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THE ROLE OF THE BAR IN THE ACQUISITION
OF BAR PRESS AVOIDANCE

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THESIS



ABSTRACT

THE ROLE OF THE BAR IN THE ACQUISITION OF BAR PRESS AVOIDANCE

by Edward Rea Christophersen

A considerable amount of research has been devoted to the bar press avoidance situation in rats. Specifically, numerous investigations have been made in an effort to discover any variable which would account for the relatively poor avoidance performance in the bar press situation as compared to avoidance performance in a wheel-turn or shuttle bar situation.

The present experiment, based upon intensive pilot work, examined the effect, upon performance, of pairing the presentation of a retractable bar with the buzzer (CS). Three groups of six subjects were run in an automated bar press avoidance apparatus. Control group 1 resembled the typical avoidance schedule in which shocks are presented at fixed intervals unless a bar press is made, in which case the next shock is postponed. The bar, for control group 1 was always in the extended position.

The conditions for the experimental group were identical to control group 1 except that the bar was extended with the onset of the CS and retracted with the termination of the CS, i.e., the bar was present only when the CS was being presented.

Control group 2 was similar to the experimental group except that, the bar, in addition to being presented with the CS, was presented irregularly throughout the experimental session.

Subjects were said to have reached criterion performance when

they avoided 95% of the shocks two sessions in a row.

The results indicated that the pairing of the presentation of the bar with the CS yielded significantly better performance than having the bar present throughout the session. The slowest subject in the experiment group reached criterion one session before the fastest subject in control group I. It was suggested that these results could be attributed to (1) eliminating bar-holding, (2) eliminating non-reinforced bar presses, or (3) the discriminative stimulus properties acquired by the bar thru repeated pairing with the buzzer and the shock.

A group with an intermittently presented bar was included in an effort to differentiate between the first and third possibilities. The data indicated that the introduction of the bar was a strong cue.

Approved: _____

M. Ray Denny, Major Professor

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OF BAR PRESS AVOIDANCE

By

Edward Rea Christophersen

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Introduction

Discrimination avoidance procedures are used extensively by the behavior scientist. In such procedures, an animal is trained to perform a response in the presence of a stimulus which signals the occurrence of a noxious stimulus, such as shock, noise, wind, or a strong light. The response, which may consist of pressing a lever, or of running from one side of an alley to the other, terminates the signal and prevents the onset of the noxious stimulus. However, the reported difficulty of establishing a discriminative avoidance habit with rats in a lever-pressing apparatus severely limits the use of this favored experimental technique.

Numerous investigations have been undertaken in an effort to identify the variables which account for the poor performance in bar-press avoidance; for example: the role of the tone-shock pairing in warm up, the role of the response in warm up and the role of shock intensity in warm up (Hoffman, Fleshler, and Chorny, 1961); the length of ITI and the length of the CS-UCS interval (Meyer, Cho, and Weseman, 1960); UCS intensity (Stone 1960; Kimble, 1955; Boren, Sidman, and Herrnstein, 1959); UCS duration (Chapman and Bolles, 1964); CS termination verses UCS termination (Kamin, Campbell, Ryan, and Walker, 1959); the effect of sensory feedback, post-response time, and reduction of the shock density (Bolles and Popp, 1964); systematic variation of the interval between the response and the onset of the pre-shock warning signal (Ulrich, Holz, and Azrin, 1964); avoidance with inescapable shock (Hurwitz, 1964). All of these studies, however,

have yielded essentially negative results.

There has to be some kind of procedural difference to account for good avoidance learning in the shuttle box or jump-out box while avoidance learning in a bar press situation remains so poor. Pilot work was conducted in an effort to find an explanation for this difference by attempting to get good bar press avoidance.

One of the findings of the pilot work was that the rats tended to hold the bar down during the response-shock interval (only the initial depression of the lever counted as a bar press response, holding counted as only one response). A search of the literature yielded a number of studies which reported this same finding. Dinsmoor, Matsuoka, and Winograd (1958) examined bar-holding specifically. Their data supported the hypothesis that holding behavior is maintained in part by its preparatory function, i.e., sequences of behavior in the escape situation indicated that animals turned the shock off more quickly on trials when they were holding the bar down at the onset of shock than on trials when they were off the bar. Anger (personal communication, 1965) has found that rats on a Sidman avoidance schedule hold the bar as much as 60% of the time.

In the avoidance situation, any time the bar is pressed prior to the onset of the noxious stimulus, the noxious stimulus is avoided. But what of the situation where the subject holds the bar down for two trials in a row? The first trial is counted as an avoidance response and postpones the shock, but on the second trial the subject is shocked for essentially the ~~same~~ response (continuing to hold the bar down). The present study was designed to see what would happen if the subject were not allowed to respond without reinforcement during the safe period

the following: (1) the number of times the word "I" appears in the text;

i

(2) the number of times the word "you" appears in the text;

(3) the number of times the word "we" appears in the text;

(4) the number of times the word "us" appears in the text;

(5) the number of times the word "they" appears in the text;

(6) the number of times the word "it" appears in the text;

(7) the number of times the word "he" appears in the text;

(8) the number of times the word "she" appears in the text;

(9) the number of times the word "we" appears in the text;

(10) the number of times the word "us" appears in the text;

(11) the number of times the word "they" appears in the text;

(12) the number of times the word "it" appears in the text;

(13) the number of times the word "he" appears in the text;

(14) the number of times the word "she" appears in the text;

(15) the number of times the word "we" appears in the text;

(16) the number of times the word "us" appears in the text;

(17) the number of times the word "they" appears in the text;

(18) the number of times the word "it" appears in the text;

(19) the number of times the word "he" appears in the text;

(20) the number of times the word "she" appears in the text;

(21) the number of times the word "we" appears in the text;

(22) the number of times the word "us" appears in the text;

(23) the number of times the word "they" appears in the text;

(24) the number of times the word "it" appears in the text;

(25) the number of times the word "he" appears in the text;

(26) the number of times the word "she" appears in the text;

(27) the number of times the word "we" appears in the text;

(28) the number of times the word "us" appears in the text;

(29) the number of times the word "they" appears in the text;

Thus, all responses which were made were reinforced. This was accomplished by using a retractable lever. The lever was in the test chamber only when a bar press could be reinforced; its introduction acted, then, as a conditioned stimulus. It was thought that the prevention of bar-holding, coupled with the discriminative properties (if any) of the presense of the bar and the prevention of any "unrewarded" bar presses, would yield significantly better bar press avoidance learning than had previously been demonstrated. Two groups of subjects were run under identical conditions except that, in the experimental group the bar was retractable and in the control group the bar was present all the time. A third group was run in an effort to differentiate between bar-holding, as such, and the discriminative properties accompanying the introduction of the bar.

Method

Subjects

Eighteen male albino rats, approximately 90 days old, were housed in individual cages and allowed free access to food and water.

Apparatus

The experimental space measured (9" x 10" x 12½" high). Three sides were constructed of wood; the top and the door were of clear plastic, allowing unrestricted observation of the SS. The top was mounted on switches so that when the subject hit the top, shock was terminated, i.e., a "top hit" served as an escape response. The floor of the compartment consisted of stainless steel rods, 3/32 in. in diameter and spaced .5 in. apart. A G.E. 313 bulb (1.7 amp) on the back wall on the enclosure illuminated the chamber during the sessions. The response lever was a Lehigh Valley Electronics Model 1405M Retractable Lever; it was located 2 in. above the grid floor. A clearly audible non-aversive buzzer served as the warning signal (CS). The CS-UCS interval was 5 sec. The experimental compartment was contained within a sound attenuating chest. A blower served as a masking noise and as a ventilator.

Direct current shocks (100 volts) 1.5 ma in intensity were delivered through the grid floor until the bar was pressed or until 5 seconds elapsed, whichever occurred first. An Applegate constant current stimulator generated the shocks through a polarity scrambling circuit of the type devised by Hoffman (1962).

Bar presses were "rewarded" by termination of the CS and UCS (if on) and also by turning on a safe light (2½ in. above the bar) which denoted the "safe period", i.e., absence from shock.

Procedure

Experimental Group. During the first four sessions, the subjects (Ss) were trained to respond by placing them in the apparatus with the bar extended. After 25 sec. the buzzer was presented. If no bar press occurred within 5 sec. the shock was introduced. If no bar press or "top hit" occurred, the CS and UCS were terminated at 5 sec., 2 sec. were allowed to elapse, and the CS was presented again. When a bar press occurred, the CS or CS and UCS were terminated, the bar was retracted, and the "safe light" was turned on. The safe period duration was 25 sec., after which the bar was reintroduced, 2 sec. elapsed, and the CS was represented.

On session 5, and all later sessions, the bar was introduced when the buzzer came on, stayed in as long as the buzzer was on, and was retracted when the buzzer was terminated.

The response-shock interval of 32 sec., the shock-shock interval of 7 sec., and the 25 sec. safe light remained constant. The sessions lasted either 2 hours or until 100 shocks had been presented, whichever occurred first.

All bar presses turned on the safe light but only those bar presses occurring prior to the onset of the shock were counted as avoidance responses, i.e., if the bar were pressed while it was being retracted, there was immediate cessation of shock concurrent with the onset of the safe light.

All Ss were run until they had reached the pre-set criterion of 95% avoidance or above for two sessions in a row.

Control Group 1. The treatment was identical to the experimental group except that the bar was always extended, i.e., it was never retracted. All Ss were run until they had reached criterion; those Ss not reaching criterion by the 11th day were discontinued.

Control Group 2. The treatment was identical to the experimental group except that the bar was extended and retracted according to the schedule listed in Table 4 of the Appendix. Also, on every trial, the bar was extended with the buzzer onset and retracted with the buzzer termination. The safe period was divided into 4 sec. segments during which the bar was either extended or retracted according to the schedule.

Both the experimental and the control group subjects also had available, as an escape response, a "top hit". That is, if the subject, while being shocked, hit the top, that shock was terminated.¹

¹ An additional experimental group was run, at a later date, without the "top hit" escape response. The rate of acquisition, however, was similar to the present experimental group. The difference between shocks prior to reaching criterion was not significant ($t=.223$, $df=7$, $.450 > p > .40$).

Results

Figure 1 shows the mean percent avoidance $\pm$ one standard deviation for the experimental group and control group 1 (bar always extended). The entire experimental group was avoiding at least 95% of the shocks on the sixth and seventh day. Two subjects of control group 1 reached criterion on the eighth day. All other subjects from control group 1 reached criterion after the eighth session. Figure 2, a frequency polygraph of sessions to criterion, shows no overlap between the two groups. It should be noted that three of the control group 1 subjects had not reached criterion by the 11th session and were discontinued.

A t-test was run on those subjects which reached criterion to determine the significance of the difference in the number of shocks to criterion ($t=2.87$, $df=10$, $.010 > p > .005$). (See Appendix, Tables 1 and 2). The experimental group subjects had significantly fewer shocks prior to reaching criterion.

Figure 3 represents the rate of acquisition of bar press avoidance for individual subjects in control group 2. The subjects with a high level of avoidance were discriminating between the buzzer CS and the introduction of the bar. (See Appendix, Table 3). Excess bar presses were gradually eliminated, over sessions, in these subjects. However, two subjects showed little or no avoidance learning and no discrimination. Because of the high inter-subject variability, control group 2 was not compared directly with the experimental group or control group 1.

Figures 4 and 5 represent, respectively, the rates of acquisition for individual subjects in the experimental group and in control group 1.

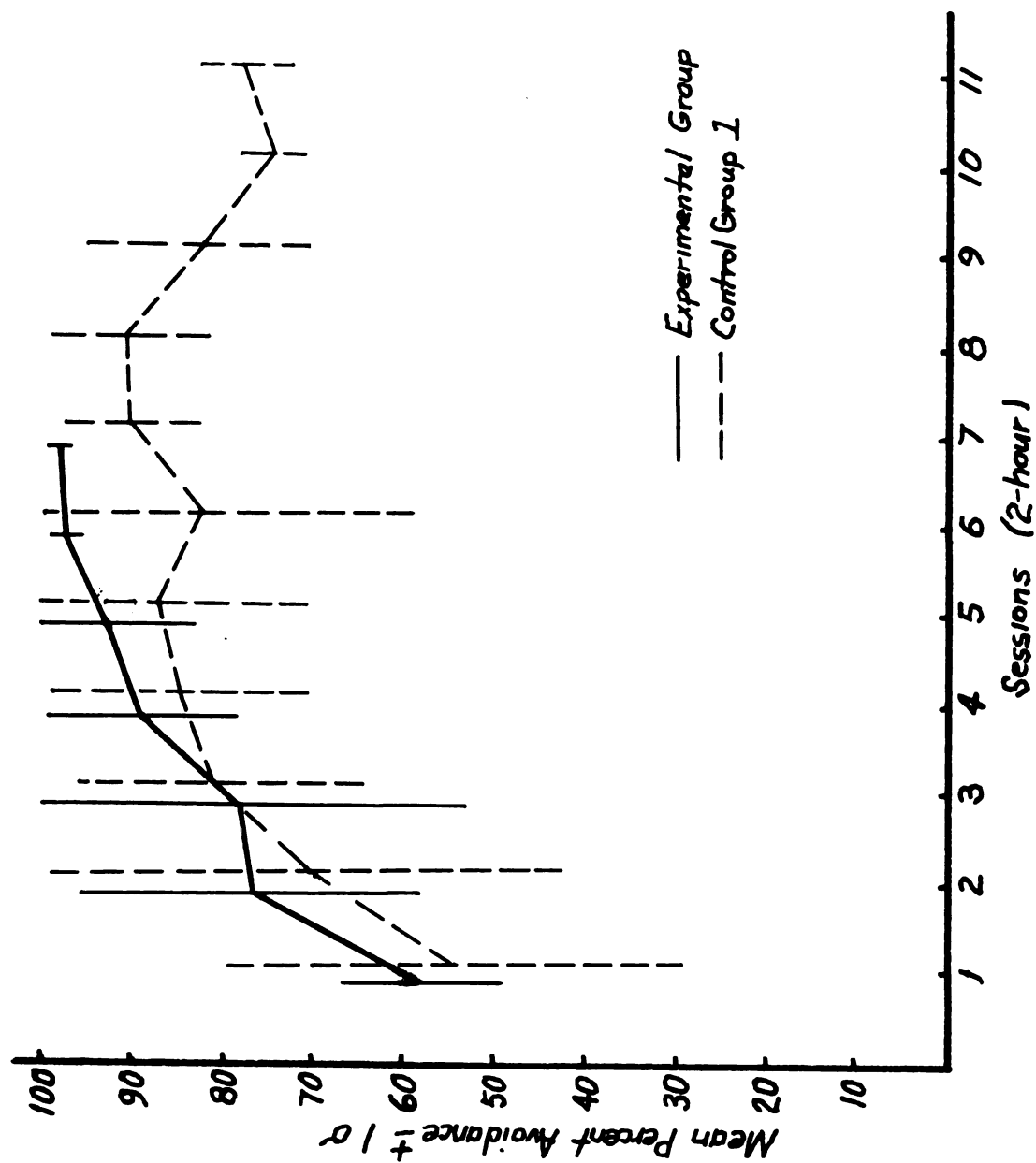


Fig. 1. A comparison of percent avoidance, mean $\pm$ one standard deviation, for the experimental group and control group 1.

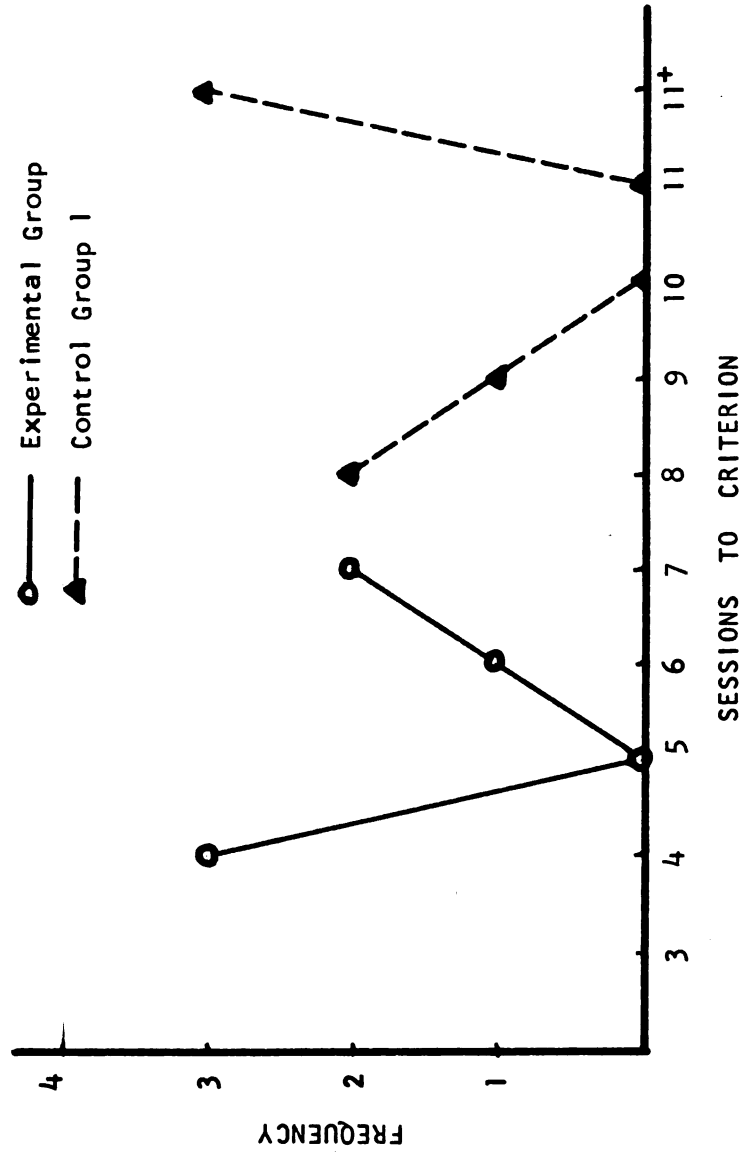


Fig. 2. A comparison of the number of sessions prior to reaching criterion for the experimental group and control group I. Each point represents the number of subjects per respective group that reached criterion in that session.

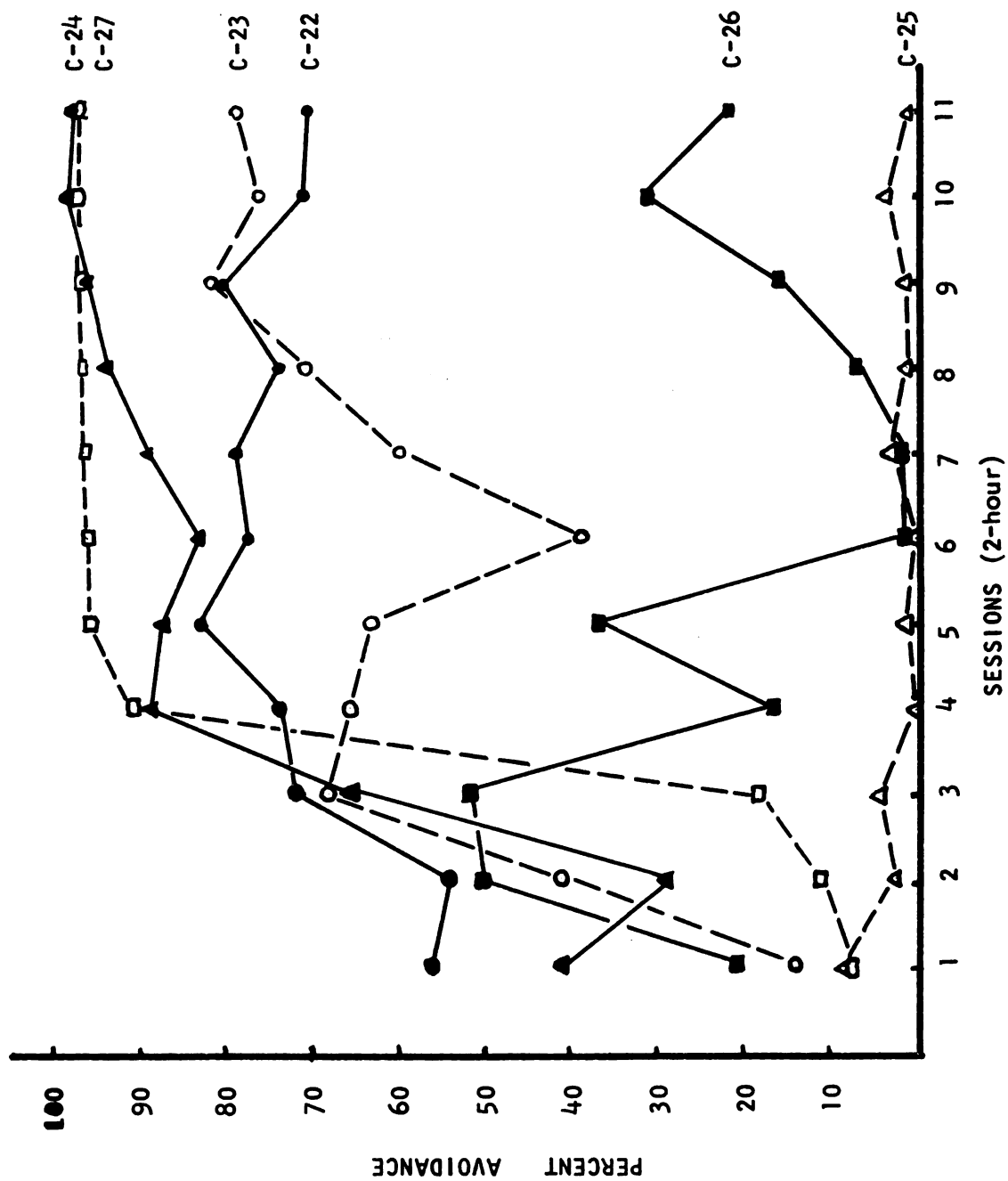


Fig.3. Rate of acquisition of bar press avoidance for each individual subject in Control Group 2.

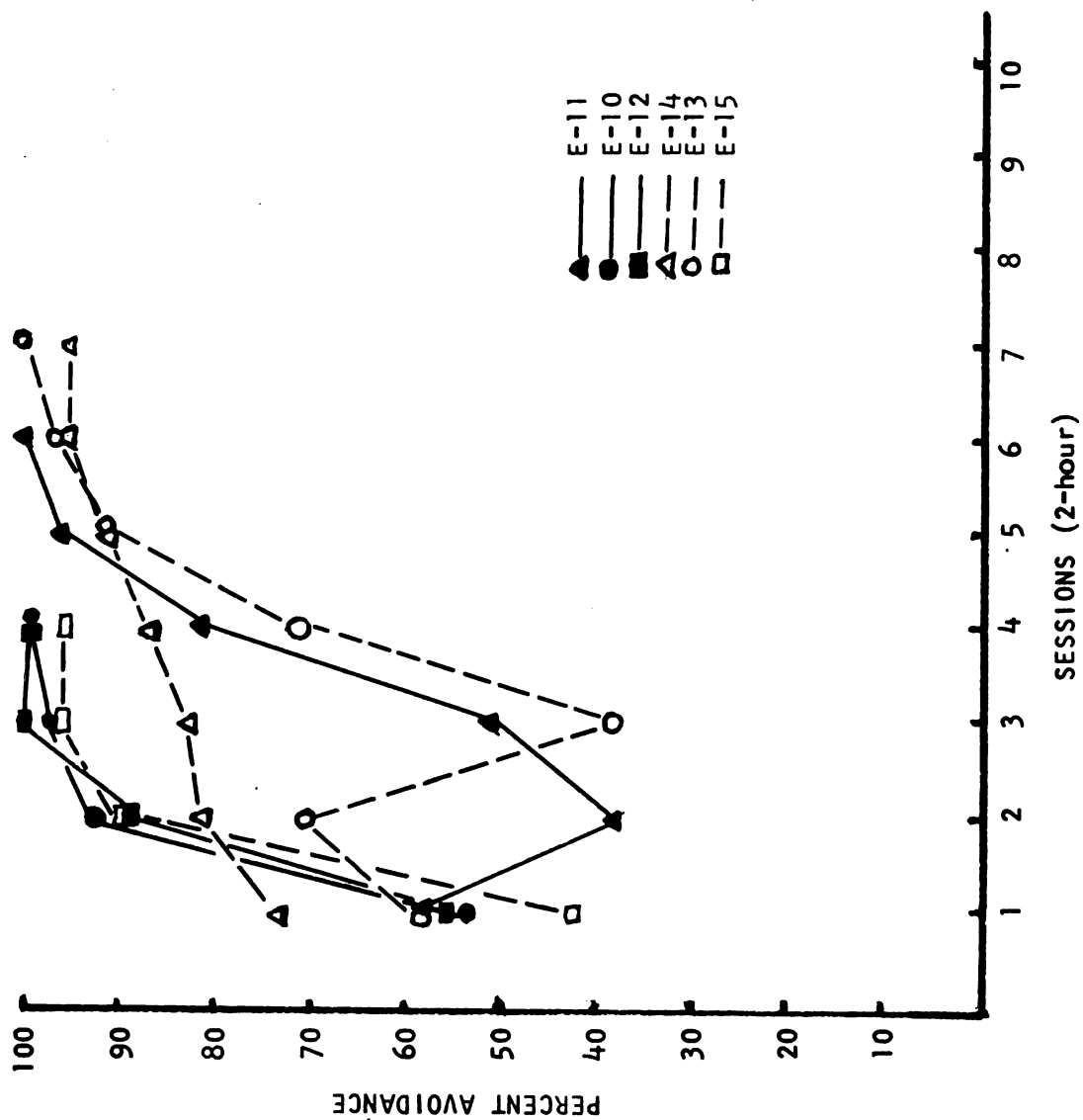


Fig. 4. Rate of acquisition of bar press avoidance for each individual subject in the experimental group.

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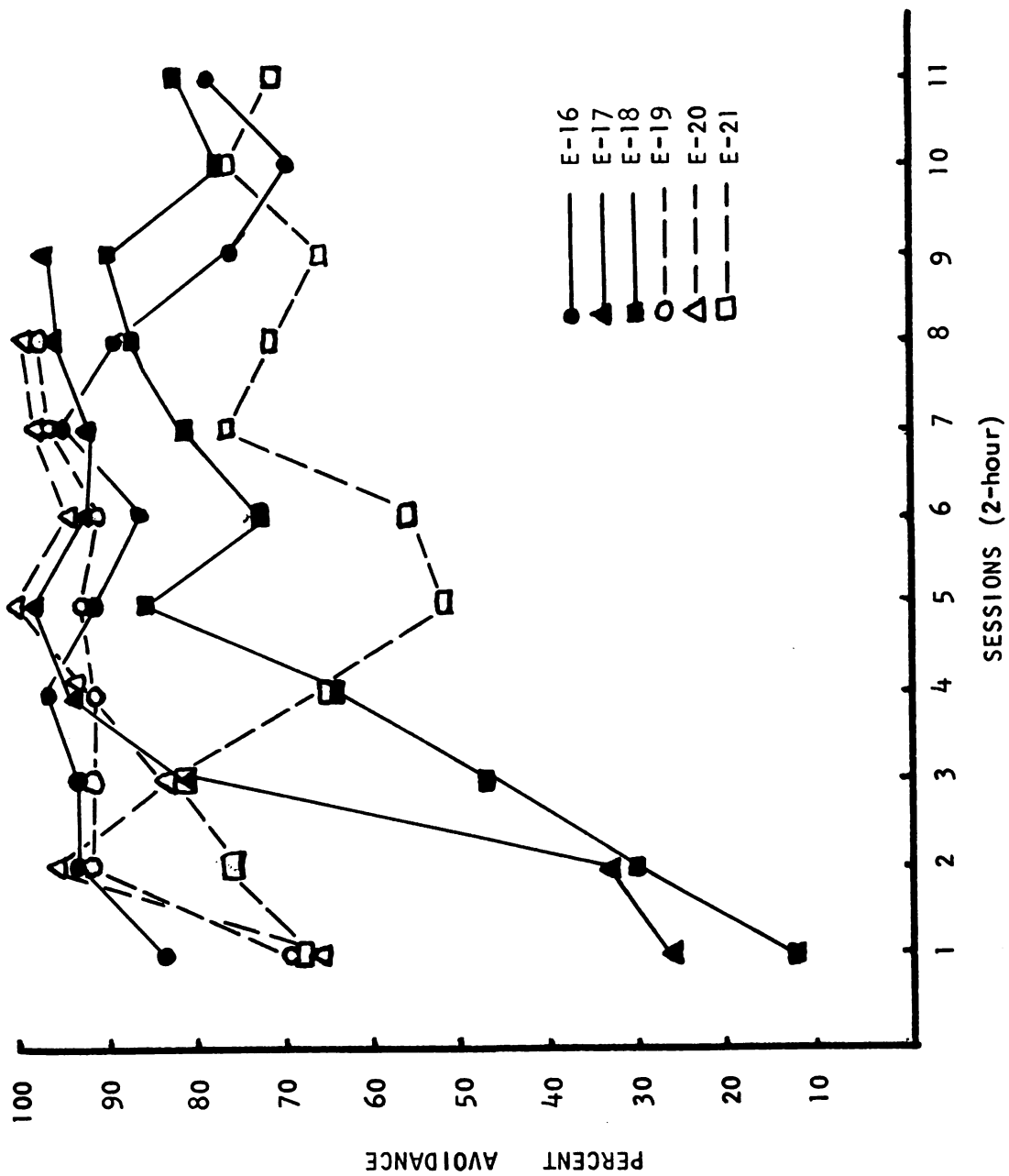


Fig. 5. Rate of acquisition of bar press avoidance for each individual subject in control group 1.

Discussion

The data reported here have demonstrated that it is possible to achieve a high percentage of avoidance in the bar press situation. The control condition in which the bar was always extended was similar to previous work with bar press avoidance. The method and the apparatus were meant to reflect previous findings that resulted in better bar press avoidance. For example: Myers (1962) demonstrated superior learning with a buzzer warning signal over a light or a tone; Ulrich, Holz, and Azrin (1964) found that the use of a warning signal reduced the number of shocks received; Chapman and Bolles' (1964) data argued for shock durations longer than brief shocks of .2 to .3 sec., hence the present study incorporated a 5 sec. maximum duration; Dinsmoor, Hughes, and Matsuoka (1958) found that learning was better if the subjects were required to released the bar, i.e., holding did not count as a response on the next trial, this was incorporated in the present work; Boren, Sidman, and Herrnstein (1959), found that acquisition of the avoidance response was facilitated by using shocks levels above 1.2 ma hence the present use of 1.5 ma. An additional variable, the "safe light", was suggested by the findings of Ulrich, Holz, and Azrin, 1964. All of the above mentioned procedural variables were included in control group 1.

The experimental group was identical to control group 1 except that the bar was extended with the warning signal and retracted when the warning signal terminated. This manipulation clearly facilitated the acquisition of the bar press response in an avoidance situation. This facilitation can be attributed to several possibilities: (1) eliminating bar-holding as a competing response, (2) eliminating non-

reinforced bar pressed, i.e., those bar presses that occur outside of the CS-UCS interval, and (3) the discriminative stimulus properties acquired by the bar thru exclusive pairing with the buzzer and the shock.

The group with the intermittently presented bar was included in an effort to differentiate between the first and third possibilities. The data didn't shed much light on possibility (1), but did indicate that the introduction of the bar was a strong cue. Further consideration of the discriminative properties of the bar led to the examination of the training procedure for the group that had the bar extension paired with the buzzer. The warning signal came on and the bar was extended. When 5 sec. elapsed without a response, the shock was delivered. The bar remained extended until it was pressed; when pressed, the bar was retracted and the safe light was turned on for the safe period. The bar, in this situation, is used in a way similar to the way Ulrich, Holz, and Azrin (1964) used the warning stimulus, i. e., the warning stimulus stayed on (the bar was in) until the response had been made so that, in agreement with Azrin, Holz, Hake, and Ayllon (1963), the safe period was made contingent upon a specific response and the safe period was selectively associated with the absence of shocks.

The data from the present investigation are handled nicely by elicitation theory. In terms of elicitation theory (Denny and Adelman, 1956) conditional fear or anxiety results from the consistent fashion with which the autonomic responses accompany the attempt to escape. Cessation of the aversive stimulation, in this case, the bar press, elicits a relaxational - approach response which is incipiently

conditioned to the immediately preceding stimuli of the bar press and the warning stimuli. With continued trials the relaxational-approach response is consistently elicited and thereby strongly conditioned to the stimuli accompanying the bar press. The animal is not allowed to relax for sufficient time to allow extinction to occur because the relaxation cues come to be associated with the safe light. On those trials where the subject continues to relax after the termination of the safe light, relaxation is punished by the onset of the warning stimulus and the introduction of the bar. The present procedure allows the subject to relax, during the safe light but terminates the relaxation with the beginning of the next trial.

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APPENDIX

		SESSIONS						
		1	2	3	4	5	6	7
<u>E-10</u>	<u>E-11</u>	<u>E-12</u>	<u>E-13</u>	<u>E-14</u>	<u>E-15</u>			
% Av.	% Av.	% Av.	% Av.	% Av.	% Av.			
Shocks	Shocks	Shocks	Shocks	Shocks	Shocks			
Trials	Trials	Trials	Trials	Trials	Trials			
128 58 54.7	122 50 59.2	148 64 56.1	53 22 58.3	89 23 74.3	66 37 43.9			
245 18 92.7	166 100 39.1	124 14 88.9	258 77 70.2	195 37 81.0	192 20 89.6			
251 7 97.2	133 65 51.2	222 0 100.0	164 100 39.0	151 25 83.4	196 7 96.4			
266 2 99.7	61 11 81.2	243 1 99.5	232 66 71.5	247 32 87.0	147 5 96.6			
	204 7 96.6		226 20 91.1	231 17 92.6				
	223 0 100		203 5 97.5	221 10 95.5				
			167 0 100.0	169 7 95.8				

TABLE 1. Experimental Group. The number of trials, the number of shocks, and the per cent avoidance per subject, per session.

						SESSIONS										
						1	2	3	4	5	6	7	8	9	10	11
<u>C-16</u>			<u>C-17</u>		<u>C-18</u>		<u>C-19</u>		<u>C-20</u>		<u>C-21</u>					
	% Av.		% Av.		% Av.		% Av.		% Av.		% Av.					
	Trials	Shocks	Trials	Shocks	Trials	Shocks	Trials	Shocks	Trials	Shocks	Trials	Shocks				
234	39	83.3	138	100	116	100	245	76	224	74	246	80				
258	13	94.9	152	100	145	101	251	15	264	13	248	56				
249	13	94.7	240	44	191	101	236	15	238	37	234	43				
231	5	97.8	234	13	218	79	224	14	184	11	197	69				
206	15	92.7	211	2	178	24	207	14	254	4	208	100				
238	33	86.1	258	23	236	60	287	19	223	15	228	100				
236	9	96.1	240	16	243	42	256	10	243	12	251	56				
238	25	89.9	252	10	252	29	256	7	252	5	245	67				
230	55	76.1	258	4	253	25					238	81				
239	71	70.8			247	57					247	57				
241	50	79.3			248	40					258	75				

TABLE 2. Control Group1. The Number of Trials, the Number of Shocks, and the Percent Avoidance per subject, per session.

				SESSIONS										
				1	2	3	4	5	6	7	8	9	10	11
<u>C-22</u>														
	Trials	Shocks	% Av.											
	213	94	55.8											
<u>C-23</u>														
	Trials	Shocks	% Av.											
	118	101	14.4											
<u>C-24</u>														
	Trials	Shocks	% Av.											
	170	101	40.5											
<u>C-25</u>														
	Trials	Shocks	% Av.											
	109	100	8.2											
<u>C-26</u>														
	Trials	Shocks	% Av.											
	126	100	20.6											
<u>C-27</u>														
	Trials	Shocks	% Av.											
	109	100	8.2											

TABLE 3. Control Group 2. The number of trials, the number of shocks, and the per cent avoidance per subject, per session.

1	2	1	1	1
2	1	2	1	1
1	1	1	2	2
1	1	1	2	1
2	2	1	1	1
1	2	2	1	2
1	2	1	2	1
1	2	2	1	1
1	2	1	2	2
1	2	2	1	1
2	2	2	2	1
2	1	1	1	2
2	1	2	1	2
2	1	2	2	1
1	2	1	1	1
1	1	2	1	1
1	2	2	1	2
2	1	1	1	1
2	1	1	2	2
1	2	2	1	1
1	1	1	2	2
1	1	2	1	2
1	1	1	2	2
1	1	2	1	1
1	1	1	2	2
1	1	2	1	1
1	1	1	2	2
2	2	2	1	2
1	1	1	2	1
2	2	2	2	2
2	1	2	1	1
2	2	1	2	1
1	2	2	1	1
1	1	2	2	1
1	1	1	1	1
1	2	2	2	1
1	1	1	1	1
1	1	2	2	1
1	2	2	1	1
2	1	2	2	1
2	2	1	1	2

TABLE 4. Schedule of Bar Presentations for Control Group2. A continuously revolving tape was programmed according to this schedule. The schedule reads from top to bottom, left to right. Each number represents a 4 sec. interval, 1 = bar extended and 2 = bar retracted.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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		Sessions						
		1	2	3	4	5	6	7
<u>E-10</u>	Bar Presses	193	328	267	284			
	Bar Present	128	245	251	266			
<u>E-11</u>	Bar Presses	194	314	341	212	235	280	
	Bar Present	122	166	133	61	204	223	
<u>E-12</u>	Bar Presses	287	396	262	267			
	Bar Present	148	124	222	243			
<u>E-13</u>	Bar Presses	90	421	225	296	261	210	173
	Bar Present	53	258	164	232	226	203	167
<u>E-14</u>	Bar Presses	147	216	315	301	375	236	198
	Bar Present	89	195	151	247	231	220	167
<u>E-15</u>	Bar Presses	103	410	361	354			
	Bar Present	66	192	196	147			

TABLE 5. Experimental Group. Number of bar presentations and number of bar presses per subject, per session.

Sessions	<u>C-16</u> Bar Presses	<u>C-17</u> Bar Presses	<u>C-18</u> Bar Presses	<u>C-19</u> Bar Presses	<u>C-20</u> Bar Presses	<u>C-21</u> Bar Presses
1	465	222	151	416	308	414
2	410	314	252	298	317	380
3	280	321	322	273	271	365
4	253	306	293	254	199	301
5	232	248	238	238	260	256
6	287	307	300	338	256	279
7	258	281	286	295	261	295
8	259	286	297	285	264	290
9	272	298	296			247
10	330		347			277
11	328		303			272

Table 6. Control Group 1. Number of bar presses per subject, per session.

1. The first part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation.

2.

3.

4.

5.

6.

7.

8. The second part of the document is a list of the names of the persons who have been appointed to the various positions of the Board of Directors of the Corporation.

SESSIONS

1 2 3 4 5 6 7 8 9 10 11

<u>C-22</u>		<u>C-23</u>		<u>C-24</u>		<u>C-25</u>		<u>C-26</u>		<u>C-27</u>	
Bar Presses	Bar Present	Bar Presses	Bar Present	Bar Presses	Bar Present	Bar Presses	Bar Present	Bar Presses	Bar Present	Bar Presses	Bar Present
529	759	234	138	408	279	252	159	201	88	267	158
512	840	410	414	355	285	247	183	468	554	219	116
528	801	440	344	561	783	259	165	503	680	282	217
547	816	475	487	542	777	241	152	285	335	542	618
464	745	547	463	249	239	250	140	377	362	535	413
523	740	286	216	535	430	247	139	253	226		
542	793	531	399	525	355	262	130	237	259		
542	583	504	285	548	284	250	114	271	283		
495	740	541	358	547	264	249	137	296	266		
526	731	541	326	546	258	212	153	350	465		
539	755	540	298			87	288	306	387		

TABLE 7. Control Group 2. Number of bar presentation and number of bar presses per subject, per session.

MICHIGAN STATE UNIVERSITY LIBRARIES



3 1293 03046 3875