to depend on the cues obtained through sensations other than that of vision. For that reason, in the case of the blind, sensations except for that of

vision are assumed to be more differentiated or structuralized than those of the seeing. Accordingly, the blind can be expected to hallucinate less than the seeing.

The purpose of this study is to investigate experimentally the validity of the above supposition.

METHOD

Subjects: Eight male and seven female subjects participated in the experiment. These subjects were from among junior high school students of a school for the blind in Sendai-city. The age of them was from fourteen to fifteen years old. Eleven subjects were congenitally blind and the remaining four subjects had lost their sight before six years old.

Procedure: The procedure of the experiment was exactly the same as that of (I). The experiment on visual hallucination was naturally excluded.

RESULTS

1. Percentages of subjects who had hallucinative experiences.

The percentages of subjects who had more or less hallucinative experience are shown in Table 3. The data for the seeing are also shown at the same time for comparison.

As shown in the table, percentages of the blind who experienced hallucinations are generally lower than in the case of the seeing. (By the auditory hallucination: $CR=2.93$ $p<0.01$, By the olfactory hallucination: $CR=1.88$ $p<0.05$. By the tactual hallucination: $CR=3.15$ $p<0.1$.)

Table 3. Numbers and percentages of the subjects who had hallucinative experiences.

	Blind n=15		Normal n=20	
	n	%	n	%
Auditory	3 (2)	20 (13)	14 (3)	70 (15)
Olfactory	5 (3)	33 (20)	13 (3)	65 (15)
Tactual	5 (2)	33 (13)	17 (6)	85 (30)

() clearly hallucinated

Table 4. Average frequencies of hallucinative experiences which was produced in each subject during three minutes.

	Blind n=15		Normal n=20	
	Mean	SD	Mean	SD
Auditory	0.5 (0.1)	0.7 (0.1)	2.9 (0.3)	2.5 (0.8)
Olfactory	1.0 (0.3)	1.7 (0.6)	2.3 (0.3)	2.9 (0.7)
Tactual	0.7 (0.2)	1.3 (0.5)	3.1 (0.8)	2.7 (1.7)

() clearly hallucinated

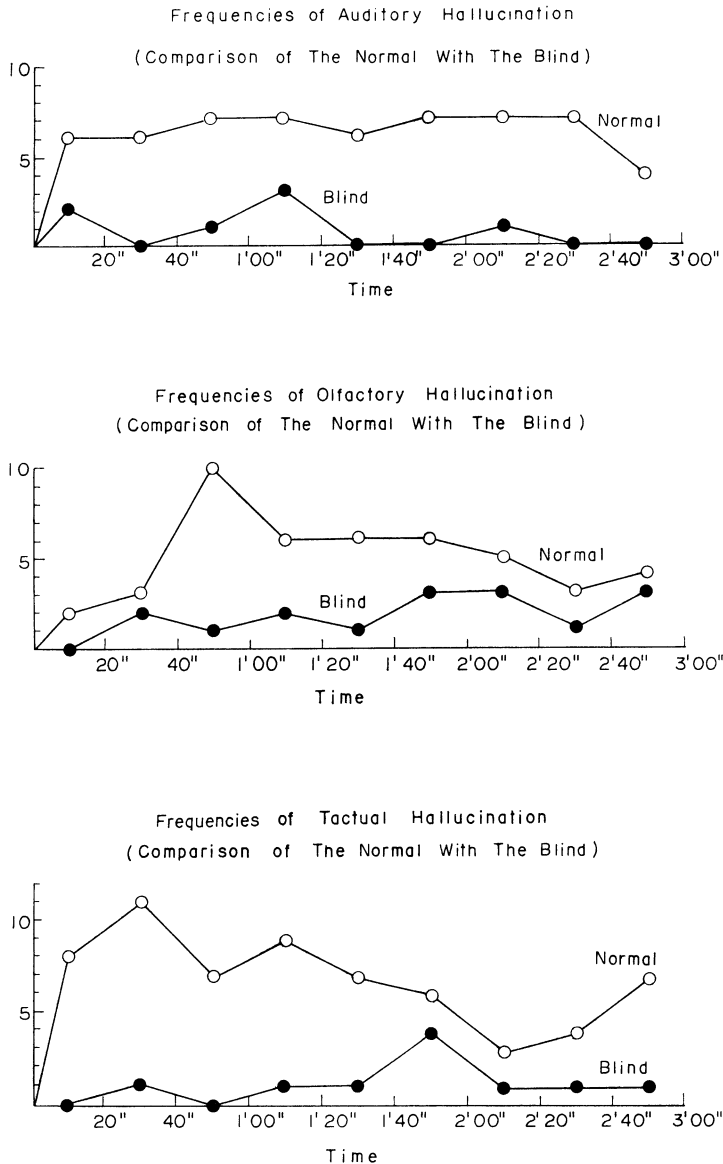


Fig. 4. Temporal patterns of hallucinating.

2. Frequencies of hallucinative experiences.

Frequencies of the suggestively produced hallucinations of the blind were generally lower than those of the seeing. Statistically significant was auditory ($t=3.58$ $df=33$ $p<0.01$) and tactual ($t=3.09$ $df=33$ $p<0.01$) hallucination. By the olfactory hallucination, however, significant difference was not found between the blind and the seeing ($t=1.50$ $df=33$ $p>0.05$). The significant

differences of clear hallucinations were not found in any senses.

3. Temporal patterns of hallucinating are shown in Figure 4.

DISCUSSION

The blind was assumed to be well differentiated and structuralized in the sensations other than that of vision, compared with the seeing and was therefore supposed to show the tendency of reduction in hallucinating. This supposition was confirmed.

The results obtained in the experimental study (I) did not correspond to the original supposition. The relation between the sensory modalities (the degrees of differentiation and structuralization of them were supposed to be different) and the productions of hallucinations in them was not found to be as clear as assumed. Some uncontrolled factors might perhaps have intervened. In the experimental study (II), however, it was demonstrated by the study of the blind that the relationship still existed between the degree of differentiation or the structuralization of sensory function and the production of hallucination.

(III) SUGGESTIVELY PRODUCED HALLUCINATION AND CONTENT OF SUGGESTION

PROBLEM

In this section the validity of the supposition proposed beforehand was investigated further with regard to the contents of suggestion itself. The following problems were studied: 1) Are there any changes in the production of the hallucinations when the degree of differentiation in the content of suggestion is varied? 2) If some changes are found, are they in line with the supposition proposed beforehand?

METHOD

Subjects: Seventeen male and three female subjects aged nineteen to twenty years participated in the experiment. All the subjects were the undergraduate students from Tohoku Institute of Technology.

Procedure: The apparatus shown in Figure 1 was used. Subjects were given the following suggestions by tape recorder:

“Now your ability to discriminate things are going to be tested. . . . It is tested how sensitively your eyes can discern things. . . . Please fix your eyes on the screen. . . . Now, on that screen various kinds of stimuli are presented. The stimuli are presented very, very faintly. So, if you do not watch carefully on the screen, you can not see the stimuli. . . . Please look carefully at the screen. . . . If you see a presented stimulus indistinctly, tell it to me at once by saying ‘indistinctly’ And if you discern a presented stimulus clearly report it to me by saying ‘clearly’ Are you ready? Now, please watch carefully the screen!”

Then the following four suggestions which were thought to differ in the degree of differentiation and structuralization were given.

Suggestion 1. The brightness of the screen changes faintly.

Suggestion 2. At the center area of the screen a light disc about five centimeters in diameter is presented.

Suggestion 3. On the screen a photo of human face is presented.

Suggestion 4. On the screen a triangular geometrical figure drawn with black line is presented.

RESULTS

1. Percentages of the subjects who experienced the suggested hallucination.

As shown in Table 5 percentages of the subjects who experienced hallucinations of a slight change of brightness of the screen were the highest among all the percentages. Difference of percentages between the hallucination of slight change of the brightness and that of light disc was significant ($CR=3.45$ $p<0.01$). Therefore other percentages were all significantly lower than those of slight change of the brightness at the level of $p<0.01$.

Table 5. Percentages of the subjects who had hallucinative experiences.

	Slight change of brightness	Light disc	Photo of face	Geometrical figure
Not at all	1 (5%)	11 (55%)	13 (65%)	13 (65%)
Indistinctly	10	6	5	6
Clearly	9} 19 (95%)	3} 9 (45%)	2} 7 (35%)	1} 7 (35%)
Total	20 (100%)	20 (100%)	20 (100%)	20 (100%)

Any significant differences, however, were not found among percentages of light disc, face and geometrical figure.

In the same way, with regard to clear hallucination, the percentage of slight change of the brightness was the highest among all others ($CR=2.07$ $p<0.05$).

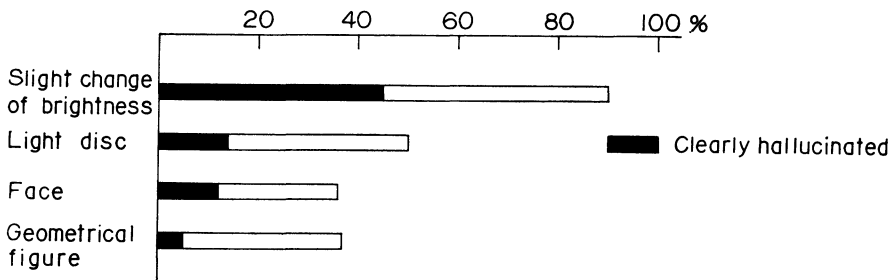


Fig. 5. Percentage of the subjects who had experiences of suggested hallucination.

2. Frequencies of hallucinative experiences.

As shown in Table 6 indistinct hallucinations of slight change of the brightness were most frequently produced in each subject, compared with other hallucinations.

Table 6. Average frequencies of hallucinative experiences which was produced in each subject during three minutes.

	Slight change of blightness		Light disc		Photo of face		Geometrical figure	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Indistinctly	2.9	2.0	0.9	1.2	0.6	0.9	0.5	0.8
Clearly	1.0	1.3	0.2	0.2	0.1	0.3	0.1	0.2
Total	3.9	2.9	1.1	1.5	0.9	1.1	0.6	1.0

The difference was statistically significant. (With light disc $t=4.82$ $df=76$ $p<0.001$. With face $t=5.16$ $df=76$ $p<0.001$. With geometrical figure $t=5.68$ $df=76$ $p<0.001$.) Differences among each disc, face and geometrical figure were not significant. Also fequency of clear hallucinations of the slight change of the brightness was significantly higher in comparison with other hallucinations. (With light disc $t=3.62$ $df=76$ $p<0.001$ With face $t=4.07$ $df=76$ $p<0.001$ With geometrical figure $t=4.07$ $df=76$ $p<0.001$.) Differences among each light disc, face and geometrical figure were not significant.

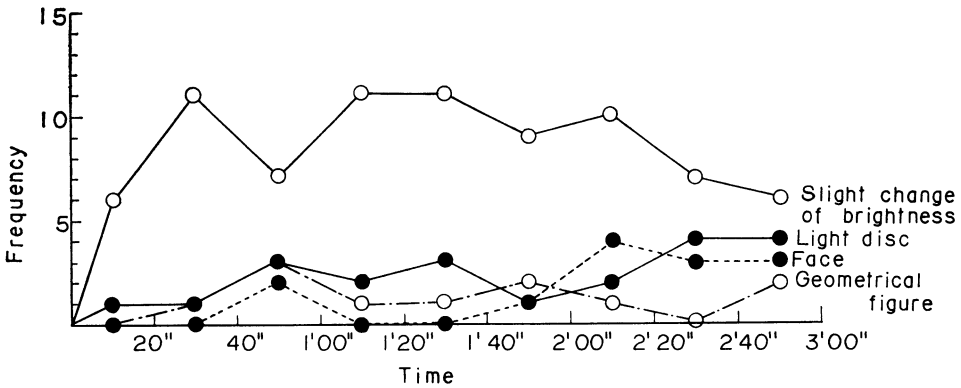


Fig. 6. Temporal patterns of hallucinating.

DISCUSSION

The suggestion of slight change of the brightness seems to be a sort of vague, undifferentiated one. On the other hand suggestions such as geometrical figure or a photo of human face seem to be somewhat more differentiated ones. As a result the hallucinations of slight change of brightness were much more easily produced than those of others. Any difference in the production of hallucination was not shown among each light disc, face and geometrical figure. Any difference in the degree of differentiation or structuralization might not exist among each of the materials. It was demonstrated from these results that within the same sensory

modality the production of hallucination depends on the content of suggestion itself. The more undifferentiated, diffuse or vague the content of suggestion is, the easier the production of hallucination is and vice versa.

SUMMARY AND CONCLUSION

The productive conditions of hallucinations by suggestion are supposed to be determined by the 'differentiation' or 'structuralization' of sensory functions on the side of subject and of the content of suggestion itself on the side of stimulus material.

Three experimental studies were carried out in line with this supposition.

1. In the first study, differences of hallucinative experiences in various sensory modalities were investigated. As the results any remarkable tendencies which correspond to various sensory modalities were not found in the quantitative aspects of hallucinative experiences. But characteristic tendencies were suggested in the temporal pattern of hallucinating.

2. In the second study, the hallucinating tendencies of the blind were investigated. The production of hallucinations by suggestion in the blind was difficult in general as compared with the seeing.

3. In the third study, several suggestions which differed in the degree of ambiguity were given to the subject. When the contents of suggestion were undifferentiated or vague such as in the faint change of the brightness of the screen, the production of hallucination by suggestion was much easier, while the suggestion of more differentiated contents such as geometrical figure on the screen were not effective in producing hallucinations.

It was confirmed by the results of the three studies that the production of hallucination by suggestion depends on the degree of differentiation or structuralization of sensory functions on the side of subjects and of suggestions on the side of stimulus materials. When the sensory function or the content of suggestion is diffuse and undifferentiated, various hallucinations are easily produced. When the sensory function or the content of suggestion is well-differentiated and structuralized, the production of hallucination is difficult.

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ZUSAMMENFASSUNG

In dem ersten Teil der Forschung wurden die durch Suggestion produzierten Halluzinationen in verschiedenen sensorischen Modalitäten untersucht. Keine merkwürdigen Tendenzen, die jeder Modalität entsprechen, wurden auf der quantitativen Seite der halluzinatorischen Erlebnisse gefunden. Einige charakteristische Tendenzen aber wurden im zeitlichen Verlauf des Halluzinierens gefunden.

In dem zweiten Teil wurde die Halluzinationstendenz der Blinden untersucht. Bei den Blinden war die Produzierung der Halluzinationen verhältnismässig schwerer als bei den Normalen.

In dem dritten Teil wurden die Inhalte der Suggestion nach dem Grad der Differenzierung geändert. Durch die Suggestion des undifferenzierten oder unbestimmten Inhalts wurden häufige Halluzinationen gewonnen.

Aus den Resultanten ergab sich, daß die folgende Voraussetzung bestätigt wurde: Das Produzieren der Halluzinationen ist abhängig von dem Grad der Differenzierung oder Strukturierung der Sinnesfunktion auf der Seite der Versuchsperson und auch des Inhalts der Suggestion auf der Seite des Reizmaterials.

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