AVERSIVELY MOTIVATED PERFORMANCE IN RATS WITH SEPTAL LESIONS

by

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Abstract

The primary concern of this study was the effect of septal forebrain lesions on one-way escape avoidance performance in rats. The subjects were 88 male hooded rats of the Long-Evans strain, about 90 days old. Forty rats sustained lesions of the septal area, while 48 rats served as control subjects. Using apparatus designed to eliminate the need to handle the rats, the subjects were run on a one-way escape-avoidance task. Procedural variations were introduced to assess the effects of (1) practice, (2) an irrelevant food drive, and (3) conflict, on performance. Septal lesions in rats impaired their performance on the one-way escape-avoidance task. An interaction between the lesion and drive state was detectable, but no interaction between the lesion and practice was found. In a conflict situation (food versus electric shock) the eating behavior of septally lesioned rats was facilitated. An interaction between the lesion and the level of punishment was also detectable. The results support the view that septal lesions reduce the effectiveness of punishment, and contradict the view that septal lesions reduce response inhibition.

Table of Contents

List of Tables

List of Figures

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Introduction

The present experiment was concerned with aversively motivated performance of rats with lesions of the septal forebrain region. It is well documented (King, 1958; Garber and Simmons, 1968; Kenyon and Krieckhaus, 1965a; Krieckhaus, Simmons, Thomas, and Kenyon, 1964; and Simmons, 1965) that, in rats, lesions in the septal area enhance acquisition of the two-way conditioned avoidance response. However, such lesions have been found to impair performance on all other avoidance tasks; e.g., passive avoidance (Kaada, Rasmussen, & Kveim, 1962; McCleary, 1961, 1965), one-way active avoidance (Vanderwolf, 1964; Kenyon & Krieckhaus, 1965b) and avoidance requiring reversal of a response in a T-maze (Thompson & Langer, 1963).

There are three major views concerning the behavioral functions of the septal region. According to these views, the behavioral effects accompanying septal lesions reflect: 1) a loss of response inhibition (McCleary, 1966); 2) an increase in drive (Harvey and

Hunt, 1965); 3) a decrement in the effectiveness of punishment (Simmons, 1965).

In the development and assessment of these theories, the effects of septal lesions on aversively motivated performance have played a dominant role, largely because such performance has shown the most marked sensitivity to septal damage. The decrement in one-way avoidance performance (Vanderwolf, 1964; Kenyon and Krieckhaus, 1965b) poses an obvious problem for the response inhibition theory. In view of the facilitatory effects of drive on avoidance performance (Amsel, 1950; Thomas and Slotnick, 1963), the decrement in one-way avoidance performance is hardly consistent with the suggestion that septal lesions increase drive.

McCleary (1966) has sought to explain the decrement in performance. He has suggested that the handling of subjects in the one-way avoidance procedure was differentially aversive to the septally lesioned rats; i.e., the subjects with septal lesions were essentially punished after each trial, while the control subjects were relatively unaffected by the handling. Zucker (1965)

reported that septal lesions in cats facilitated one-way avoidance performance, if handling of the subjects was eliminated. No comparable data exist for rats. It is clear that Simmons' (1965) position leads to the expectation that septal lesions will impair one-way avoidance performance, whether or not the subjects are handled.

At the present time, the above theories are not precise enough to allow a choice among them on the basis of quantitative predictions; e. g., the number of avoidances or the average response latencies of normal and septally lesioned rats. The current theoretical controversy appears to consist of a series of arguments concerning what experimental variables are, or are not, relevant to the behavioral tests that yield differences between normal and septally damaged rats. Kaada et al. (1962) and McCleary (1966) have argued that the nature of the response required of the animal is the crucial variable; Harvey and Hunt (1965) have suggested that it is the drive state induced in the animal; Simmons (1965) has insisted that

it is the introduction of negative stimuli that produces the observed differences between normal and septal rats on avoidance tasks. In the research reported here an attempt was made to obtain experimental evidence relevant to this controversy.

The present experiment involved:

1) The acquisition of a one-way avoidance response using apparatus that eliminated any direct handling of the subjects;

2) A punishment-food conflict situation analogous to that imposed in a passive avoidance task.

Procedural variations were introduced to evaluate the relative importance of punishment, drive, and practice in determing the effects of septal lesions on rats' performance in these test situations.

The hypothesis, based on Simmons' view, was — in all situations the performance of the septally lesioned rats would reflect a decrement in the effectiveness of punishment.

Method

Subjects. The subjects were 88 male, Long-Evans, hooded rats, which were approximately 90 days old at the beginning of the experiment. These animals had a weight range of 235 to 383 grams.(see appendix B, p. 43).

Ratings and resistance to handling. Prior to surgery, the subjects were rated for emotionality on a five-point scale (method used by Thomas, Moore, Harvey, and Hunt, 1959). A score of zero was assigned for a normal response (little or no avoidance or struggling) and a score of four for very extreme responses (biting, squealing, and struggling). Intermediate numbers were given for less extreme reactions. Six days postoperative, the subjects were again rated in the same manner. All ratings were made by two independent observers.

Surgical procedures. All subjects underwent surgery on the day they were first rated. Septal lesions were produced electrolytically by the passage of an anodal current (bilaterally, two discharges of a 100mf. capacitor at 120 volts at each site) through a stainless steel electrode (0.015 in.) insulated

except for 0.5 mm. of its tip. The tip of the electrode was positioned in the septal area with a Kopf Model 400 Stereotaxic Instrument. The coordinates were 2.0 mm. anterior to bregma, 0.5 mm. on either side of the central suture, and 6.0 mm. below the surface of the skull. Forty control subjects underwent the same surgical procedures except for the passage of the lesion-producing electrical current. All surgery was performed under ether anesthesia. Eight subjects of the cue control group did not undergo surgery.

One-way escape-avoidance apparatus. The apparatus was designed to eliminate any direct handling of the subjects during a training session. A wooden trough, 43 (length) X 10 (width) X 12 (height) in., served as an outer frame. The initial 12-in. section of the alley was painted black; the remainder, white. Two identical clear Plexiglas boxes, 11 (length) X 8 (width) X 10 (height) in., with black opaque guillotine doors at both ends, and grid floors, were placed within this framework. With the boxes in place, the apparatus constituted an ordinary avoidance box with a black starting box and a white goal compartment. A fluorescent desk lamp, mounted over the terminal section of the trough provided the only light in the experimental room. (Illustration of apparatus, appendix A, p. 42.)

Escape-avoidance training procedure. At the start of the training sessions each subject was transferred from his home cage to a Plexiglas box by inverting the cage over the open door of the box. As both boxes were made of clear Plexiglas, the type of colour cue depended upon which section of the trough a box was placed. About 5 sec. before the beginning of a trial the empty box was put in the terminal (white) section of the trough. Then, the box containing the subject was placed in the initial (black) section. All subjects were trained to flee from the black start compartment to the white goal compartment.

When the boxes were in the appropriate positions the guillotine doors which separated the compartments were raised; 15 sec. later a 0.5-ma. shock was delivered to the grid floor of the start compartment. After the subject had crossed from the black to the white compartment, the doors were lowered. The box which now contained the subject was removed from the trough immediately and placed on the table outside of the trough. The now empty box was slid ahead in the trough to the white section. After a pause of about 15 sec., a new trial was begun.

Conflict procedures. The same general procedures as above were employed with the following exceptions:

(1) with the box outside of the trough a small dish of food was placed in it. After the subject had taken its first bite of food, the subject was allowed a 2-min. period in which to eat. At the end of this period, the food was removed, and the Plexiglas compartment placed in the trough. The food was again placed in the compartment, and after the subject had taken its first bite of food, another 2-min. eating period followed. (2) Immediately before the guillotine doors were raised on each one-way escape-avoidance trial, the dish of food was placed in the starting compartment with the subject.

Design. Each subject was randomly assigned to one of the training programs outlined below, so that 8 control and 8 septally lesioned subjects were involved in each program except Program G, which involved 8 unoperated control subjects.

		No Drive	Drive	Drive and Conflict
Septals	Practice	A	B	C
	No Practice	D	E	F
Controls	Practice	A	B	C
	No Practice	D	E	F

The specifics of each training program for the groups were as follows:

GROUP	TRAINING PROGRAM
A	40 trials of escape-avoidance training - 48 hour pause - 10 trials of escape-avoidance training.
B	40 trials of escape-avoidance training - 48 hour pause in which no access to food was allowed - 10 trials of escape-avoidance training under food drive.
C	40 trials of escape-avoidance training - 48 hour pause in which no access to food was allowed - 10 trials of escape-avoidance training under food deprivation and conflict conditions.
D	40 trials of escape-avoidance training.
E	40 trials of escape-avoidance training under 48 hours of food deprivation.
F	40 trials of escape-avoidance training under 48 hours food deprivation and conflict conditions.
G	40 trials of escape-avoidance training under 48 hours food deprivation with cue.

Group G was introduced into the experiment after the other subjects had been trained. The introduction of conflict into the situation appeared to facilitate escape-avoidance performance. To determine whether this facilitation could be attributed to the additional cue of placing the food dish in the start compartment just before the beginning of the trial, Group G received 40 trials of escape-avoidance training under

food drive; an empty food dish was placed in the start compartment just prior to the raising of the guillotine doors.

Group D was constituted for purposes of data analysis. It consisted of subjects randomly selected from Groups A, B, and C.

Behavioral measures. The measures used included:

1) Resistance to handling - the sum of the ratings made by the two observers;

2) Escape-avoidance performance - the number of avoidance responses and the time required to make an escape or avoidance response;

3) Willingness to eat in a conflict situation - time before subject ate and number of trials on which the subject ate the food.

Data analysis. The data was analyzed with the Mann-Whitney U test. Where this test could not adequately assess the interaction effects, an analysis of variance for a factorial design with completely randomized groups was employed on the latency data. In these cases, response speeds (i.e., the reciprocals of the latencies) were used to reduce the asymmetry of the distributions. Throughout the data analysis, a significance level of .05 was adopted. However, the

p-values cited are the minimum attainable values using the procedures and tables in Lindquist (1953) and Siegel (1956).

Anatomical procedures. At the end of the experiment, all septally lesioned subjects and randomly selected control subjects were sacrificed under deep ether anesthesia and perfused with physiological saline and with formalin. The brains were sectioned at 50 micra. Every third section through the area of the lesion was photographed and examined to determine the site and extent of damage.

Results

Lesions. The surgical procedures were found to have successfully accomplished the destruction of the septal forebrain region, specifically, the lateral and medial nuclei. Systematic intrusions on adjacent structures were absent. Only a trace of the electrode insertion was detectable in some of the control subjects. The smallest and largest lesions encountered in the septally lesioned subjects are shown in Figure 1. (p. 26).

Resistance to handling See Table 1. (p. 16). The septally lesioned subjects showed an increase in their resistance to handling as compared to no increase in the control subjects. This increase was considered to be a gross validation of the septal effect.

One-way escape-avoidance performance. Septal lesions impaired the performance of the subjects on the escape-avoidance task. This point is illustrated in Table 2 which shows the number of avoidances made in the first 40 trials by the subjects of each training program, and in Figure 2 which shows the response speeds of the subjects of Training Program B (normal acquisition without food drive or conflict) over the first 40 trials. The subjects of Training Program B, as illustrated by Figure 2, demonstrate the typical

acquisition of a conditioned avoidance response. As the data indicate, the control subjects show a learning effect whereas the septally lesioned subjects remain at a relatively constant level throughout the 40 trials. Table 3 shows the response speeds over the last 10 trials for subjects run under Training Programs A, B, and C, and the response speeds over the first 10 trials for subjects run under Training Programs D, E, F, and G. The data obtained on these trials (for A, B, C, D, E, and F) were used in the analysis of variance (see Table 4), to determine the effects of 1) lesion, 2) prior practice, and 3) training schedule on one-way escape-avoidance performance. All of the main effects achieved significance; there were no significant interactions. The significant effect due to training schedule depended primarily on the detrimental effect of drive on the performance of the control subjects.

It seems plausible to attribute the significant difference between the control subjects run under food deprivation and those run under food deprivation with conflict to the cue properties of the food dish. Control subjects of schedule E, run under food deprivation, were significantly slower than those of

schedule G, run under food deprivation with the introduction of the empty food dish ($t = 3.00$, $p < .01$). Presumably, the addition of the food to the dish provided a more salient cue, since the control subjects run under schedule F were significantly faster than those run under schedule G ($t = 2.62$, $p < .05$).

An inspection of the data indicated that a more adequate treatment of the interaction between drive and lesion effects was desirable and possible. This was accomplished by examining the performance of the subjects run under Programs A and B before and after the 48-hour pause. For the subjects of schedule B, this was a period of food deprivation. Tables 5 and 6 summarize the data and the two-way analysis of variance. Both main effects (the lesion and the drive state) as well as the interaction effect were significant.

Measures of food-punishment conflict behavior. The subjects with septal lesions showed a greater willingness to eat than did the control subjects only in situations associated with punishment. These data are summarized in Table 7.

The most direct assessment of the interaction of lesions and prior shock experience was provided by the

change in the eating behavior of the subjects of training Program C when they were shifted from the outside to the inside of the trough. The median increase in the time to eat was 318 secs. (range, -0 to 627) for the control subjects, while the median increase for subjects with septal lesions was 40 secs. (range, -132 to 160; U=14, p =.03).

Table 1. Resistance to handling. The medians (M), ranges (R), and Mann-Whitney U tests (control subjects versus subjects with septal lesions) are shown for ratings of resistance to handling preoperatively and postoperatively. The score for each subject was the sum of the ratings given by two independent observers. N = 40 for each group.

Occasion		Control subjects	Subjects with septal lesions	Test
Pre-operative:	M	0	0	U=813
	R	0-8	0-8	p=.39
Post-operative:	M	0	8	U=253
	R	0-8	0-8	p=.000

Table 2. Avoidance data. The medians (M), ranges (R), Mann-Whitney U tests (U), and probability values (p) are shown for number of avoidances made by control and septally lesioned subjects during the first forty escape-avoidance trials. N = 8 for each group.

Condition	Training Program		Control Subjects	Subjects with Septal Lesions	Test
Avoidance	A	M	31.5	13.5	U=2
		R	22-33	1-25	p=.000
Avoidance	B	M	29.0	14.5	U=5
		R	24-35	1-28	p<.001
Avoidance	C	M	29.5	14.0	U=0
		R	27-33	2-24	p=.000
Avoidance	D	M	31.5	18.0	U=0
		R	26-35	6-25	p=.000
Avoidance Under Food Drive	E	M	25.0	18.0	U=16
		R	7-30	1-26	p=.052
Avoidance Under Food Drive with Conflict	F	M	32.0	24.0	U=14
		R	23-38	20-36	p<.032
Avoidance Under Food Drive with Cue	G	M	32.0	X	X
		R	12-34	X	X

Table 3. Escape-avoidance response speeds (1/ response times in sec.). For each subject, the average response speed was calculated over the appropriate block of 10 trials. For the subjects of Training Programs A, B, and C, these were trials 41 - 50. For the subjects of Training Programs D, E, F, and G, the first 10 trials were used. The figures shown are means (M) and standard deviations (S) of these speeds for each group. N = 8 for each group.

Condition	Training Program		Control subjects	Subjects with septal lesions
Practice	A	M	.47	.25
		S	.27	.20
Practice, drive	B	M	.28	.15
		S	.25	.12
Practice, drive, conflict	C	M	.42	.30
		S	.33	.14
No practice	D	M	.39	.21
		S	.26	.13
No practice, drive	E	M	.07	.10
		S	.01	.06
No practice, drive, conflict	F	M	.31	.11
		S	.19	.08
No practice, drive, cue	G	M	.41	X
		S	.24	X

Table 4. An analysis of variance to determine the effects of lesions, practice, and training on escape-avoidance response speeds (1/ response times in sec.). The data used for this analysis are summarized in Table 3. The figures shown are degrees of freedom (df), mean squares (MS), F-ratio, and probability value (p). N = 8 for each group.

Source	df	MS	F	p
Lesion (L)	1	.46	12.33	$<.001$
Training Program (T)	2	.28	7.37	$<.001$
Practice (P)	1	.31	8.19	$<.001$
L X T	2	.05	1.27	$>.05$
L X P	1	.01	0.30	$>.05$
P X T	2	.02	0.40	$>.05$
L X P X T	2	.03	0.71	$>.05$
WITHIN	84	.04		

Table 5. Drive and lesion effects on escape-avoidance performance. For each subject the score used was its mean response speed on trials 41-50 less its mean response speed on trials 31-40. The figures shown are the means (M) and standard deviations (S) of these scores for the groups run under Training Programs A and B. N = 8 for each group.

Condition	Training		Control Subjects	Subjects with septal lesions
Avoidance-Pause-Avoidance	A	M	-.35	.10
		S	.30	.11
Avoidance-Pause-Avoidance with drive	B	M	.00	-.11
		S	.31	.16

Table 6. An analysis of variance to determine the effects of lesions and drive on escape-avoidance performance. The data used for this analysis are summarized in Table 5. The figures shown are degrees of freedom (df), mean squares (MS), F-ratio, and probability value (p). N = 8 for each group.

Source	df	MS	F	p
Lesion (L)	1	.29	39	< .001
Drive (D)	1	.54	72	< .001
D X L	1	.96	130	< .001
WITHIN	28	.01		

Table 7. Willingness of subjects to eat. The medians (M), ranges (R), Mann-Whitney U tests (U; control subjects versus subjects with septal lesions) and probability values (p) are shown for the subjects of Training Programs C and F. The score for each subject was the time taken to eat outside the trough, the time taken to eat inside the trough, and the number of trials on which the subject ate while under food drive with conflict. N = 8 for each group.

Table 7

Measure	Training Program		Control	Septal	Test
Latency to eat outside of trough	C-prior CAR training	M	201.5	95.0	U=13
		R	40-300	10-265	p<.025
	F- no prior training	M	69.5	66.5	U=27
		R	27-183	3-168	p=.323
Latency to eat in trough	C-	M	385.5	117.5	U=4
		R	195-900	3-300	p<.001
	F-	M	137.0	119.0	U=27
		R	33-558	28-288	p=.323
Number of trials on which subjects ate during 10 trials under drive with conflict	C-	M	0	0.5	U=16
		R	0-0	0-6	p<.01
	F-	M	0	0.5	U=20
		R	0-0	0-3	p<.03
Number of trials on which subjects ate during 40 trials under drive with conflict trials	F-	M	0	0.5	U=16
		R	0-0	0-27	p<.01

Figure 1. Coronal sections through the anterior and posterior extent of the smallest and largest lesion and through the centers of the lesions. The lesions are shown in stipling on coronal sections of the brain (Pellegrino and Cushman, 1967). The marginal scales are stereotaxic coordinates. The anterior-posterior distances in mm. are shown in the upper right, distance from ear bar zero. Relevant abbreviations include:

ACB - nucleus accumbens septi
CA - commissura anterior
CC - corpus callosum
CH - commissura hippocampi
DBB - diagonal band of Broca
FX - fornix
HPC - hippocampus
LS - nucleus lateralis septi
MPA - area parolfactorius medialis
MS - nucleus medialis septi

PT - nucleus parataenialis thalami

RE - nucleus reuniens thalami

TS - nucleus triangularis septi

V - ventribulus

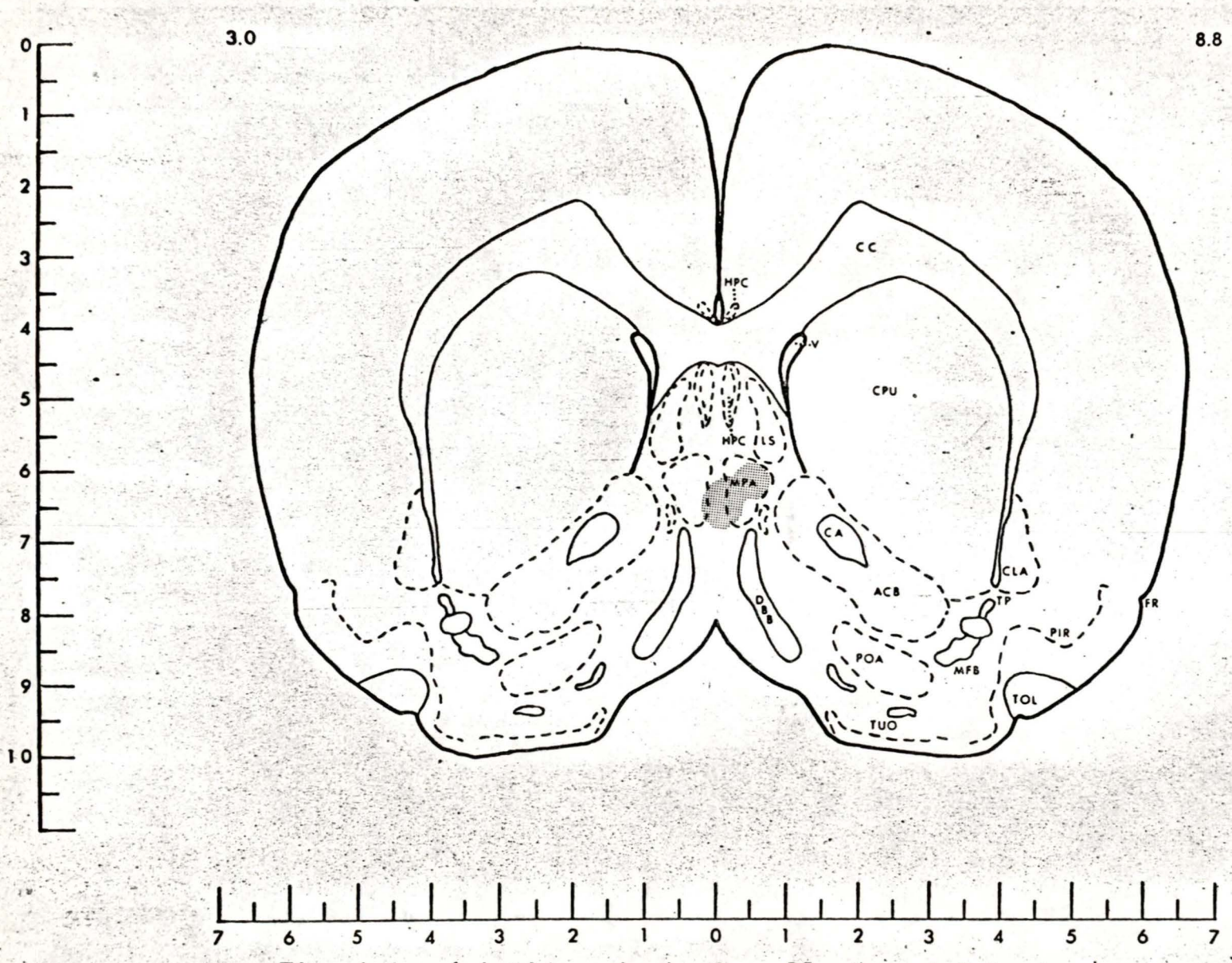

Fig. 1.1. Anterior extent of smallest septal lesion.

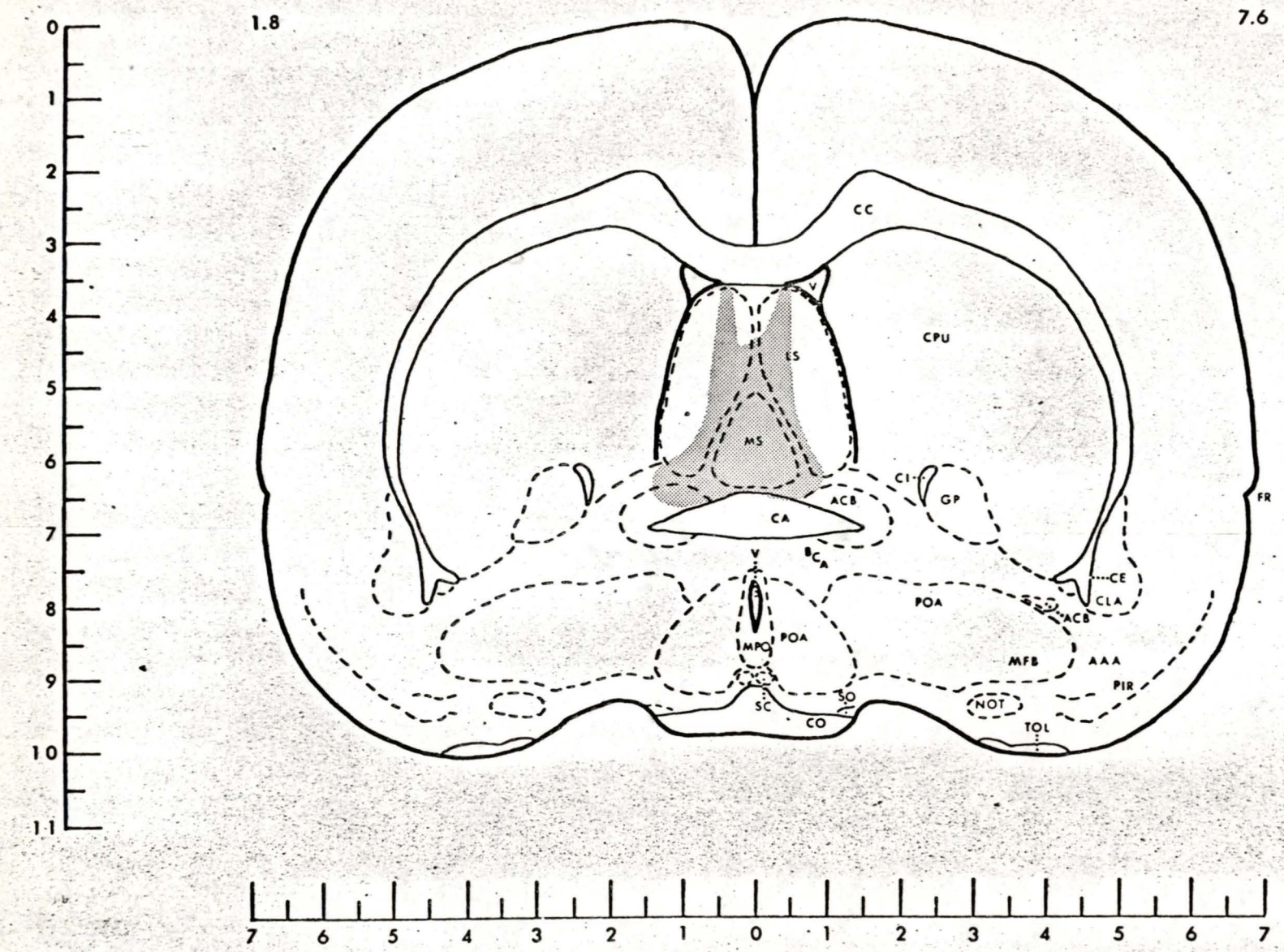

Fig. 1.2. Center of smallest septal lesion.

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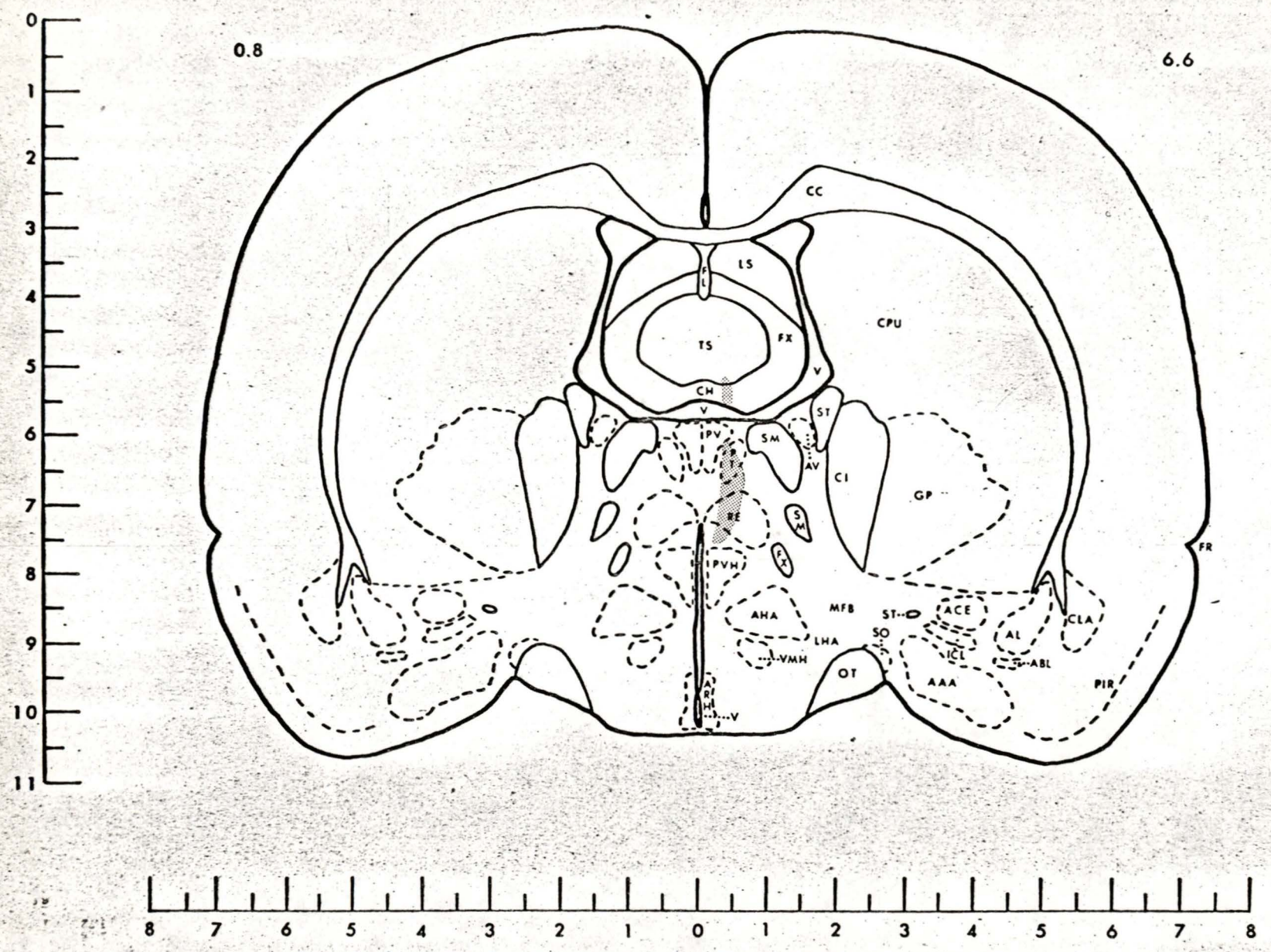


Fig. 1.3. Posterior extent of smallest septal lesion.

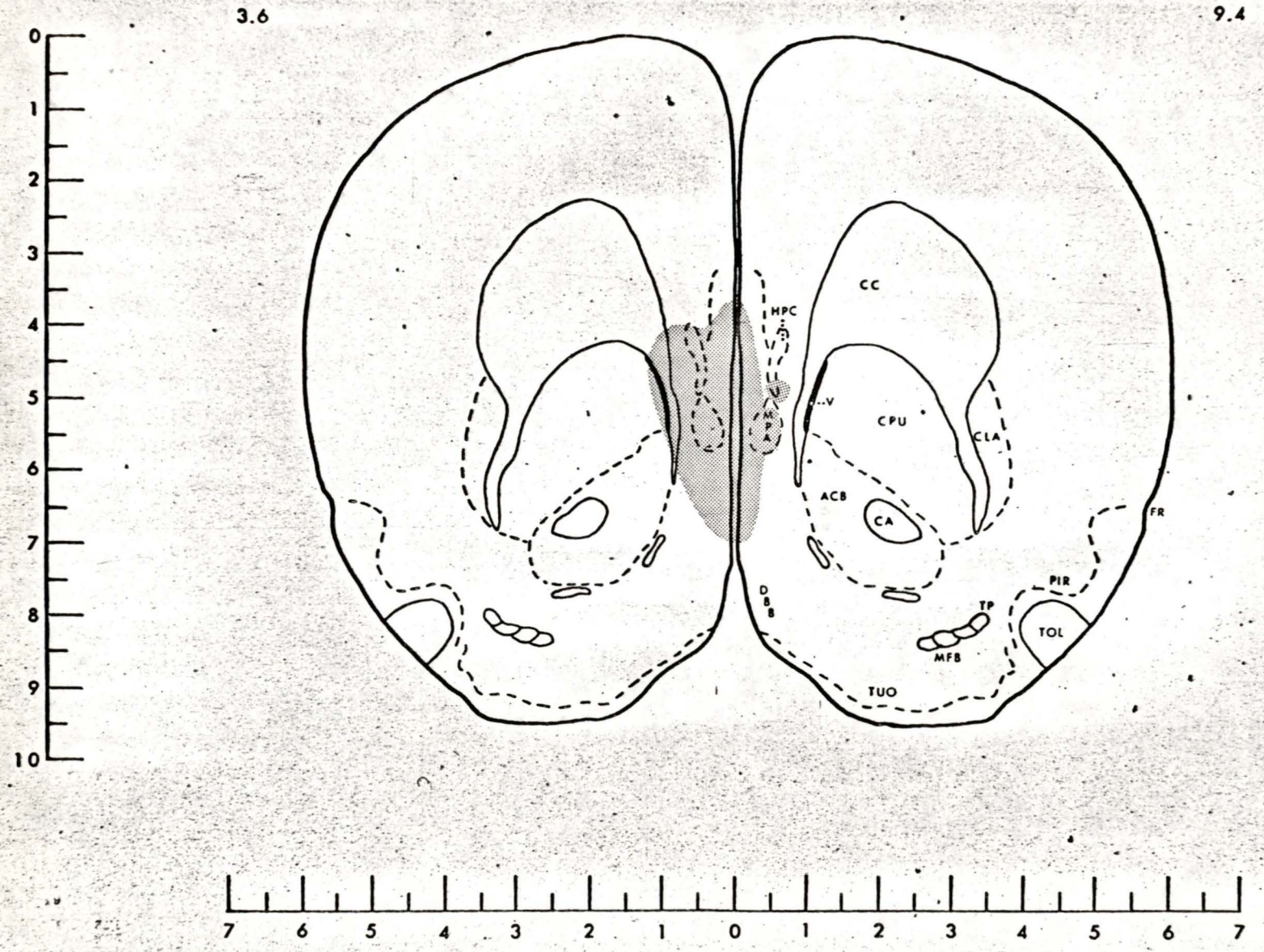
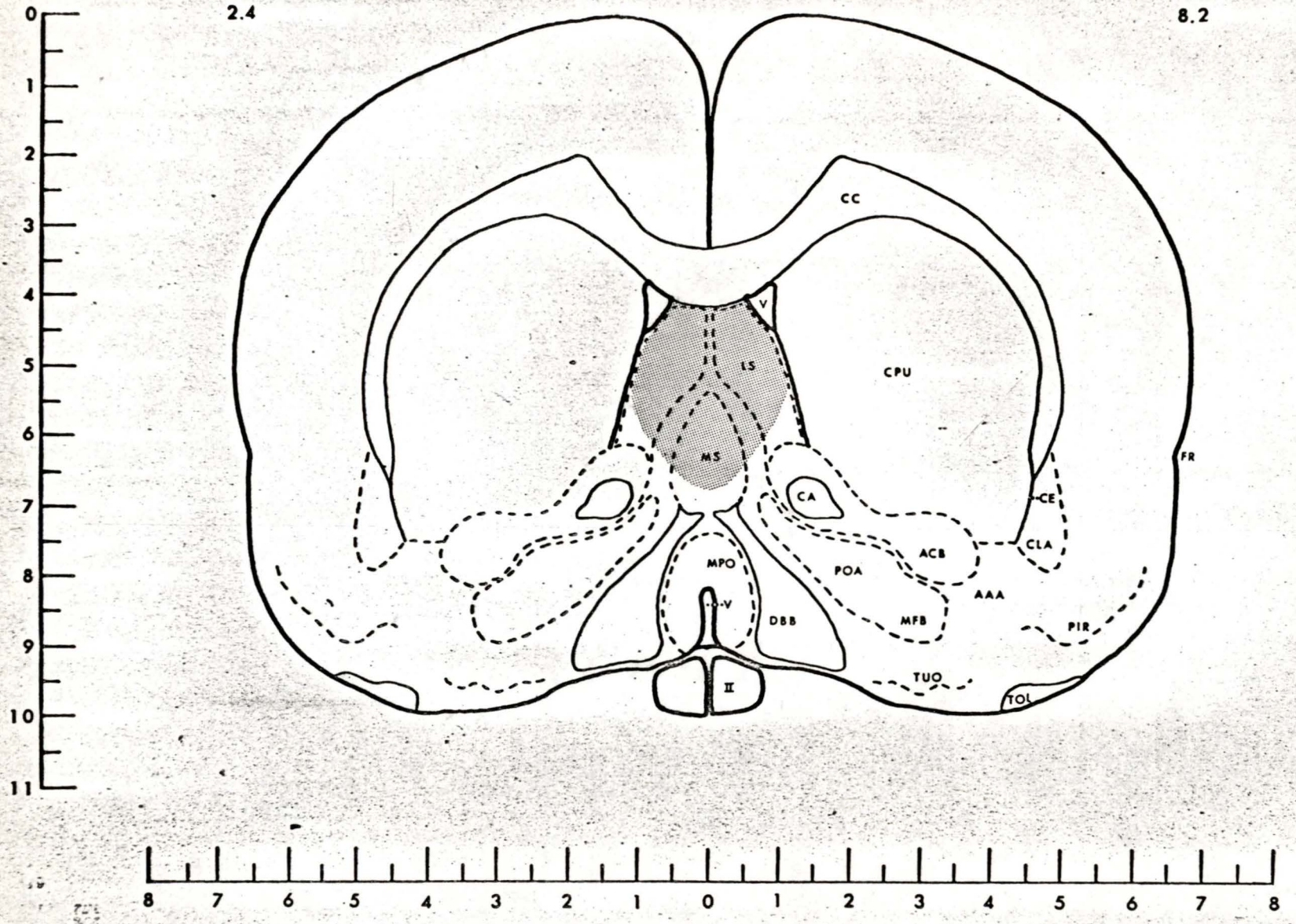


Fig. 1.4. Anterior extent of largest septal lesion.



Fib. 1.5. Center of largest septal lesion.

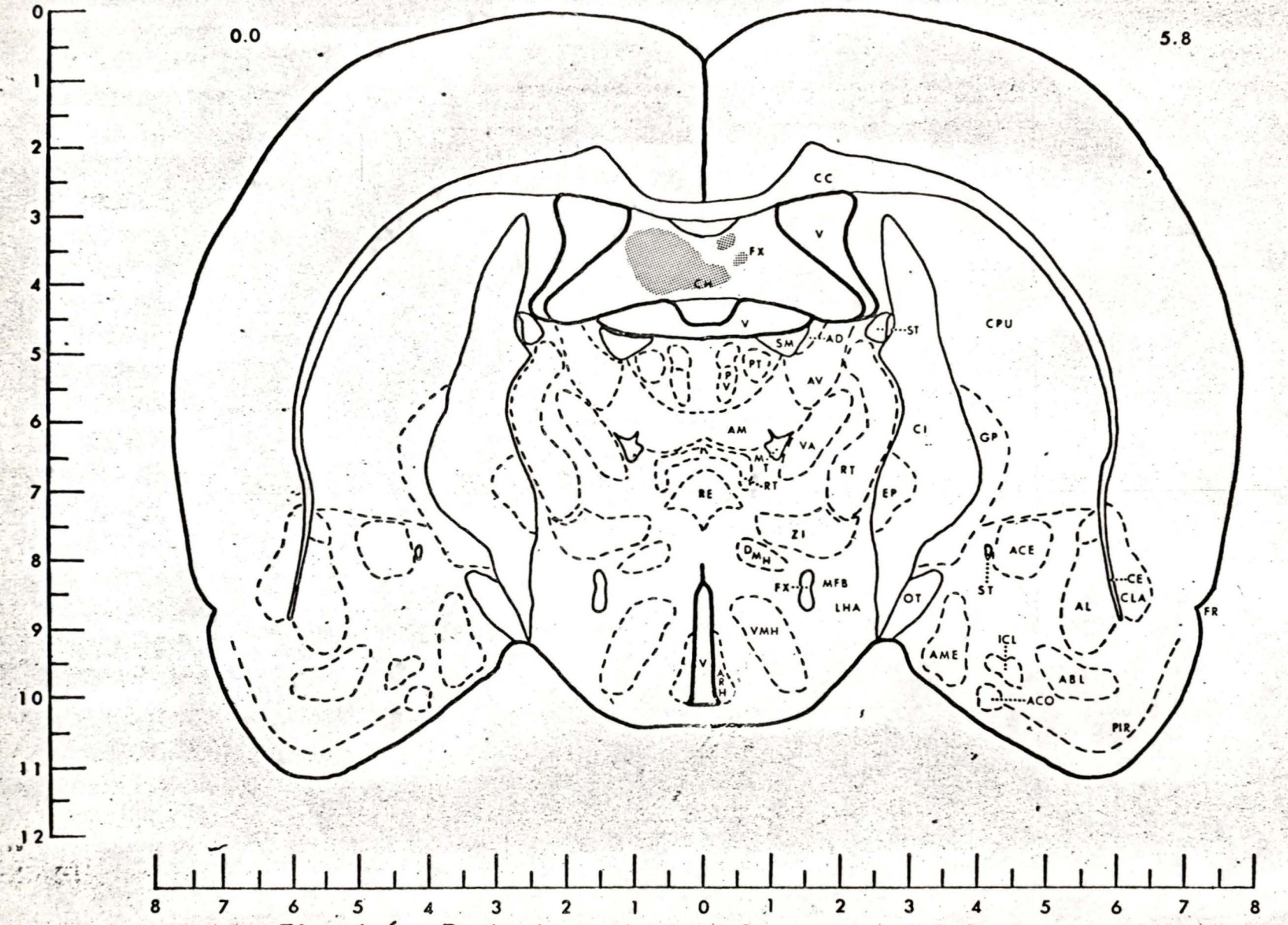


Fig. 1.6. Posterior extent of largest septal lesion.

Figure 2. Average one-way escape-avoidance performance. Response speeds (inverse of response latencies) on each trial for the first forty trials are shown for control and septally lesioned subjects of Training Program B. Avoidance of the shock would correspond to a response speed of about .07 sec.

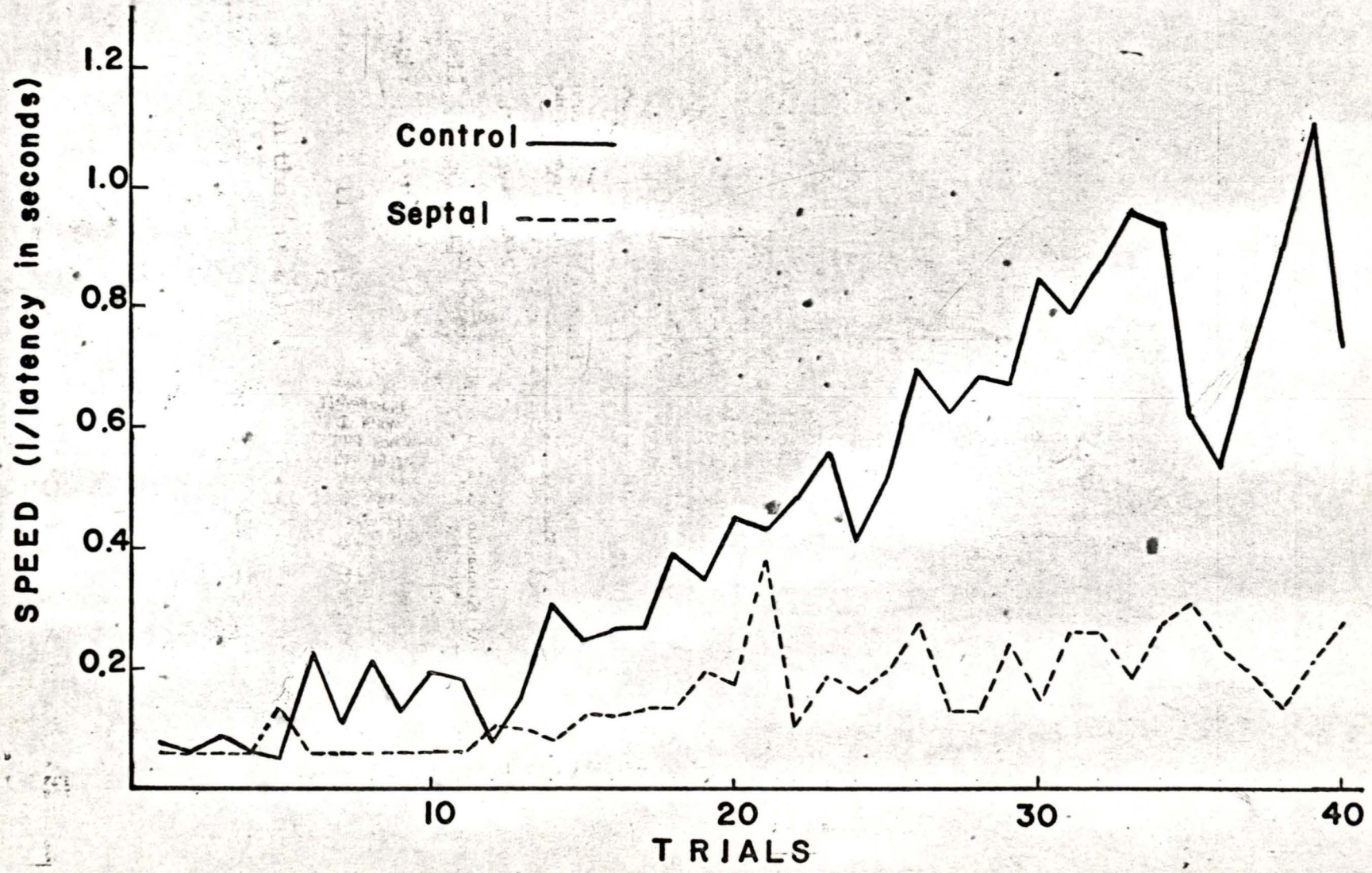


Figure 2. Average one-way escape-avoidance performance.

Discussion

The results of this experiment, together with the findings of other investigators, clearly support Simmons' (1965) hypothesis: in septally lesioned rats the reduction in the effectiveness of punishment in initiating or maintaining escape-avoidance behavior is pronounced. This experiment, in agreement with others (Vanderwolf, 1964; Kenyon & Krieckhaus, 1965b) shows that septally lesioned rats are impaired in one-way escape-avoidance performance. In this experiment, as well as in others (Simmons and Thomas, 1961; Kaada, et al., 1962), septally lesioned rats demonstrate a reduction in the inhibitory effects of punishment upon positively motivated approach and consummatory responses. Additional support for this view is provided by Garber and Simmons (1968). They demonstrated that the decrement in the effectiveness of punishment could lead to improved two-way avoidance performance by reducing conflict. Further, Thompson and Langer (1963) report that septal lesions impair T-maze reversal learning motivated by electric shock.

The present evidence clearly indicates that, in

escape-avoidance situations, a loss of response inhibition is not a major factor in performance disturbances produced by septal lesions. The septally lesioned subjects could inhibit an active avoidance response, and do so irrespective of different levels of practice. McCleary (1966) suggested that the handling of the subjects was the factor responsible for impaired one-way escape-avoidance performance. The present results indicate that even without handling of the subjects, the lesions impaired one-way escape-avoidance performance in rats. The contrary finding in cats (Zucker, 1965) suggests that either 1) substantial differences exist in the functional organization of the septal area in rats and cats, or 2) as Kenyon and Krieckhaus (1965) have argued, Zucker's procedures did not incorporate the essence of the one-way avoidance situation; viz., a relative lack of conflict as compared to the two-way avoidance situation. The data obtained here suggested that extensive practice of an escape-avoidance response would not attenuate the differences between the control subjects and the subjects with septal lesions. Finally, one might argue that competing responses interfered with the performance of the septally lesioned rats; evidence contrary to this interpretation has been

reported by Kenyon and Krieckhaus (1965). It is not obvious that the response inhibition hypothesis provides the best explanation for the behavioral effects of septal lesions in rats.

There is some evidence in the results of the present experiment to suggest that increased drive contributed to the impaired performance of the septally lesioned subjects. The detection of an interaction between the lesion and drive effects depended upon the type of statistical analysis employed. In this sense, the interaction effect was a weak one. However, there is adequate evidence to warrant further theoretical and experimental efforts directed to this point.

In the present study, food drive impaired escape-avoidance performance. In Amsel's (1950) study and in Thomas and Slotnick's (1963) experiment the irrelevant food drive facilitated avoidance performance of normal subjects. In the latter study, two-way avoidance procedures were used; in Amsel's experiment, a very low shock level (.09 ma.) was employed in a one-way avoidance task. The theoretical implications of these procedural differences are not obvious. It is true however, that in the present experiment and in previous studies of two-way avoidance conditioning, the

effects of an irrelevant drive were similar to the effects of septal lesions.

It seems implausible to argue that the drive increments in septally lesioned rats would be specific to food or water. The drive effects in this experiment appeared only in situations associated with punishment. What may be needed for further investigation is some concept of arousal, emotionality, or general stress. The formal definition of such a concept has proved to be behaviorally and physiologically difficult. However, the notion has presented itself in the interpretation of psychobiological phenomena with sufficient frequency to merit detailed attention.

Simmons (1965) has taken an extreme position in attempting to extend his theoretical position to account for the effects of septal lesions on positively motivated performance. He has suggested that septal lesions cause increased aggressiveness; such lesions produce not simply a decrement in the effectiveness of punishment, but a shift in response sets from flight to attack. In an escape situation this shift manifests itself as an apparent decrement in the effects of punishment, but in reward situations one sees an increase in responses that indicate frustration (displacement behavior such as attacking

food dish) as a consequence of not obtaining continuous reinforcement. In avoidance situations, only qualitative observations support such a view (Kaada et al., 1962).

Major variations of the views discussed here exist; only those with extensive experimental support have been cited. The results obtained in this experiment indicate that, whatever view of septal function evolves, such a view will have to reflect the finding that in escape-avoidance situations, septal lesions in rats decrease the effectiveness of punishment.

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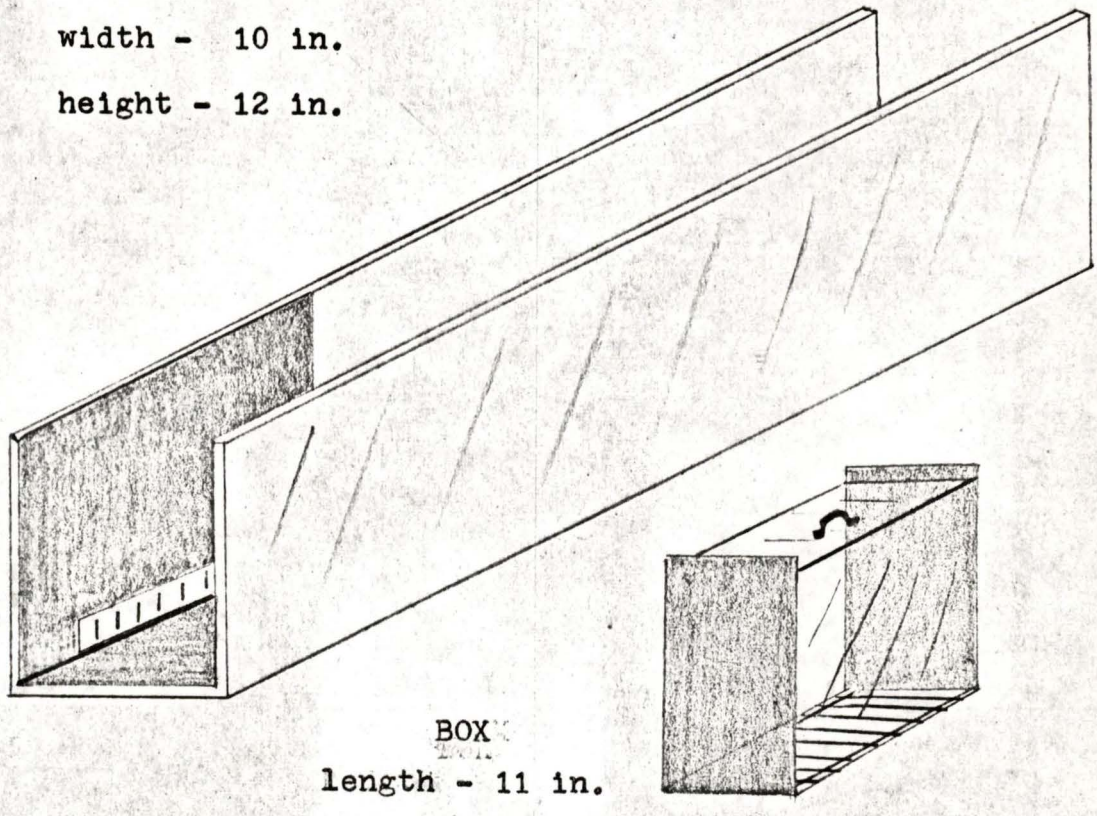
Appendix A: Illustration of one-way escape-avoidance apparatus.

TROUGH

length - 43 in.

width - 10 in.

height - 12 in.



BOX

length - 11 in.

width - 8 in.

height - 10 in.

Appendix B: Comparison of Weight of Ss at time of sacrifice.

The weights, at time of sacrifice, of eight control subjects and eight septally lesioned subjects were randomly selected. A t-test was used to analyze this data. The weights and results are presented below.

Control	Septal
279	323
300	282
326	299
266	313
296	325
324	302
327	310
351	274

The mean for control subjects was 303.5 grams and 308.6 grams for the septally lesioned subjects. The $t = .43$, was not significant at a significance level of .05 ($p = .30$).

Appendix C: Detailed Data.

The data for individual subjects are given on the pages that follow. The abbreviations used include:

RAT NUM	Rat number.
GRP	Group (septally lesioned subjects indicated by S; control subjects by C).
CRD NUM	Card number (for computer coding).
PRE H	Preoperative ratings of resistance to handling (for rater 1, for rater 2, and sum of 1 and 2).
POS H	Postoperative ratings of resistance to handling (as for PRE H).
TRN PGM	Training program (A, B, C, D, E, F, and G).
EAT OUT	Time required for the subject to eat when the Plexiglas box was placed outside the trough (in sec.).
RESPONSES	One-way escape-avoidance performance data given under the headings:
TIME	Response latencies in .01 sec.
A	An entry of A indicates the subject avoided the electrical shock on that trial.

E — An entry of E indicates that the subject ate on that trial (for subject of Training Programs C and F only)

Co. — Card 1, contains the data for trials 1 -10; Card 2, for trials 11-20; Card 3, for trials 21-30; Card 4, for trials 31-40; and Card 5, for trials 41-50.

RAT NUM	GRP	CRD NUM	PRE H 1	PRE H 2	PRE H T	POS H 1	POS H 2	POS H T	TRN PGM	EAT OUT	EAT IN
001	S	0	4	4	8	4	4	8	C	105	213
002	C	0	0	0	0	0	0	0	C	190	300
003	S	0	4	4	8	4	4	8	C	85	130
004	C	0	4	4	8	3	3	6	C	195	195
005	C	0	0	1	1	0	0	0	C	275	465
006	S	0	0	0	0	0	0	0	C	265	300
008	C	0	0	0	0	0	0	0	C	40	343
009	S	0	0	0	0	4	4	8	C	10	3
010	C	0	1	1	2	0	0	0	C	300	428
011	S	0	2	1	3	3	2	5	C	205	73
012	S	0	0	0	0	0	0	0	A	0	0
013	C	0	0	0	0	0	0	0	A	0	0
014	C	0	1	0	1	0	0	0	A	0	0
015	S	0	3	3	6	4	4	8	A	0	0
016	C	0	3	0	3	2	1	3	A	0	0
017	S	0	0	1	1	4	4	8	A	0	0
018	C	0	0	0	0	2	1	3	A	0	0
019	S	0	0	0	0	0	0	0	A	0	0
020	C	0	0	0	0	0	0	0	A	0	0
021	S	0	0	0	0	4	4	8	A	0	0
022	C	0	0	0	0	0	0	0	F	64	558
023	S	0	0	0	0	4	4	8	F	50	288
024	C	0	0	0	0	0	0	0	F	27	83
025	S	0	0	0	0	4	4	8	F	80	108
026	C	0	4	4	8	4	4	8	F	33	88
027	S	0	0	0	0	4	4	8	F	59	85
028	C	0	0	0	0	0	0	0	F	183	188
029	S	0	0	2	2	4	4	8	F	87	130
030	C	0	0	1	1	0	0	0	F	103	186
031	S	0	0	0	0	4	4	8	F	30	28
032	S	0	0	0	0	0	0	0	E	0	0
033	C	0	1	1	2	1	1	2	E	0	0
034	S	0	0	0	0	4	4	8	E	0	0
035	C	0	0	0	0	0	0	0	E	0	0
036	S	0	0	0	0	1	2	3	E	0	0
037	C	0	2	1	3	0	0	0	E	0	0
038	S	0	0	0	0	1	2	3	E	0	0
039	C	0	0	0	0	0	0	0	E	0	0
040	S	0	1	0	1	1	1	2	E	0	0
041	C	0	0	0	0	1	1	2	E	0	0
042	S	0	0	0	0	4	4	8	F	168	138
043	C	0	0	0	0	0	0	0	F	97	63
044	S	0	0	0	0	0	1	1	F	3	68
045	C	0	0	0	0	0	0	0	F	67	300
046	C	0	3	3	6	0	0	0	F	74	165
047	S	0	1	2	3	4	4	8	F	72	93
048	S	0	3	2	5	3	3	6	E	0	0
049	C	0	0	0	0	0	0	0	E	0	0
050	S	0	0	0	0	4	4	8	E	0	0
051	C	0	0	0	0	0	0	0	E	0	0
052	S	0	0	0	0	0	0	0	B	0	0
053	C	0	1	1	2	2	2	4	B	0	0
054	S	0	0	0	0	0	0	0	B	0	0
055	C	0	0	0	0	0	0	0	B	0	0
056	S	0	0	0	0	4	4	8	B	0	0
057	C	0	2	2	4	1	2	3	B	0	0
058	S	0	0	0	0	4	4	8	B	0	0
059	C	0	0	0	0	0	0	0	B	0	0
060	S	0	0	0	0	0	0	0	B	0	0
061	C	0	0	0	0	0	0	0	B	0	0
062	C	0	0	0	0	0	0	0	B	0	0
063	S	0	0	0	0	0	1	1	B	0	0
064	S	0	0	0	0	4	4	8	B	0	0
065	C	0	0	0	0	0	0	0	B	0	0

RAT NUM	GRP	CRD NUM	PRE H 1	PRE H 2	PRE H T	POS H 1	POS H 2	POS H T	TRN PGM	EAT OUT	EAT IN
066	S	0	0	0	0	4	4	8	A	0	0
067	C	0	0	0	0	0	0	0	A	0	0
068	S	0	0	0	0	3	3	6	C	65	105
069	C	0	0	0	0	1	1	2	C	315	830
070	S	0	0	0	0	3	3	6	A	0	0
071	C	0	0	0	0	3	3	6	A	0	0
072	S	0	0	0	0	3	3	6	C	80	240
073	C	0	0	0	0	2	2	4	C	273	900
074	S	0	0	0	0	4	4	8	A	0	0
075	C	0	0	0	0	0	0	0	A	0	0
076	S	0	0	0	0	4	4	8	C	158	100
077	C	0	0	0	0	0	0	0	C	268	275
078	S	0	0	0	0	0	0	0	B	0	0
079	C	0	0	0	0	0	0	0	B	0	0
080	S	0	0	0	0	0	0	0	E	0	0
081	C	0	0	0	0	0	0	0	E	0	0

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IEF285I    SYS69228.T095739.RP017.TRUMPOUR.GOSET                  PASSED
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IEF285I    SYSOUT                                                 SYSOUT
IEF285I    VOL SER NOS=
  GO          END                DATE 69.228        TIME OF DAY 10.0463
IEF285I    SYS69228.T095739.RP017.TRUMPOUR.GOSET                  DELETED
IEF285I    VOL SER NOS= SYS003.
      JOB  TRUMPOUR END.          DATE 69.228        TIME OF DAY 10.0476
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RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES											
				TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
012	S	A	1	1556			1625			1577			1593			1615		
				1556			1557			1567			1580			1542		
			2	1557			1537			907	A		1538			1540		
				1544			1548			1548			1537			1543		
			3	1533			1120	A		708	A		1536			150	A	
				340	A		708	A		1274	A		658	A		760	A	
			4	748	A		1040	A		1411	A		1032	A		1539		
				1306	A		491	A		1073	A		1107	A		726	A	
			5	1552			919	A		660	A		614	A		646	A	
				524	A		1088	A		630	A		1038	A		1695		
015	S	A	1	1561			1555			1633			2134			1673		
				1950			1688			1858			1613			2651		
			2	2531			1615			1630			1552			1595		
				1557			1785			1684			1555			1800		
			3	1574			1552			1596			1544			1018	A	
				1619			1616			1603			1764			1544		
			4	1560			1062	A		1546			936	A		1547		
				1584			1548			1541			1540			1303	A	
			5	1572			1568			96	A		1558			1554		
				160	A		1603			1640			1479	A		1583		
017	S	A	1	1795			1568			1610			1575			1616		
				1637			1537			1552			1537			1548		
			2	1552			793	A		442	A		1161	A		1541		
				435	A		1548			108	A		508	A		1539		
			3	509	A		1525			417	A		537	A		551	A	
				101	A		322	A		484	A		145	A		1428	A	
			4	708	A		144	A		800	A		117	A		633	A	
				502	A		145	A		519	A		117	A		537	A	
			5	288	A		92	A		107	A		106	A		1548		
				209	A		1548			130	A		90	A		106	A	
019	S	A	1	2282			3132			2369			2813			5792		
				4308			6023			2438			4538			1858		
			2	3248			1772			1628			1564			3258		
				3411			1684			3232			3228			3371		
			3	1606			178	A		1607			1528			3465		
				1558			1541			1617			2375			1541		
			4	2143			2140			957	A		1158	A		821	A	
				1573			275	A		1562			1395	A		455	A	
			5	1550			1552			1551			116	A		88	A	
				1548			638	A		102	A		858	A		590	A	

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES											
				TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
021	S	A	1	1885			1560			1687			1554			1622		
				1557			1553			1540			1536			1543		
			2	491	A		1537			520	A		1065	A		823	A	
				1542			890	A		1214	A		532	A		1038	A	
			3	551	A		1091	A		643	A		1415	A		1548		
				84	A		700	A		730	A		115	A		1184	A	
			4	1102	A		1542			1047	A		1048	A		651	A	
				1055	A		1557			573	A		804	A		868	A	
			5	1538			1652			1552			1538	A		543	A	
				293	A		617	A		1147	A		829	A		533	A	
066	S	A	1	1580			1670			1548			1741			1645		
				1744			1550			1553			1562			1695		
			2	1553			1555			1627			1630			1541		
				409	A		338	A		1345	A		1548			1538		
			3	1549			425	A		1525			774	A		1100	A	
				1359	A		501	A		1640			1029	A		1126	A	
			4	1100	A		1547			597	A		841	A		870	A	
				520	A		860	A		982	A		700	A		1537		
			5	1556			155	A		1622			497	A		1552		
				1547			1538			1094	A		1571			92	A	
070	S	A	1	1681			1941			1728			1820			1631		
				1763			3179			1685			1705			1857		
			2	3132			1810			1613			3132			1725		
				1751			1575			1804			1670			1638		
			3	1587			1696			1580			1550			1721		
				1694			1594			1599			1705			1589		
			4	1629			1611			1655			1580			1602		
				1578			1584			1553			1381	A		1572		
			5	1608			1562			1566			1543			1555		
				1540			1552			1544			1558			1797		
074	S	A	1	1569			1583			1563			1551			1536		
				1569			1551			1592			1545			1539		
			2	1553			1539			1538			1540			1528		
				1553			1545			1552			1520			1530		
			3	1542			1194	A		1537			1535			1540		
				803	A		1521			652	A		1397	A		1547		
			4	1546			1541			1604			374	A		679	A	
				1590			375	A		400	A		1536			595	A	
			5	538	A		1551			1114	A		1558			180	A	
				544	A		1539			618	A		1176	A		1175	A	

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES											
				TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
013	C	A	1	1621			1553			1549			1485	A		209	A	
				1545			1579			1535			1553			1675		
			2	357	A		262	A		596	A		1584			157	A	
				226	A		111	A		127	A		236	A		162	A	
			3	90	A		105	A		106	A		125	A		749	A	
				94	A		75	A		72	A		105	A		59	A	
			4	140	A		103	A		73	A		76	A		68	A	
				92	A		94	A		98	A		240	A		99	A	
			5	1568			232	A		600	A		1575			477	A	
				112	A		122	A		110	A		103	A		420	A	
014	C	A	1	1672			1788			1891			1638			1680		
				1694			1630			1633			1544			1560		
			2	1272	A		189	A		1542			1583			117	A	
				1545			1543			317	A		1530			157	A	
			3	338	A		146	A		119	A		135	A		1120	A	
				160	A		1544			110	A		1615			155	A	
			4	97	A		1563			174	A		143	A		102	A	
				153	A		168	A		128	A		90	A		178	A	
			5	1562			1580			1560			1562			1632		
				1557			1554			391	A		103	A		246	A	
016	C	A	1	1553			1540			1582			1543			1635		
				1566			1649			1008	A		410	A		1549		
			2	157	A		237	A		101	A		128	A		104	A	
				262	A		584	A		116	A		117	A		137	A	
			3	135	A		181	A		82	A		84	A		104	A	
				123	A		104	A		111	A		79	A		143	A	
			4	104	A		77	A		156	A		98	A		104	A	
				90	A		109	A		368	A		1032	A		96	A	
			5	1515			1556			293	A		1543			100	A	
				116	A		1555			785	A		96	A		738	A	
018	C	A	1	1572			1579			1534			1561			1628		
				1575			565	A		158	A		680	A		150	A	
			2	352	A		1737			97	A		161	A		296	A	
				101	A		117	A		180	A		87	A		91	A	
			3	88	A		101	A		62	A		71	A		79	A	
				78	A		90	A		62	A		61	A		65	A	
			4	63	A		68	A		76	A		78	A		80	A	
				133	A		103	A		89	A		77	A		140	A	
			5	1540			79	A		123	A		777	A		1546		
				1150	A		250	A		977	A		468	A		148	A	

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES											
				TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
020	C	A	1	1608			1547			1549			1541			1675		
				548	A		1585			428	A		1633			1571		
			2	408	A		122	A		367	A		156	A		247	A	
				149	A		457	A		150	A		132	A		530	A	
			3	117	A		872	A		354	A		151	A		185	A	
				103	A		118	A		115	A		101	A		107	A	
			4	198	A		113	A		100	A		87	A		97	A	
				95	A		95	A		375	A		78	A		89	A	
			5	1525			140	A		80	A		85	A		96	A	
				1445	A		190	A		375	A		263	A		135	A	
067	C	A	1	1666			1687			1577			1588			1580		
				1633			286	A		639	A		1560			1548		
			2	1601			1607			1181	A		1561			586	A	
				86	A		1388	A		251	A		455	A		198	A	
			3	221	A		1547			255	A		379	A		875	A	
				1565			115	A		122	A		570	A		620	A	
			4	419	A		697	A		82	A		152	A		80	A	
				71	A		205	A		596	A		69	A		102	A	
			5	1549			140	A		1463	A		761	A		1557		
				79	A		379	A		1547			60	A		55	A	
071	C	A	1	1607			1536			1659			1548			745	A	
				1696			557	A		262	A		681	A		1580		
			2	655	A		956	A		332	A		84	A		464	A	
				356	A		406	A		640	A		729	A		1545		
			3	79	A		513	A		151	A		351	A		182	A	
				164	A		489	A		636	A		122	A		163	A	
			4	500	A		1188	A		108	A		155	A		156	A	
				149	A		236	A		124	A		151	A		1515		
			5	131	A		110	A		127	A		83	A		260	A	
				84	A		109	A		91	A		93	A		65	A	
075	C	A	1	1662			1634			1573			1605			1529		
				1637			1594			1526			1550			1560		
			2	1558			356	A		525	A		761	A		1553		
				1515			733	A		1590			810	A		424	A	
			3	358	A		1032	A		386	A		532	A		163	A	
				119	A		163	A		55	A		58	A		68	A	
			4	52	A		51	A		70	A		55	A		63	A	
				523	A		65	A		269	A		48	A		476	A	
			5	1693			181	A		62	A		50	A		160	A	
				449	A		52	A		52	A		49	A		407	A	

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
052	S	B	1	1581			1589			1610			1553			161	A	
				1586			1531			1571			1561			1637		
			2	1560			273	A		355	A		1551			391	A	
				391	A		765	A		793	A		124	A		128	A	
			3	73	A		1553			377	A		1543			745	A	
				193	A		344	A		289	A		99	A		609	A	
			4	82	A		543	A		1548			256	A		98	A	
				108	A		97	A		367	A		134	A		431	A	
			5	1285	A		802	A		814	A		1558			328	A	
				224	A		325	A		211	A		179	A		131	A	
054	S	B	1	1576			1593			1711			1643			1784		
				1588			1650			1575			1704			1675		
			2	1565			1700			1738			1778			1734		
				1593			1639			1585			1628			1559		
			3	1556			1545			1545			1535			852	A	
				1628			606	A		1586			1534			833	A	
			4	1019	A		1139	A		1146	A		1598			1187	A	
				855	A		453	A		1257	A		1098	A		1593		
			5	1558			1549			1565			491	A		1551		
				1535			1531			1175	A		1648			538	A	
056	S	B	1	1630			1577			1560			1566			1004	A	
				1572			1548			1618			1575			1557		
			2	1546			1076	A		481	A		449	A		493	A	
				855	A		268	A		259	A		483	A		1570		
			3	111	A		272	A		156	A		123	A		109	A	
				79	A		492	A		1791			350	A		273	A	
			4	413	A		71	A		162	A		79	A		121	A	
				287	A		561	A		97	A		540	A		65	A	
			5	241	A		860	A		704	A		1551			102	A	
				105	A		180	A		843	A		680	A		1579		
058	S	B	1	1706			1628			1746			1727			1602		
				2409			1810			2578			4179			4455		
			2	3344			2078			4057			4285			3480		
				3612			1687			3497			2882			1904		
			3	4353			3807			2577			1856			2322		
				1978			1826			1836			2385			1710		
			4	1612			1601			1634			1573			1589		
				1600			1630			1126	A		1557			1759		
			5	1609			1934			1595			1584			1657		
				1567			1604			1631			1546			1635		

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES											
				TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
060	S	B	1	1817			1810			1570			1617			2180		
				1561			1552			1531			1559			1445	A	
			2	1395	A		1626			1550			1028	A		549	A	
				473	A		522	A		869	A		582	A		536	A	
			3	337	A		1442	A		600	A		774	A		1530		
				1554			1207	A		469	A		483	A		890	A	
			4	708	A		1272	A		389	A		1555			422	A	
				1083	A		354	A		474	A		932	A		1559		
			5	730	A		789	A		1129	A		754	A		567	A	
				1571			598	A		758	A		1550			744	A	
063	S	B	1	1688			1607			1570			1623			1634		
				1747			1710			1624			1767			1703		
			2	2089			1865			1616			1643			1545		
				1578			1700			1894			1630			2916		
			3	1549			1500			1544			1604			1558		
				1550			1631			1548			1547			1545		
			4	1546			1555			1572			1600			1548		
				1640			1535			1535			1357	A		1528		
			5	1580			1631			1553			2035			1551		
				1561			1551			1548			1564			774	A	
064	S	B	1	1568			1694			1569			1783			1563		
				1581			1593			1628			1537			1543		
			2	1244	A		1563			1571			1553			1550		
				590	A		1372	A		491	A		1379	A		1364	A	
			3	654	A		1623			1545			1564			959	A	
				1548			1317	A		1526			1082	A		785	A	
			4	767	A		1412	A		585	A		1698			1547		
				600	A		336	A		1556			567	A		1120	A	
			5	1567			1071	A		1433	A		1582			714	A	
				1605			1179	A		1546			666	A		701	A	
078	S	B	1	1976			1975			2677			1786			1732		
				1685			1708			1721			1610			1559		
			2	1571			1579			1561			1654			1562		
				1556			1531			1544			1534			1548		
			3	1537			1544			864	A		1538			1535		
				1536			1076	A		1539			1532			1047	A	
			4	1575			1537			1050	A		811	A		1557		
				1552			1120	A		1562			747	A		1303	A	
			5	1640			1633			1486	A		1538			700	A	
				1515			1533			995	A		1545			1230	A	

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES											
				TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
053	C	B	1	1668			1574			1571			1489	A		1579		
				270	A		677	A		182	A		435	A		612	A	
			2	261	A		1577			445	A		126	A		359	A	
				591	A		109	A		127	A		107	A		97	A	
			3	85	A		93	A		81	A		104	A		77	A	
				73	A		133	A		71	A		87	A		68	A	
			4	88	A		69	A		63	A		90	A		70	A	
				74	A		186	A		104	A		69	A		92	A	
			5	208	A		1548			86	A		63	A		73	A	
				83	A		59	A		60	A		45	A		45	A	
055	C	B	1	481	A		1767			1615			1549			1781		
				319	A		1321	A		1633			1601			1594		
			2	1585			1445	A		357	A		193	A		453	A	
				159	A		1571			174	A		369	A		189	A	
			3	694	A		160	A		140	A		143	A		110	A	
				81	A		171	A		106	A		132	A		240	A	
			4	94	A		91	A		82	A		120	A		73	A	
				87	A		143	A		79	A		77	A		112	A	
			5	772	A		82	A		76	A		164	A		89	A	
				83	A		200	A		73	A		57	A		107	A	
057	C	B	1	1705			1747			1558			1571			1540		
				488	A		309	A		1557			1609			1400	A	
			2	1588			1555			770	A		638	A		1090	A	
				857	A		464	A		1106	A		440	A		140	A	
			3	174	A		271	A		129	A		1562			172	A	
				104	A		75	A		117	A		104	A		280	A	
			4	173	A		113	A		131	A		122	A		656	A	
				1548			96	A		81	A		83	A		182	A	
			5	1578			1582			1607			1495	A		1581		
				1627			1590			1930			506	A		395	A	
059	C	B	1	1498	A		1567			1618			1686			1656		
				163	A		1590			135	A		1735			327	A	
			2	156	A		456	A		494	A		237	A		107	A	
				183	A		185	A		195	A		1079	A		1558		
			3	183	A		207	A		298	A		107	A		965	A	
				282	A		913	A		1570			104	A		202	A	
			4	211	A		87	A		202	A		79	A		167	A	
				93	A		83	A		73	A		71	A		74	A	
			5	312	A		71	A		458	A		124	A		72	A	
				68	A		124	A		67	A		65	A		57	A	

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES											
				TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
061	C	B	1	1567			1814			1721			1623			1608		
				1893			1546			1830			1543			1542		
			2	1556			1566			1592			654	A		765	A	
				237	A		1588			192	A		323	A		1160	A	
			3	408	A		1619			725	A		725	A		372	A	
				237	A		166	A		1549			733	A		117	A	
			4	1535			772	A		77	A		146	A		1137	A	
				764	A		454	A		331	A		87	A		101	A	
			5	1586			552	A		1548			81	A		1188	A	
				1545			64	A		221	A		161	A		72	A	
062	C	B	1	1675			1557			1593			1562			1537		
				1658			1600			848	A		396	A		170	A	
			2	813	A		1903			712	A		856	A		543	A	
				1559			884	A		1087	A		249	A		531	A	
			3	1620			480	A		1560			636	A		397	A	
				106	A		618	A		121	A		790	A		179	A	
			4	114	A		127	A		128	A		173	A		124	A	
				657	A		88	A		434	A		85	A		148	A	
			5	117	A		841	A		118	A		1389	A		82	A	
				589	A		393	A		1575			62	A		52	A	
065	C	B	1	1573			1552			531	A		1578			1610		
				1574			1597			1630			1542			1549		
			2	1538			1545			1684			1613			1307	A	
				955	A		480	A		215	A		234	A		132	A	
			3	475	A		636	A		217	A		809	A		210	A	
				785	A		93	A		111	A		80	A		80	A	
			4	116	A		286	A		200	A		91	A		332	A	
				429	A		119	A		76	A		200	A		554	A	
			5	1559			310	A		294	A		1481	A		509	A	
				1545			134	A		114	A		1097	A		617	A	
079	C	B	1	1582			1654			1616			1533			1619		
				1561			1563			1746			461	A		479	A	
			2	1495	A		1551			1553			739	A		1037	A	
				1537			1530			1552			790	A		410	A	
			3	185	A		104	A		130	A		314	A		364	A	
				479	A		227	A		203	A		1597			71	A	
			4	73	A		86	A		100	A		86	A		426	A	
				510	A		363	A		180	A		152	A		626	A	
			5	99	A		1609			164	A		70	A		93	A	
				72	A		203	A		59	A		62	A		73	A	

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES											
				TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
001	S	C	1	1868			1775			1675			1627			1626		
				1560			1637			1595			1635			1524		
			2	1516			1523			1635			1640			1532		
				1557			1620			1630			1540			1657		
			3	1575			947	A		1662			1610			1521		
				1520			1532			1572			1513			1601		
			4	1508			1493	A		1568			1513			1574		
				1553			1513			1520			1630			1567		
			5	1626			1568			1644			116	A		514	A	
				434	A		447	A		111	A		99	A		135	A	
003	S	C	1	1585			1668			1780			1678			1588		
				1570			1574			1565			1554			1566		
			2	1690			1608			497	A		1541			1573		
				1530			1529			607	A		1528			1559		
			3	1518			872	A		1530			86	A		1535		
				1635			579	A		1536			1520			1535		
			4	532	A		89	A		1522			632	A		570	A	
				942	A		312	A		1278	A		774	A		1088	A	
			5	1628		E	1578			1124	A		1618			1580		
				119	A		114	A		130	A		76	A		1212	A	E
006	S	C	1	1553			1540			1540			1840			1623		
				1893			1632			1577			1616			1565		
			2	1530			1536			1527			1554			1291	A	
				1532			1622			1539			1590			1579		
			3	1555			1534			630	A		1539			491	A	
				1560			1576			1583			1534			1523		
			4	1611			1587			1103	A		929	A		1540		
				1314	A		1530			1540			1563			897	A	
			5	1624			1565			1542			1528			1195	A	
				718	A		1009	A		1224	A		1609			98	A	
009	S	C	1	1781			1718			1575			1650			1645		
				1622			1555			1575			1518			1562		
			2	1531			1568			108	A		945	A		1565		
				1640			107	A		163	A		1174	A		1548		
			3	828	A		1533			361	A		1162	A		88	A	
				1530			227	A		92	A		688	A		109	A	
			4	118	A		975	A		1528			80	A		138	A	
				452	A		740	A		1077	A		841	A		159	A	
			5	1570			1565		E	908	A		1589		E	470	A	E
				373	A	E	737	A	E	508	A		742	A		1772		E

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
011	S	C	1	1591			1619			1541			1558			1559		
				1540			1538			1537			1546			1547		
			2	1549			1549			1539			437	A		753	A	
				1540			1066	A		1535			1187	A		310	A	
			3	149	A		477	A		200	A		103	A		1155	A	
				787	A		1189	A		573	A		955	A		1536		
			4	1092	A		1531			620	A		818	A		150	A	
				578	A		575	A		881	A		561	A		217	A	
			5	1535			433	A		1198	A	E	977	A		1175	A	
				1540			77	A		121	A		1358	A		49	A	
068	S	C	1	1567			1571			1674			1593			98	A	
				1569			1583			1544			1541			1639		
			2	1531			435	A		1596			1584			1541		
				1631			372	A		1595			1758			1607		
			3	1534			1629			342	A		1545			1328	A	
				1624			571	A		1539			1550			390	A	
			4	448	A		1554			414	A		224	A		1544		
				557	A		259	A		744	A		649	A		345	A	
			5	1554		E	1002	A		1058	A		155	A		110	A	
				1565		E	567	A		749	A		635	A		843	A	
072	S	C	1	1565			1689			1582			1556			1538		
				1605			308	A		1568			1670			737	A	
			2	1053	A		1602			1593			1532			1538		
				532	A		179	A		1557			960	A		1531		
			3	900	A		1532			1534			124	A		128	A	
				233	A		922	A		885	A		507	A		882	A	
			4	505	A		105	A		326	A		203	A		1156	A	
				215	A		86	A		67	A		68	A		129	A	
			5	1835			686	A		286	A		508	A		910	A	
				465	A		408	A		1545			291	A		72	A	
076	S	C	1	1562			1604			1572			1540			1568		
				1591			1530			1567			1547			1536		
			2	1533			1519			1544			1537			1538		
				1530			1567			1538			1530			1527		
			3	1531			1547			1540			1542			1547		
				466	A		916	A		1530			1528			1538		
			4	831	A		1134	A		1595			691	A		1534		
				528	A		1554			1379	A		1538			1533		
			5	1585			1540			148	A		1565			597	A	
				1114	A		1541			1582			1723			351	A	

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES											
				TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
002	C	C	1	1553			477	A		1541			1480	A		1625		
				1608			1275	A		1641			416	A		1527		
			2	227	A		467	A		257	A		222	A		432	A	
				143	A		1552			100	A		100	A		214	A	
			3	260	A		97	A		225	A		154	A		139	A	
				224	A		160	A		241	A		157	A		168	A	
			4	128	A		1420	A		283	A		146	A		209	A	
				106	A		110	A		160	A		1636			320	A	
			5	1570			90	A		85	A		115	A		89	A	
				84	A		158	A		106	A		70	A		61	A	
004	C	C	1	482	A		2095			1589			858	A		173	A	
				1555			108	A		1023	A		1582			134	A	
			2	518	A		1541			205	A		1545			1546		
				184	A		113	A		122	A		116	A		94	A	
			3	135	A		145	A		355	A		120	A		162	A	
				126	A		145	A		1542			783	A		142	A	
			4	114	A		103	A		95	A		223	A		85	A	
				128	A		107	A		103	A		279	A		78	A	
			5	1588			1576			1583			569	A		243	A	
				154	A		1537			110	A		86	A		66	A	
005	C	C	1	1800			1535			1776			3900			1532		
				1540			1532			1562			1524			867	A	
			2	1529			1512			293	A		282	A		1980		
				441	A		376	A		848	A		376	A		421	A	
			3	202	A		232	A		443	A		477	A		467	A	
				490	A		627	A		381	A		556	A		153	A	
			4	308	A		336	A		183	A		362	A		508	A	
				206	A		128	A		242	A		143	A		114	A	
			5	1603			1556			80	A		71	A		106	A	
				102	A		80	A		96	A		85	A		1547		
008	C	C	1	607	A		1576			1532			1585			1678		
				228	A		1538			287	A		1563			1660		
			2	607	A		322	A		266	A		153	A		169	A	
				491	A		443	A		291	A		395	A		205	A	
			3	230	A		135	A		196	A		108	A		537	A	
				251	A		118	A		203	A		145	A		92	A	
			4	346	A		202	A		146	A		114	A		132	A	
				591	A		252	A		159	A		88	A		315	A	
			5	1545			117	A		83	A		102	A		111	A	
				90	A		78	A		80	A		84	A		99	A	

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES											
				TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
010	C	C	1	1687			1532			1558			1533			1549		
				1608			1623			1562			1559			1559		
			2	1549			618	A		508	A		215	A		140	A	
				254	A		314	A		144	A		129	A		102	A	
			3	111	A		436	A		477	A		182	A		217	A	
				440	A		96	A		1572			155	A		108	A	
			4	86	A		1566			88	A		98	A		82	A	
				88	A		80	A		65	A		68	A		79	A	
			5	1585			73	A		1605			57	A		92	A	
				57	A		85	A		57	A		53	A		74	A	
069	C	C	1	1621			1614			1585			790	A		1557		
				1700			318	A		336	A		658	A		1574		
			2	706	A		1547			850	A		1540			642	A	
				121	A		426	A		778	A		289	A		706	A	
			3	651	A		754	A		185	A		573	A		1541		
				129	A		1635			291	A		115	A		293	A	
			4	1193	A		1533			91	A		83	A		1580		
				528	A		1312	A		355	A		195	A		208	A	
			5	1634			517	A		649	A		1680			209	A	
				1554			85	A		473	A		1007	A		436	A	
073	C	C	1	1660			1555			1551			1561			1554		
				1596			1548			1565			744	A		359	A	
			2	1591			439	A		1126	A		495	A		95	A	
				384	A		248	A		269	A		187	A		400	A	
			3	335	A		90	A		74	A		97	A		179	A	
				102	A		353	A		580	A		610	A		1538		
			4	1158	A		82	A		60	A		581	A		88	A	
				300	A		828	A		1555			60	A		182	A	
			5	157	A		92	A		265	A		59	A		48	A	
				63	A		285	A		60	A		59	A		98	A	
077	C	C	1	1594			1110	A		1787			1595			1590		
				1668			124	A		1631			1549			1561		
			2	465	A		1154	A		1532			540	A		431	A	
				608	A		365	A		121	A		1543			1555		
			3	395	A		299	A		1612			1235	A		348	A	
				223	A		694	A		412	A		1065	A		100	A	
			4	431	A		316	A		76	A		514	A		101	A	
				1469	A		113	A		617	A		200	A		1451	A	
			5	1562			1060	A		507	A		1413	A		1414	A	
				1573			1310	A		113	A		437	A		83	A	

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES											
				TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
037	C	E	1	1596			1577			1581			1594			2029		
				1562			238	A		1576			1825			2034		
			2	1982			103	A		1559			106	A		196	A	
				185	A		73	A		71	A		78	A		61	A	
			3	1559			68	A		76	A		101	A		89	A	
				49	A		86	A		66	A		84	A		638	A	
			4	56	A		79	A		69	A		81	A		147	A	
				75	A		100	A		108	A		114	A		69	A	
039	C	E	1	1628			1446	A		1556			789	A		1585		
				1611			768	A		1585			1703			527	A	
			2	1633			1556			1625			411	A		570	A	
				304	A		416	A		598	A		477	A		522	A	
			3	423	A		811	A		371	A		105	A		192	A	
				700	A		1134	A		1577			593	A		511	A	
			4	445	A		145	A		368	A		696	A		539	A	
				266	A		345	A		116	A		234	A		440	A	
041	C	E	1	1245	A		1114	A		1584			1628			1680		
				1602			1590			1603			1677			1557		
			2	704	A		1086	A		758	A		1722			407	A	
				604	A		471	A		127	A		127	A		209	A	
			3	96	A		151	A		107	A		157	A		82	A	
				1448	A		1632			298	A		88	A		266	A	
			4	99	A		97	A		89	A		101	A		213	A	
				187	A		83	A		143	A		98	A		78	A	
049	C	E	1	1680			1550			1568			1635			1555		
				1617			1643			1585			1566			448	A	
			2	1576			1562			1575			1654			880	A	
				1555			1095	A		137	A		630	A		390	A	
			3	442	A		491	A		246	A		107	A		467	A	
				188	A		225	A		439	A		73	A		67	A	
			4	212	A		116	A		100	A		99	A		226	A	
				70	A		320	A		1552			442	A		763	A	
051	C	E	1	1597			1556			1539			1570			1562		
				1643			1646			1610			1556			1587		
			2	1616			1347	A		1205	A		1607			1535		
				500	A		392	A		1465	A		442	A		1655		
			3	325	A		322	A		710	A		303	A		275	A	
				325	A		183	A		174	A		418	A		235	A	
			4	1008	A		473	A		1562			507	A		402	A	
				537	A		440	A		189	A		303	A		388	A	

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES													
				TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
031	S	F	1	1643			1653			1625			1590			1593		
				1627			1551			1587			1597			945	A	E
			2	1487	A	E	1562			1575			1588			965	A	E
				115	A	E	1578			787	A	E	1585			105	A	E
			3	1577			1017	A	E	1576			635	A	E	435	A	
				192	A	E	1547		E	572	A	E	500	A	E	448	A	
			4	1219	A	E	671	A	E	1537			353	A	E	545	A	
				322	A	E	290	A	E	444	A	E	372	A	E	333	A	E
042	S	F	1	1653			1539			1621			1604			1640		
				1553			1666			1548			1615			1625		
			2	1713			1558			1567			241	A		1556		
				2726			1553			863	A		167	A		1229	A	
			3	1574			1547			168	A		370	A		112	A	
				1554			948	A		601	A		1152	A		1223	A	
			4	147	A		418	A		1546			99	A		200	A	
				400	A		684	A		639	A		1247	A		839	A	
044	S	F	1	1596			1579			1549			1760			1600		
				1587			1540			1784			1614			619	A	
			2	617	A		1047	A		1537			1082	A		698	A	
				518	A		1625			1542			446	A		432	A	
			3	523	A		599	A		547	A		148	A		1161	A	
				934	A		1638			1596		E	1578		E	510	A	E
			4	570	A	E	675	A	E	1154	A	E	628	A	E	679	A	E
				1560		E	373	A	E	1185	A	E	986	A	E	1498	A	E
047	S	F	1	1555			1558			298	A		1578			1407	A	
				640	A		85	A		832	A		124	A		1618		
			2	140	A		96	A		1004	A		95	A		83	A	
				87	A		127	A		51	A		63	A		82	A	
			3	72	A		80	A		76	A		75	A		111	A	
				65	A		736	A		590	A		340	A		88	A	
			4	77	A		68	A		71	A		75	A		477	A	
				859	A		153	A		365	A		108	A		73	A	
022	C	F	1	1658			1616			1575			126	A		67	A	
				1550			1627			107	A		78	A		1568		
			2	68	A		222	A		808	A		410	A		1556		
				1108	A		687	A		220	A		1699			87	A	
			3	156	A		67	A		114	A		68	A		67	A	
				111	A		81	A		85	A		172	A		57	A	
			4	59	A		85	A		1285	A		76	A		76	A	
				64	A		142	A		72	A		45	A		65	A	

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES											
				TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
024	C	F	1	1665			330	A		108	A		1597			1568		
				1561			1555			132	A		104	A		134	A	
			2	1551			128	A		113	A		82	A		357	A	
				1567			63	A		57	A		75	A		1568		
			3	662	A		462	A		524	A		134	A		260	A	
				100	A		77	A		418	A		90	A		81	A	
			4	66	A		61	A		53	A		55	A		37	A	
				300	A		58	A		48	A		25	A		283	A	
026	C	F	1	1658			935	A		1026	A		108	A		103	A	
				108	A		108	A		465	A		1614			314	A	
			2	76	A		768	A		719	A		1610			468	A	
				80	A		394	A		107	A		86	A		107	A	
			3	113	A		92	A		101	A		103	A		67	A	
				84	A		98	A		53	A		70	A		79	A	
			4	90	A		73	A		88	A		95	A		45	A	
				70	A		66	A		86	A		57	A		48	A	
028	C	F	1	1691			1550			1679			924	A		1537		
				1836			1566			1000	A		1537			589	A	
			2	1543			328	A		99	A		117	A		1399	A	
				93	A		102	A		110	A		100	A		160	A	
			3	377	A		698	A		101	A		104	A		131	A	
				67	A		96	A		99	A		181	A		612	A	
			4	141	A		145	A		154	A		89	A		73	A	
				94	A		282	A		80	A		233	A		108	A	
030	C	F	1	1618			511	A		146	A		460	A		179	A	
				258	A		1674			93	A		98	A		120	A	
			2	225	A		272	A		84	A		170	A		63	A	
				79	A		74	A		101	A		116	A		72	A	
			3	113	A		135	A		94	A		66	A		100	A	
				52	A		155	A		98	A		81	A		98	A	
			4	78	A		93	A		83	A		176	A		78	A	
				79	A		133	A		91	A		424	A		84	A	
043	C	F	1	1572			395	A		893	A		1556			1563		
				1565			1233	A		1573			1640			170	A	
			2	1550			1549			780	A		1632			1552		
				160	A		75	A		1550			1619			92	A	
			3	107	A		107	A		1556			1547			1555		
				84	A		155	A		173	A		103	A		1552		
			4	140	A		431	A		115	A		90	A		1558		
				95	A		68	A		176	A		76	A		712	A	

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES											
				TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
045	C	F	1	1748			1586			1553			1605			1557		
				1548			1548			1578			1596			1613		
			2	1554			1543			1555			1553			1555		
				575	A		1612			1013	A		188	A		1031	A	
			3	631	A		263	A		150	A		118	A		85	A	
				105	A		96	A		152	A		162	A		95	A	
			4	89	A		112	A		923	A		137	A		80	A	
				151	A		1027	A		755	A		1549			99	A	
046	C	F	1	1700			312	A		455	A		215	A		312	A	
				295	A		200	A		1616			98	A		1553		
			2	195	A		1563			1551			1391	A		176	A	
				88	A		76	A		64	A		91	A		93	A	
			3	90	A		75	A		75	A		74	A		74	A	
				57	A		115	A		62	A		58	A		75	A	
			4	55	A		58	A		52	A		78	A		48	A	
				62	A		62	A		71	A		176	A		56	A	
082	C	G	1	1764			1991			2215			1641			1608		
				1620			1580			1655			1625			1545		
			2	1767			1727			1551			1628			1143	A	
				1553			1560			1548			1530			468	A	
			3	1538			861	A		320	A		916	A		1558		
				1545			1180	A		1565			1525			615	A	
			4	1647			1097	A		1661			1221	A		1248	A	
				1544			219	A		778	A		1637			1537		
083	C	G	1	1606			1570			1736			1542			1545		
				1688			318	A		582	A		1730			1537		
			2	285	A		255	A		144	A		87	A		96	A	
				142	A		205	A		151	A		303	A		376	A	
			3	389	A		112	A		92	A		205	A		95	A	
				115	A		1277	A		197	A		126	A		100	A	
			4	74	A		89	A		80	A		521	A		111	A	
				87	A		320	A		95	A		168	A		468	A	
084	C	G	1	1673			1662			403	A		179	A		1715		
				400	A		1576			369	A		1064	A		408	A	
			2	1597			590	A		1635			256	A		420	A	
				718	A		1608			1587			478	A		700	A	
			3	1543			110	A		1126	A		344	A		107	A	
				723	A		64	A		122	A		62	A		131	A	
			4	58	A		272	A		61	A		56	A		146	A	
				82	A		255	A		68	A		53	A		44	A	

RAT NUM	GRP	TRN PGM	CRD NUM	RESPONSES											
				TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E	TIME	A	E
085	C	G	1	1696			1598			1796			1543			1560		
				758	A		1586			1540			1552			294	A	
			2	172	A		57	A		52	A		132	A		100	A	
				62	A		390	A		640	A		86	A		238	A	
			3	46	A		435	A		55	A		57	A		52	A	
				80	A		194	A		47	A		42	A		45	A	
			4	70	A		54	A		43	A		489	A		403	A	
				222	A		64	A		574	A		432	A		145	A	
086	C	G	1	1664			1532			261	A		726	A		1555		
				1393	A		1569			1557			333	A		265	A	
			2	276	A		498	A		248	A		228	A		1529		
				319	A		185	A		134	A		127	A		105	A	
			3	120	A		741	A		334	A		59	A		202	A	
				121	A		90	A		478	A		166	A		594	A	
			4	205	A		1537			1553			80	A		96	A	
				858	A		139	A		1008	A		355	A		137	A	
087	C	G	1	1602			1547			1539			1541			1596		
				1519			1542			1562			1762			1547		
			2	260	A		1535			1590			1113	A		144	A	
				260	A		1262	A		311	A		84	A		935	A	
			3	1568			1284	A		143	A		1084	A		70	A	
				535	A		78	A		262	A		220	A		192	A	
			4	1168	A		1535			679	A		1529			730	A	
				1568			262	A		75	A		62	A		381	A	
088	C	G	1	1730			1580			1706			440	A		1540		
				535	A		1748			305	A		1135	A		132	A	
			2	1162	A		133	A		124	A		112	A		183	A	
				206	A		278	A		128	A		103	A		179	A	
			3	145	A		1050	A		119	A		97	A		132	A	
				404	A		272	A		780	A		1542			78	A	
			4	396	A		1523			188	A		145	A		245	A	
				227	A		327	A		68	A		98	A		71	A	
089	C	G	1	1529			1537			1820			1567			1523		
				871	A		1049	A		1560			1297	A		985	A	
			2	1212	A		730	A		724	A		378	A		1408	A	
				798	A		620	A		906	A		369	A		356	A	
			3	744	A		480	A		157	A		552	A		97	A	
				675	A		558	A		217	A		137	A		62	A	
			4	368	A		420	A		122	A		241	A		92	A	
				1024	A		584	A		72	A		116	A		205	A	

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