

SUPPRESSION WITH NEGATIVE INSTRUCTION¹

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TESTS WITH ALCOHOL AND CAFFEINE AND ON CASES OF DEMENTIA PRÆCOX AND MANIC DEPRESSION

In a previous article² the nature and development of the act of suppression with negative instruction in association tests under normal conditions are described. The object of this paper is to give the effect of alcohol and caffeine upon the power of association and reproduction as well as upon the act of suppression. Introspective data upon the process of suppression is also included. The results of the association tests with suppression in cases of dementia præcox and manic depression will also be briefly described at the close of the paper. The same conditions as in the previous experiment prevailed for these experiments. Simple pictures representing a single object were shown and the subject told to give the first word suggested by the picture. As two of the subjects figured in both series new pictures, but of the same nature as the others, were used, except in the case of the tests on the insane, where the old pictures were employed. In all 120 pictures were used, 10 of which were shown on each test day. With few exceptions a test was made every week. The previous instructions were altered so that the subjects were told not only not to name the picture, but not to name any part of it. This was found necessary because one of the subjects got 'set' to name a part of the picture. Except in the case of the insane subjects full introspection on the main period was required at all times. After the experiment had been some weeks in progress Professor Titchener's suggestion³ in regard to introspection upon the fore-period was followed. The reaction time was taken with a

¹ From the Harvard Psychological Laboratory.

² 'Suppression with Negative Instruction,' *Psychological Bulletin*, June, 1910, Vol. VII., pp. 200-208.

³ E. B. Titchener, 'A Text-Book of Psychology,' p. 460.

TABLE I
TESTS WITH ALCOHOL
Subject A

Al = alcohol test, N = normal test, A = association test, R = reproduction test, R.T. = reaction time, k' = any kinæsthetic imagery, k'' = kinæsthetic imagery of the name of the picture, v = visual imagery, a = auditory imagery, S.S. = successful suppression, S.R. = successful repetition.

	No.	A		R		A				R				A		R
		R.T.	m.v.	R.T.	m.v.	k'	k''	v	a	k'	k''	v	a	S.S	S.R.	
N	1	1.7	.30	1.7	.16	4	2	6		2	1	2		10	8	
Al	2	1.6	.36	1.3	.16	5	2	4				1		9	8	
N ¹	3	1.2	.09	1.0	.13	3	1	6		4		6		9	7	
Al	4	1.1	.15	1.1	.10	10	4	5		6	3	7		8	10	
N	5	1.7	.58	1.3	.16	6	3	6		4	1	3		8	9	
Al	6	1.5	.24	1.1	.10	6	2	11				7		10	9	
N	7	1.6	.16	1.5	.20	5	1	14		3	2	6		10	9	
Al	8	1.3	.16	1.2	.10	9	4	5		1	1	1		9	8	
N	9	1.6	.14	1.3	.28	15	3	8	1	3		2		10	6	
Al	10	1.4	.46	1.1	.16	4	1	2		1	1	1		10	9	
N	11	1.5	.21	1.3	.18	9	4	2		3	1			10	9	
Al	12	1.3	.27	1.0	.20	5	3	1		4	3			9	10	
N	av.	1.5	.24	1.3	.19	Total 42	14	42		19	5	19		% of un-	3%	18%
Al	av.	1.4	.27	1.1	.14	Total 39	16	28		12	8	17		successful tests	8%	10%

¹ Contains only nine reactions.

Subject B

	No.	A		R		A				R				A		R	
		R.T.	m.v.	R.T.	m.v.	k'	k''	v	a	k'	k''	v	a	S.S.	S.R.		
N	1	1.8	.40	2.4	1.30	15	10	1		7	4			10	8		
Al	2	1.7	.26	1.6	.40	16	11	3		15	8	1		7	8		
N	3	1.6	.11	2.0	.19	10	6	2		10	7	1	1	9	7		
Al	4	1.6	.15	1.5	.37	16	11	1	1	6	5			9	6		
N	5	2.0	.72	1.8	.33	10	7	2	1	9	6			8	6		
Al	6	1.4	.18	1.1	.22	4	4		4	3	3	2		10	9		
N	7	1.7	.36	1.5	.46	13	11	3		6	3			9	8		
Al	8	1.9	.44	1.4	.28	12	10	2		7	7			10	8		
N	9	1.7	.21	1.5	.26	11	9		1	4	2			8	9		
Al	10	1.6	.28	1.2	.22	13	8			5	5			7	8		
N	11	1.7	.30	1.4	.29	6	3	2		4	2			10	9		
Al	12	1.5	.30	1.1	.10	7	4			7	6			6	9		
N	av.	1.7	.35	1.8	.47	Total 65	46	10	2	40	24	1	1	% of un-	7%	20%	
Al	av.	1.6	.27	1.3	.26	Total 68	48	6	5	43	34	4		successful tests	14%	17%	

stop watch. There were six normal subjects, two figured in the alcohol tests, two in the caffeine tests and two in the tests under normal conditions. These last tests were introduced as a check in order to be sure that the results obtained in the

TABLE II

TESTS WITH CAFFEINE

Subject C

Ca = caffeine tests, N = normal tests

	No.	A		R		A				R				A	R
		R T	m v.	R T	m v.	k'	k''	v	a	k'	k''	v	a	S.S.	S.R.
N	1	4.1 ²	1.1	2.4 ²	.80	8	7	6				2		10	9
Ca	2	2.2	.40	1.5	.10	2	2	7		4	4	5		9	10
N ¹	3	2.2	.40	1.5	.19	4	3	4		2	2	2		9	8
Ca	4	1.8	.33	1.4	.27	4	3	2		4	4	2		8	7
N	5	2.2	.68	1.7	.58	6	6	1	I	3	3			8	8
Ca ¹	6	1.9	.46	1.3	.28	5	5	4		4	4			9	9
N	7	2.2	.60	1.4	.18	8	6	5		7	7			9	9
Ca	8	2.0	.34	1.5	.10	5	5	4		4	4			9	9
N	9	1.9	.34	1.3	.14	8	8	3		6	4			9	9
Ca	10	2.2	.56	1.3	.16	4	4	8		4	2	I		10	8
N	11	2.3	.58	1.3	.28	6	4	3						9	8
Ca	12	1.7	.21	1.4	.32	6	6	4		5	3			8	10
N	av.	2.2	.52	1.4	.27	Total 40	34	22	I	18	16	4		% of un-	8%
Ca	av.	2.0	.38	1.4	.21	Total 26	25	29		25	21	8		successful tests	10% 12%

¹ Contains only nine reactions.² Unusually long R.T. due to inexperience and which it was deemed better to omit.

Subject D

	No.	A		R		A				R				A	R
		R T	m v.	R T	m v.	k'	k''	v	a	k'	k''	v	a	S.S.	S.R.
N	1	1.8	.34	1.4	.27	1	1	2	6	1		1	2	10	8
Ca	2	1.5	.14	1.2	.08	12	9	2		3	3		2	9	9
N	3	2.0	.37	1.5	.21	12	9	2		2	1	1		10	9
Ca	4	1.6 ¹	.22	1.2	.11	8	7	2		2	2	2		7	9
N	5	1.8	.28	1.7	.44	8	7	7		4	2	2		10	9
Ca	6	2.0	.30	1.7	.45	13	11	4		8	6	1		10	7
N	7	2.3	.50	1.5	.30	15	8	1		2				10	9
Ca	8	2.1	.26	2.2	.50	15	9	6		14	9	1		10	8
N	9	1.9	.27	1.7 ¹	.39	13	9			12	11			10	7
Ca	10	1.9	.39	1.8	.50	9	9	3		3	3			9	9
N	11	2.3	.41	1.7	.35	11	8	1		4	4			10	9
Ca	12	1.9	.32	1.7	.32	18	7	2		10	8	1		10	8
N	av.	2.0	.36	1.6	.33	Total 60	42	13	6	25	18	4	2	% of un-	0%
Ca	av.	1.8	.27	1.6	.33	Total 75	52	21		40	31	5	2	successful tests	7% 12%

¹ Contains only nine reactions.

alcohol and caffeine tests were due to the drugs and not to possible differences between the character of the pictures used on drug days and those used on normal days.

Thirty c.cm. of 95 per cent. alcohol in 60 c.cm. of water

were given on alternate test days to the alcohol subjects (Al-subjects). It was taken three quarters of an hour before the test began. This amount of time was required for the alcohol to

TABLE III
TESTS UNDER NORMAL CONDITIONS

Subject E

Dg = those days on which the same pictures were used that were used for the foregoing subjects on drug days. The averages of these days are taken just as if they were drug days.

	No	A		R		A				R				A	
		R.T.	m.v.	R.T.	m.v.	k'	k''	v	a	k'	k''	v	a	S.S.	S.R.
N	1	1.5	.26	1.3	.21									7	6
Dg ¹	2														
N	3	1.3	.15	1.2	.24									8	5
Dg ¹	4														
N	5	1.0	.10	1.2	.40	2	2		1	2	2		2	6	6
Dg	6	1.3	.34	1.9	.12	3	3	2		2	2	2		8	9
N	7	1.2	.19	1.1	.26	4	3	1	3	2	2	1		7	8
Dg	8	1.4	.20	1.1	.16	3	2	4		2	1			8	9
N	9	1.5	.36	1.0	.06	6	6		1	2	2			9	7
Dg	10	1.7	.30	1.1	.10	2	2	1	1	1	0			9	9
N	11	1.3	.22	1.1	.16	4	3	3	2	3	2			9	8
Dg	12	1.1	.12	1.0	.10	5	5		1	4	4			8	8
N	av.	1.3	.21	1.1	.22	Total 16	14	4	7	9	8	1	2	% of un-	23%
Dg	av.	1.3	.24	1.2	.12	Total 13	12	7	2	9	7	2		successful tests	17% 32%

¹ It was impossible to use the data of these days on account of an unforeseen irregularity in the experiment. They would, however, have made no difference in the av. R.T.

Subject F

	No	A		R		A				R				A	
		R.T.	m.v.	R.T.	m.v.	k'	k''	v	a	k'	k''	v	a	S.S.	S.R.
N	1	2.7	.88	1.9	.26			3				1		10	6
Dg	2	2.3	.65	1.3	.30	2	2	5	2	5	4	1		8	9
N	3	1.8	.42	1.2	.20	1	1	3	2			3		10	8
Dg	4	1.9	.39	1.5	.23	4	3	5	0	1	1	4	1	9	7
N	5	1.7	.22	1.7	.58	1	1	6		2	1	2		10	6
Dg	6	2.1	.52	1.3	.18	9	4	6				2		10	6
N	7	1.8	.44	1.3	.24	1	1	5		1	1			9	10
Dg	8	1.9	.40	1.6	.30	5	4	7		1	1	3		10	9
N	9	2.3	.48	1.3	.16	3	1	8				1		9	8
Dg	10	1.6	.34	1.4	.10	4	1	7		3	2			10	9
N	11	2.0	.40	1.3	.28	2	2	8						10	7
Dg	12	1.8	.26	1.4	.28			2				1		9	7
N	av.	2.0	.47	1.4	.29	Total 8	6	33	2	3	2	7		% of un-	2%
Dg	av.	1.9	.43	1.4	.23	Total 24	14	32	2	10	8	10	1	successful tests	2% 25%

show sufficient effect. The tests took place in the morning some hours after eating. Six gr. of caffeine in capsule were given on alternate days to the caffeine subjects (C-subjects). Three gr. were taken one and a half hours and three gr. one half hour before the test. On the other test days capsules of sugar of milk were given in order, as far as possible, to avoid suggestion. A like precaution would have been taken with alcohol if a suitable disguise for the alcohol could have been discovered.

Let us first examine the reaction time for the alcohol tests (Al-tests). The average reaction time for association for all the Al-days shows a decrease of $1/10$ sec. as compared with the average time for all the normal days (N-days) in the case of both Al-subjects. With this decrease in reaction time, however, there is less success at suppression. One subject has 14 per cent. failures with alcohol to 7 per cent. without. The other 8 per cent. with to 3 per cent. without.

The C-subjects show a greater decrease in the reaction time for association on C-days. The average for the C-days is $2/10$ sec. more rapid than for the N-days. As to the quality of the reaction one subject shows an increase of 2 per cent. in failures, the other an increase of 7 per cent.

In the Al-tests the R.T. for reproduction on the Al-days shows for one subject a decrease of $2/10$ sec. and for the other a decrease of $5/10$ sec. and in both cases there are slightly less failures to reproduce correctly on the Al-day. There is, then, a decided increase in rapidity to reproduce the former association with, if anything, more successful reproduction on the Al-days.

Caffeine, on the other hand, has no effect on the R.T. for reproduction of either subject. The one subject has 2 per cent. less failures, the other 5 per cent. more.

The N-subjects never show a difference of more than $1/10$ sec. between the two sets of pictures either in the R.T. for association or for reproduction. In the association test there is a decrease of $1/10$ sec. for one and the same R.T. for both sets of pictures for the other. In the reproduction one shows the same R.T., the other an increase of $1/10$ sec.

As to the failure to suppress, one N-subject shows no dif-

ference, the other one of 5 per cent., between the two sets of pictures. In the reproduction one shows a difference of 8 per cent., the other one of 20 per cent.

The slight differences in the R.T. of the N-subjects seem to show that the noticeable differences in the R.T. for the other subjects are not due to differences in the material used. The differences in the failures between the two sets of pictures are sufficiently great to prevent any other deduction in the case of the other subjects, than that neither alcohol nor caffeine markedly affect the number of failures in suppression or reproduction. This is well to know in the case of the decrease in reproduction time by alcohol and in the association time by caffeine. The tests have been made on too few subjects for any final assertion to be possible, but the results at least suggest that as much as 30 c.cm. of alcohol do not affect to any appreciable degree a control of one's thoughts or speech such as is necessary in the suppression here required, while that amount of alcohol does increase the rapidity without impairing the accuracy of the reproduction of associations recently made. Caffeine has a quickening effect upon thought. The associations are made more rapidly and the power of suppression is not seriously impaired. This is the effect that casual introspection generally attributes to the drug. It has no decided effect on the reproduction.¹

¹ Aschaffenburg writes in regard to the effect of alcohol: "Eine qualitative Veränderung der Arbeitsleistung wurde durch den alcohol nicht hervorgerufen." ('Praktische Arbeit unter Alkoholwirkung,' *Psychologische Arbeiten*, Bd. I., p. 626.) Ach's observation that alcohol causes an "Herabsetzung der Schnelligkeit und der Verkleinerung des Blickfeldes der Wahrnehmung" ('Ueber die Beeinflussung der Auffassungsfähigkeit durch einige Arzneimittel,' *Psychologische Arbeiten*, Bd. III., p. 288) may in part at least account for the lack of decrease in the R.T. for associations with alcohol, for we know that the motor discharge is aided by alcohol. In the reproduction tests, where the pictures are familiar, the influence of alcohol on the perception is not as great, or not sufficient, at any rate, to offset the increase in the rapidity of the motor discharge. It may be that the decrease in the time for the motor discharge, which, of course, would allow the word to be spoken more quickly, is the sole cause of the decrease in the R.T. for reproduction. For the influence of alcohol on the motor discharge see Ernst Rodem: 'Ueber die Dauer der psychischen Alkoholwirkung,' *Psychologische Arbeiten*, Bd. IV., pp. 40-41. Ach says further that "Caffein bewirkt eine geringe Besserung der Auffassung" (ibid.). This may be a cause of the decrease in the R.T. for associations with this drug. From August Koch's and Emil Kraepelin's observation that "Der Ablauf gewohnheitsmässiger Associationen wird durch das

A record was kept of the different types of images as is shown in the tables. It was thought that the drugs might change the type and it was also considered of interest to determine if the different reaction times could be correlated with the different types. The results seem negative. There is in general little difference between the imagery in normal days and drug days and nothing can be deduced from the differences that do occur since the normal subjects show differences as great. As to the correlation of types of imagery with reaction time for association, there is a tendency for those who have much visual imagery to have longer reaction times. This may be observed in subjects C and E. Subject A, however, is an exception. Subject E, who has the least amount of visual imagery, has the quickest R.T.

An examination of the quality of the reaction words has also been made to see if there is a change in the distribution under alcohol and caffeine. It was thought that although there was slight effect upon the actual suppression of the name of the object, yet the quality of the reaction words might perhaps give a clew among other things, to the difficulty of suppression with and without the drugs. A classification was chosen which was expected to bring out any such change in distribution. An increase in the number of descriptive words or of those words caused by suggestion through resemblance might indicate a difficulty to get one's thought away from the picture. An increase in repetition or a change in the number of super-ordinate words, or in the type of reacting under the influence of a drug, would also be of interest. The decision as to whether a word should be classified under contiguity or coördination is, as is well known, often a difficult one. Without introspection it is always a guess.

Turning to the table we find a surprising similarity in the distribution of the words on drug days and normal days. There is, however, one difference of interest. Both caffeine subjects, C and D, have fewer words from suggestion on C-day. C has a change from 7 to 2 words and D one from 18 to 4.

Caffein erleichtert" ('Ueber die Wirking der Theebestandtheile auf körperliche und geistige Arbeit,' *Psychologische Arbeiten*, Bd. I., p. 488) one would expect that caffeine would quicken the reproduction. This was not the case in our experiments.

TABLE IV
CLASSIFICATION OF ASSOCIATION WORDS

	Subject A			Subject B			Subject C			Subject D			Subject E			Subject F		
	Al	N	Total	Al	N	Total	Ca	N	Total	Ca	N	Total	Dg	N	Total	Dg	N	Total
Descriptive ..	2	2	4	8	6	14				1	1	2	3	2	5			
Verb	32	35	67	4	1	5	1	1	2	1	1	2	16	9	25	43	42	85
Contiguous ..	14	15	29	25	24	49	41	37	78	18	23	41	3	4	7	1	4	5
Super- ordinate ..				1	3	4				3	1	4	1		1			
Coördinate ..				4	4	8	3	4	7	18	13	31	4	2	6			
Repeated...	6	2	8	1	1	3	2	1	3	4	1	5	2	5	7	6	7	13
Suggested ..		2	2	3	2	5	2	7	9	4	18	22	3	8	11	3	3	6

As will be seen there is a tendency for the subjects to react always with a word of the same class; that is, they become stereotyped in the quality of reaction words. In the previous work¹ we mentioned this tendency of one of the subjects to react with verbs. In the present experiments we find two distinct verb types, A and F, and one fairly marked verb type E, two contiguity types, B and C, and one type, D, in which most of the words are divided between contiguity, coördination and suggestion. It is interesting to note that the subject E, who became the least stereotyped, also has the most failures to suppress. We will return to the discussion of these failures later. Subject B, who has the most descriptive reactions, also has a comparatively large number of failures to suppress, which fact in some part bears out the hypothesis that reaction by descriptive words shows a certain difficulty in getting away from the name of the picture. There is no correlation between these types and the reaction times.

Unfortunately the attitude of the subjects in the fore-period was not ascertained at the beginning of the experiment, so that it is impossible to give an account of the development of the consciousness of the instruction during this period. Later, however, the contents of consciousness during the fore-period were occasionally tapped by interrupting the experiment before the picture was exposed and without warning to the subject. It was found that the negative instruction, which was always repeated by the experimenter at the beginning of each series,

¹ P. 206.

continued to 'ring in the ears' of the subjects, during the fore-period of the first test, or was repeated by the subject in its negative form. As a rule after this first test there was nothing in consciousness pertaining to the instruction. The subjects described this attitude as 'passive.' They sat before the shutter and waited for it to open. This expectancy was all that could be found in consciousness. One subject, E, proved an exception. He repeated the instruction in its negative form before almost every exposure. Sometimes this was reduced to 'No, no,' or 'not picture or any part of it.' Several times it was in the form of 'do what you did before.' This is a positive command, whose purpose is to suggest a negative attitude. Beyond the mere repeating of the words of instruction the only representation in consciousness of the negative attitude was a focusing of the eyes on a point beyond where he knew the picture was to appear. It was in this background that he seemed to himself to search for a word, after recognizing the picture, and he felt that this attitude aided him in getting away from the name of the picture. In almost no instance was the negative instruction changed to a positive one. The words touched off a cortical set, which may be called a negative set, in so far as it has an inhibitory effect either upon the thought of the name of the object or its expression in speech. The nature of this set cannot be described further, but that there are two different processes, a positive and a negative one, seems fairly well established.¹ Although little was found in consciousness beyond the words of instruction to represent this negative set, one may hazard a guess that in the early development of the individual there is a characteristic representation, but that, following the laws of habit the process becomes more or less mechanical and is generally limited to physiological processes.

A full description of the process of suppression during the main period is given in the former paper. These experiments furnish no new data. The introspection does, however, throw some light upon the causes of failure to suppress and failures in reproduction as well as some description of the effect of the

¹ See summary of former paper, p. 208.

inhibitory attitude. As the tables show, there were few failures to suppress. Subject E shows the most. He is also the one subject who repeated the instruction before almost every test. When he failed to suppress he generally said that his attitude was not good. Either he had not repeated the instruction or he hadn't the instruction well in hand. There seems to be strong indication here that the subject lacked concentration. In terms of this problem the instruction not only tended to disappear from consciousness as was the case with the other subjects, but the attitude as represented in physiological processes tended also to disappear, so that the instruction had to be repeated. Like indications of lack of concentration were observed in a different experiment conducted by another experimenter in this laboratory.

When there was difficulty in recognizing the picture, the delayed act of recognition with its affective tone seemed to weaken the attitude of suppression and the picture was frequently named. A possible description is that the name of the object is delayed by lack of recognition, and when this recognition occurs the name comes into consciousness with a bound, so to speak, and as the attitude of the instruction had been pushed aside for the moment by the difficult act of recognition, the name comes to utterance.

An emotional state of one of the N-subjects, who had a momentary difference with the experimenter on one of the test-days, also caused an unusual amount of failure. An occasional unavoidable distraction also weakened the attitude. An attempt was made to conduct similar experiments under conditions of distraction, but it was found that distraction, such as is produced by noise, odors, mental work, or emotional states could not be made subject to the will of the experimenter.

As regards the failure to reproduce the previous association, one of the chief causes is the fact that there were several images in consciousness before the one given in the association test. In the reproduction test that followed, one of these images, and not the one actually given as an association, was then reproduced. For example: association "*BRUSH—hair*. Recognized brush. Kin. image of brush. Active suppression.

Visual of side of horse with brush on it. Then hair." Reproduction '*brush—horse.*' There were also instances of the reproduction of a word that had just preceded instead of the correct word.

Varied effects of the inhibitory process could be observed in the introspection. At times a certain perception was suggested by the shape of the picture. As soon as it was seen not to be the name of the picture, this perception was given as an association, even though the object itself may not have been fully recognized. For example: association "*CARPET-SWEEPER—typewriter.* Started to recognize typewriter. Saw it wasn't. Said typewriter." Association "*RATTLE—hair.* Percept slow in forming. After slight pause hair came. Suggested by picture although I knew it wasn't that." Association "*RAT—dog.* Recognized it wasn't dog. Looked so much like it that I said dog. Then recognized rat." Here is also an example where the name would not come. Association "*BATH-TUB—bowl.* Percept came somewhat slowly. Tried to get name but couldn't. Then came word bowl. The form suggested bowl." Even when the association is not by suggestion the name may be held up until after the association, both in association and reproduction tests. Association "*BLOCK—axe.* Axe came immediately. Afterward chopping block," or reproduction "*PITCHER—water.* Water came automatically. Kin. of pitcher afterward."

There are also instances where the inhibitory process instead of inhibiting the name of the object gives it a different meaning, attaching the word to imagery sometimes quite different from the picture. This very frequently occurs with verb associations; for example, association "*FLY (noun)—fly (verb).* Its wings were prominent," or association "*BRUSH (noun)—brush (verb).* Recognized brush. Visual image of brushing." Association "*SMALL TENT—circus tent.* Thought of that tent, then large circus tent." Association "*LADDER—step.* Aud. ladder. Persisted a short time. Made visual image of step to a house. Then said step."

TESTS ON INSANE SUBJECTS

Tests of a nature similar to the above were made upon dementia præcox and manic depression cases at the Danvers State Hospital.¹ A similar instrument and sixty of the cards used in the first series of normal tests were employed. Introspection was not required, inasmuch as there would always be grave questions as to its reliability. The instructions were those of the first normal tests and did not include prohibition to name a part of the picture. There were eight dementia præcox, three manic and one depression patient.

TABLE V

TESTS ON DEMENTIA PRÆCOX AND MANIC DEPRESSION

No. = number of tests, F.S. = number of failures to suppress, F.R. = number of failures in reproduction.

Subjects		A Tests			R Tests			F.S	F.R	Classification of Association Words							
		No.	R.T	m.v.	No.	R.T.	m.v.			Des.	v.	Con.	Sup.	Coö.	Re.	Sug.	
De- mentia Præcox	H	58	3.3	1.56	58	1.5	.33	19	7	1		20	20		5		
	R	51	6.4	3.07	42	4.5	2.14	51	60	6	1	7					
	Ah	58	4.9	2.23	58	1.8	.65	0	7			27	13	3		4	
	Cu	47	5.5	2.59	47	1.9	.54	21	9	10	4	10	6		1		
	S	58	3.2	1.56	58	1.9	.66	2	7	4	18	24	3	2			
	M	56	3.7	1.05	56	2.5	.90	0	9		1	43			1	1	
	Ch	57	2.1	.76	56	1.1	.25	9	5	2	3	34	2	2			
De- pression	T	55	2.8	.92	55	1.3	.23	11	14	7	5	14	7	2			
	N	58	4.5	2.03	58	1.9	.65	5	12	2	16	15	15				
Manic	E	55	2.3	.75	55	1.5	.35	5	5	2	1	34	11		4		
	Al	40	3.4	1.29	40	2.9	2.20	0	7	31	1	6					
	G	39	1.2	.38	39	.75	.13	3	0	3	29	6					

From the table we see that the reaction times for association are in all but two cases longer than for any of the normal subjects—in many instances longer than could be accounted for by a difference in education. These long R.T. occur both for dementia præcox and manic depression. Among the manic depression the manic type is more nearly normal. One showed an unusually rapid reaction time. As regards the R.T. for reproduction in all but three cases it closely resembles that of the normal subjects. Many of the m.v. are extremely large.

As regards suppression, the three cases which show many

¹ The author takes this occasion to thank the physicians of the hospital for their kindness in permitting and facilitating these tests.

failures are all dementia præcox. One has a very great many failures, the others have more than the normal subjects with the exception of normal subject E, who had most of his failures during the emotional disturbance. The one patient with the largest number of failures also has the largest number of failures to reproduce the correct word.

The fact that all the large number of failures to suppress are by dementia præcox patients seems to corroborate the theory that an impairment of the will in which a decrease in attention plays an important part, is a characteristic feature of this disease.¹ The lack of retentiveness in the case of one dementia præcox patient seemed to be a special feature of the case not found in any of the others. In her case the symptoms of dementia were much more marked.² A dementia præcox patient not recorded named the object at every exposure. He showed a willingness to take part in the experiment and whether his failure to suppress was due to any difficulty upon his part to restrain from uttering the name or from a negative attitude toward the experiment could not be decided.

These subjects also show distinct types of reaction as regards the quality of the reaction word. Most were of the contiguity type, one was distinctly of a verb type, two showed many superordinate words and one was decidedly of a descriptive word type.

SUMMARY

As was mentioned above, there were too few subjects to permit of any generalization. Several interesting possibilities, however, were suggested by the results.

1. 30 c.cm. of alcohol caused a decrease in the reaction time in the reproduction tests. It did not appreciably affect the suppression or accuracy of reproduction.

¹ Alfred Busch, 'Auffassungs- und Merkfähigkeit bei Dementia Praecox,' *Psychologische Arbeiten*, Bd. V., p. 336.

² Dr. Charles Ricksher remarks in regard to the retentiveness of dementia præcox patients, ". . . when cases are arbitrarily classed according to the apathy they show, the duration of the disease, etc., those showing the more marked deterioration almost invariably show less ability to recall either the auditory or visual stimuli than do those with a slighter degree of dementia." ('Impressibility in Dementia Praecox,' *American Journal of Insanity*, Vol. LXVI., No. 2, p. 229.)

2. Caffeine caused a decrease in the reaction time for association and showed no appreciable effect upon the suppression or accuracy of reproduction.

3. Introspection on the fore-period showed no evidence of the necessity of translating negative into positive instruction. This makes it probable that there is a distinct negative as well as positive attitude, which in most instances can be described solely in terms of cortical set.

4. The lack of a power of suppression was found only in some of the dementia præcox patients. The manic depression patients were normal in this respect. Accuracy of reproduction was normal in both dementia præcox and manic depression with one exception (dementia præcox).