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A Manual for the Primate Serial Probe Recognition (SPR) Task

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14. ABSTRACT
The Serial Probe Recognition (SPR) task utilizes a set of six images shown at a set interval followed by a probe and a white block. If the probe item was contained in the list, the probe is pressed. If the probe item was not in the previously viewed list, the white block is pressed. Before using the SPR task for screening potential pretreatment and therapy compounds against chemical warfare agents, improvements to the current SPR programming were necessary. Working with the DAKKRO Corp. (Aberdeen Proving Ground, MD), an SPR program was written that allowed greater control over all parameters of the program. Working with Rhesus macaques (Macaca mulatta), the program was tested and corrected as needed. Animals were able to adjust to the new program quickly and required very little new training. The program proved to be user friendly and allowed investigators to adjust the program configuration easily. The analysis program reduces analysis time from 40 minutes per animal per day to less than one minute per animal per day. Program use is outlined, and a short tour of the program is provided showing how to create an animal file, set up an animal information file, perform an experimental run, analyze data and delete animal files.

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Serial Probe Recognition Task, nonhuman primate, screening method, manual

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Table of Contents

List of Figures

List of Tables

I. Introduction to the Primate Serial Probe Recognition Program.

The primate SPR program presents a list of computer-generated pictures from a pool of 260 to 1260 images. The images are displayed both as part of a list and as response probes. This list may be followed by a delay. The delay is followed by a single probe item, which may or may not have been in the previously viewed list, and a white block is presented. The primate Serial Probe Recognition (SPR) program was written by Richard Sweeney of the DAKKRO, Corp. (Aberdeen Proving Ground, MD). The program is menu driven and user friendly. A variation of this program presents the list followed by two images, one of which was in the previously viewed list. The first approach is being used and will be the focus of our description of developing the configuration and sequence files.

The program allows for a variety of response devices. These include an Elographic touch screen, a computer keyboard and a mouse. The program also provides an analysis subroutine for the raw data and a condensing routine to archive data files.

II. Installation.

An installation disk set is provided. The installation instructions are activated by placing the disk into drive "A"; changing the current default directory to drive "A:" root directory; and typing the command "INSTALL" followed by a carriage return. At this point, the user should follow the directions on the screen.

The installation procedure will create the base directory for the SPR system at the location specified by the user; it will also create a number of required subdirectories within the base directory and fill the base directory with the files required to run the SPR program. After the installation, the configuration file "NEWSPR.CNF" may need to be altered to reflect a particular system configuration. For instance, the software can support a mouse, keyboard or touch screen (or all three) as input devices.

If a touch screen is to be used, it must be installed separately following the Elographics installation instructions. If a mouse is to be used, the mouse driver must be installed following the instructions supplied with the mouse if a mouse is not supplied with the computer system.

III. Equipment Requirements.

III.1. The minimum requirement for the SPR software is an XT compatible (512 Kb base memory) computer running MS-DOS® version 3.2 or higher with a single 8-Megabyte hard drive and a single floppy drive. The floppy is needed only to transfer information to/from the system. Under this minimum configuration, the keyboard is used to provide a response to the serial probes. The system has been tested on 286-, 386- and 486-based machines. The program does not require a math co-processor. The SPR program can be used within a local area network (LAN) system.

For use in an animal environment, a touch screen is required. There is a specialized SPR interface (available from DAKKRO Corporation) that allows an external pellet dispenser to be activated by the software. The SPR interface box, DAKKRO, Corp (Aberdeen Proving Ground, MD), has a phone plug socket to accommodate a switch that allows manual pellet dispensing. An

1

interface connection to the system's speaker is available to allow tones to be produced via a remote speaker (i.e., in the animal chamber).

An EGA (or better) monitor is required to produce the serial images (640 by 350 pixel resolution is used). The monitor is fitted with a touch screen positioned over the monitor with a plastic form. The touch screen/monitor combination is then secured to the animal chamber with a stainless steel band that attaches to a shelf mounted on the intelligence panel side of the chamber.

III.2 BRS/LVE designed a special primate SPR chamber (Figure 1).

a. The SPR chamber (BRS/LVE, Inc., Laurel, MD) was constructed of 1.27 cm thick black Plexiglas® on five sides. The top was made of 1.27 cm thick clear Plexiglas®. Plexiglas® allowed for efficient cleaning, and reduced the possibility of injuries due to sharp edges. The top contained a 7.62 cm diameter hole for camera placement. The exterior dimensions of the chamber were 61 cm wide by 61 cm high and 61 cm deep. The grid floor consisted of 0.95 cm diameter aluminum rods at 2.54 cm intervals. The round contour of the grid floor allowed more comfort for the animal while the reduced spacing increased the safety. The rods were mounted in a 1.27-cm thick black Plexiglas® frame, which was removable to permit cleaning. The intelligence panel, located on the left side of the chamber, had an opening (33.02 cm W X 27.94 cm H) to accommodate the monitor/touch screen combination. The left side of the chamber included a speaker, recessed food hopper and a fan for air circulation. The main chamber door had an aluminum and clear Plexiglas® guillotine entry door with a lock. A single aluminum bar (30.48 cm L X 1.27 cm diameter) was mounted above the entry door and two bars (5.08 cm L X 1.27 cm diameter) were mounted on both sides of the entry door. These bars were used to attach the transport cage to the chamber. The bars could withstand the weight of a 9.0 kg animal within the transport cage without damaging or overturning the chamber. The entry door was equipped with an enlarged (7.62 cm L X 0.32 cm diameter) handle. This handle allowed the entry door and the transport cage door to be opened simultaneously. A pellet dispenser was mounted to the top left rear corner of the chamber. It was attached to the pellet hopper with a 1.91-cm OD clear polyethylene tube. Rubberized weather stripping was placed between the pellet dispenser and the chamber. This reduced the noise and increased stability of the pellet dispenser. The entire chamber was set on a cart made of stainless steel with a center shelf (63.5 cm W X 63.5 cm L) with a 5.08 cm lip on three sides. To the right of the center shelf was a 15.24 cm wide extension for tripod placement and to the left a 45.72 cm wide extension with a handle for keyboard placement. Beneath the top center shelf were two additional shelves for the computer and interface. The cart stood on two locking swivel wheels and two angled stainless steel legs with leveling screw adjustments. The main supports were of angled stainless steel. The weight of the chamber and the cart added to the balance of the entire unit. A power strip was bolted to the right vertical leg.

III.3 The computer and the BRS/LVE special primate chamber required an interface. This interface was developed by the DAKKRO, Corp. (Figures 2 and 3). The interface was also equipped with an option for a shaping switch. The shaping switch is used in the early training to shape the primates to touch both sides of the touch screen.

Figure 1: A representative drawing of the SPR setup.

    A. SPR CHAMBER: (1) Main Door, (2) Entry Door, (3) Transport Cage Attachments, (4) Entry Door Lock, (5) Main Door Lock, (6) Waste Pan, (7) Aluminum Rod Floor Attachment, (8) Pellet Dispenser, (9) Pellet Hopper, (10) Monitor Table, (11) Monitor Leveling Screws.

    B. CAMERA ASSEMBLY: (1) Low Light Camera, (2) Zoom Lens, (3) Pan Tilt, (4) Pedestal Mount.

    C. COMPUTER COMPONENTS: (1) 286 Zenith CPU, (2) DAKKRO Interface, (3) 1390 Zenith Monitor, (4) Monitor/Touch screen Restraint Band, (5) Keyboard, (6) Mouse.

    D. CART: (1) Camera Shelf, (2) Keyboard Shelf with Handle, 3) Leveling Feet,(4) 4-inch swivel wheels, (5) Power Strip, (6) Surge Protector.

Figure 2: A schematic drawing of the SPR interface developed by DAKKRO, Corp. Interface connects the chamber, computer, touch screen, shaping switch and monitor into a working unit.

Figure 3: Diagram depicting the wiring requirement for the connection of the SPR interface and the other parts of the system.

Figure 1

4

DAKKRO
SPR
INTERFACE
CABLING

MULTI - CONNECTOR CABLE
SCHEMATICS

Figure 2

5
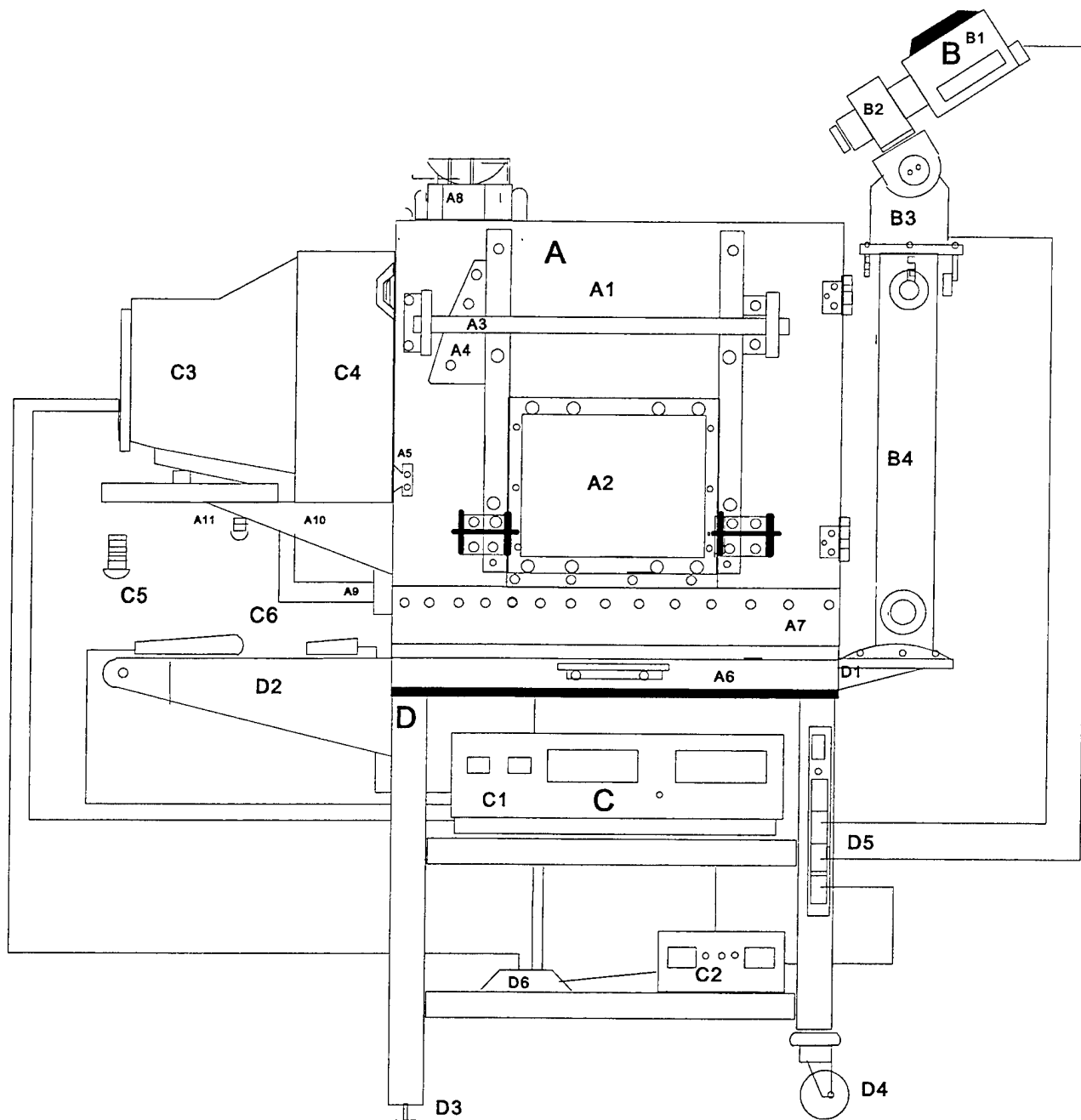
Figure 3

IV. Primate SPR Program.

    a. The DAKKRO primate SPR program is a Menu driven program. Once installed, accessing the identified directory and typing "MAINSPR" to activate the program.

C:\>**CD NEWSPR** **<enter>**
C:\NEWSPR\>**MAINSPR** **<enter>**

IV.1. Main Menu (Figure 4).

```
╔════════════════════════════════════════════════════╗
║                    MAIN MENU                       ║
╚════════════════════════════════════════════════════╝


        C - CALIBRATE the touch screen (elocalib.exe)

        T - TEST the hardware

        S - Serial Probe Recognition system menu

        4 -   < reserved for future expansion>

        5 -   < reserved for future expansion>



        Q - Quit and return to DOS
        Press a key to enter your choice ...
```
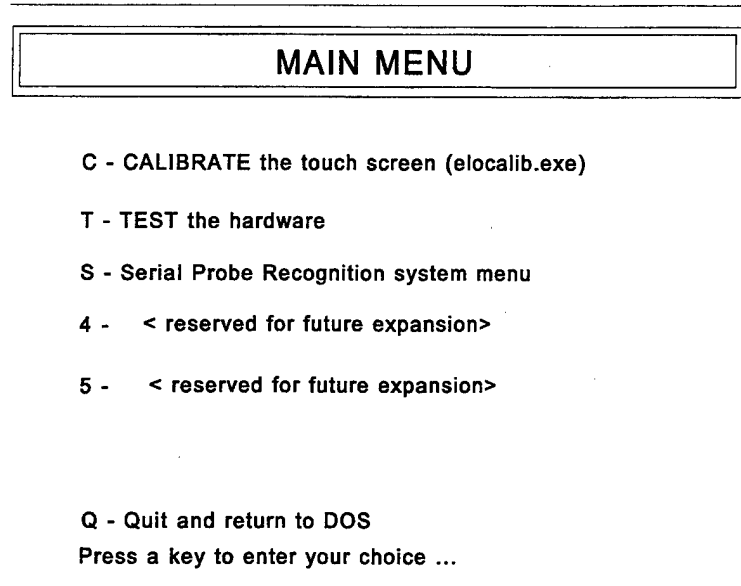
Figure 4: SPR Main Menu.

    a. After entering the DAKKRO primate SPR program, the Main Menu will be displayed. This Menu is used to test all equipment, calibrate the touch screen to the computer monitor and to enter the SPR program.

IV.1.1 Calibrate the touch screen.

    a. To calibrate the touch screen to the computer monitor **C** is pressed.

    b. This activates the ELOCALIB.EXE program which is supplied with the touch screens.

    c. From the main calibration screen, pressing **<PAGE-UP>** twice the screen will read **640 x 350**.

d. Pressing **C** begins the program (Figure 5).

e. The symbol (+) will appear in the upper left corner of the computer screen. After direct pressure is applied over the "+" an **OK** will appear. This indicates that the program has identified the pressure point.

f. Using the same process, the points in the lower right corner and upper right corner of the touch screen are calibrated to the monitor (Figure 5).
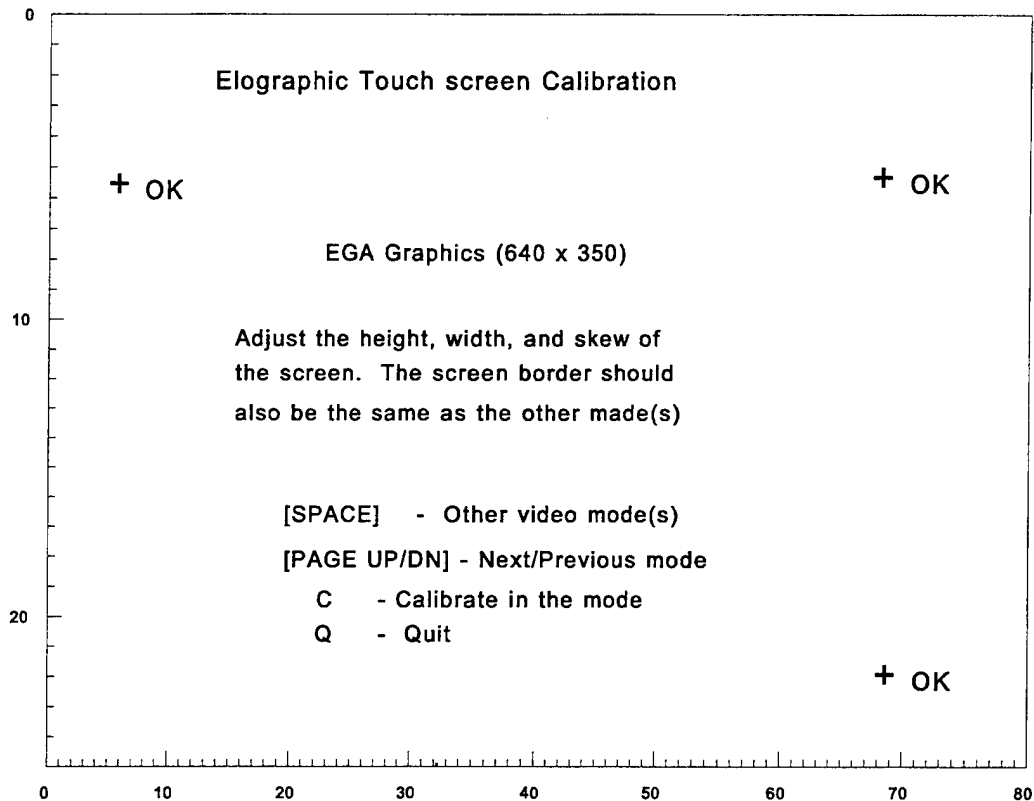
Figure 5: Calibration screen with location of calibration touch areas (+).

g. After touching the (+) in the upper right of the touch screen, a save option screen appears, with option boxes. To "Save pressure points in file" the **YES** box must be touched.

h. To "Update AUTOEXEC.BAT" the **YES** box is touched.

i. After calibration is complete the program will return to the Main Menu.

IV.1.2 TEST the hardware.

    a. From the Main Menu, the **T** is pressed to activate the test routine.

    b. This portion of the program consists of a predetermined, mock six-trial session. The test is used in the daily setup routine. The routine tests the program, computer, interface, touch screen, monitor, speaker and pellet dispenser.

    c. When the program is activated it will quickly list the configuration file and then produce a blank screen. The **<space>** bar is pressed to begin the test trial.

    d. A correct response, an incorrect response and a non-response should be performed on at least one trial to completely test the system.

        1. For a correct response, the area over the probe item is pressed for a match or over the white block if it is not a match.

        2. For an incorrect response, the area over the probe item is pressed for a non-match or over the white block if it is a match.

        3. For a non-response, the touch screen is not touched for the duration of the response phase of the trial.

    e. At the completion of the test session, the program will generate a readout of the performance.

    f. Press **<enter>** to return to the Main Menu.

IV.2. SPR Menu (Figure 6).

    a. The SPR Menu is accessed by pressing **S** from the Main Menu.

    b. This Menu is used to access all other portions of the SPR program, including file management, animal selection, animal configuration file and information file management. This Menu is also used to run the SPR sessions.

```
┌─────────────────────────────────────────────┐
│                 S P R MENU                  │
└─────────────────────────────────────────────┘

    D - DISK access menu  (for file transfers, etc.)

    S - SEQUENCE file management

    A - ANIMAL selection / configuration upgrades

    M - MAINTENANCE of images

    R - RUN an SPR SESSION for



    Q - Quit and return to DOS
    Press a key to enter your choice ...
```

Figure 6: The SPR Menu.

IV.3. Disk Management Menu (Figure 7).

```
┌─────────────────────────────────────────────┐
│           DISK MANAGEMENT MENU              │
└─────────────────────────────────────────────┘

     C - Copy ONE ANIMAL's data files to floppy
     E - Copy ALL ANIMAL's data files to floppy
     L - Load Data files from floppy
     U - Update configurations from floppy
     R - Replace configuration file on
             floppy with newer files

     A - Analyze files / with daily files seperated
     B - Analyze files / with daily files grouped

     F - Format diskette A:

     Q - Quit and return to DOS
     Press a key to enter your choice ...
```

Figure 7: The Disk Management Menu.

10

a.   From the SPR Menu, **D** is pressed to access the Disk Management Menu.

b.   This Menu is used to transfer files, retrieve configuration files or data files from a floppy disk, update configuration files from a floppy disk, update configuration files on a floppy disk, format a 5¼-inch floppy disk and analyze raw data.

IV.3.1. Copy one animal's file to a floppy drive.

a.   To copy a single animal's data files to a floppy disk, **C** is pressed.

b.   **<u>CAUTION</u>**: This option will erase all data files for this animal from the hard drive after they are copied.

c.   If a floppy disk is not in the correct disk drive, the system will give an error message:

> Not ready reading Drive A:
> Abort, **R**etry, **F**ail?

d.   A disk is placed in drive **A:** and **R** is pressed.

e.   The program will run through the animal directories on the system to find data files. The name of animals with data files in their directories will be displayed on the monitor screen.

f.   Using the arrow keys, the animal's name is highlighted. Then **<enter>** is pressed to begin the copy routine.

   1.   This routine will eliminate the data files copied from the animal's directory on the hard drive.

g.   The program will copy all the data files in the chosen animal's directory onto the floppy disk in drive **A**. It will also add these data files to an existing archive file for this animal. If an archive file does not exist for the chosen animal, the program will create an archive file and copy the files into it.

h.   When the data files are copied the system will return to the Disk Management Menu.

IV.3.2. Copy all animals' data files to a floppy disk.

a.   To activate this routine, **E** is pressed.

b.   As with copying a single animal's file, this portion of the program will scan the animals' directories for data files. The program will then copy all the data files to the floppy drive **A:.**

c. This program does not eliminate the data files from the animal directories nor does it place the data into archive files.

IV.3.3 Load data files from the floppy disk.

a. The **L** is pressed to activate this routine.

b. This is a simple transfer routine. All data files on a floppy disk in drive **A** will be transferred to a preexisting directory in the hard drive called **C:\SPRANL**. This directory is used in the analysis portion of the program.

IV.3.4. Replace configuration files of the floppy disk with current files.

a. The **R** is pressed to activate this routine.

b. This routine is used to assure all component programs have up-to-date configuration files for each animal.

  1. This allows an animal to be placed in a different chamber each day without having to update the configuration files in each test chamber manually.

c. All configuration files on the system and on the floppy disk will be compared. The newest version of the configuration file will be written to the floppy.

d. If the configuration file on the floppy is the newest version, the system will not write over it.

e. This routine is completed using a single floppy disk for all systems. Once completed, this master disk can be used to write all updated configuration files to each of the computers controlling the testing chambers (IV.3.5.).

IV.3.5. Update configuration files from a floppy disk.

a. The **U** is pressed to activate this routine.

b. This routine will update the animal's configuration files. Utilizing the master floppy created in section IV.3.4 performs this TASK. This routine must be run after replacing the configuration files on the master disk with newer versions of the files (IV.3.4.).

c. The system will identify all SPR configuration files and replace them with files from the master floppy. Those on the floppy will replace all configuration files for animals on the SPR system.

d. This routine allows the most recent configuration files to be available for each testing chamber.

12

IV.3.6. Analyze files with the daily files separated.

    a. To begin the analysis routine, **A** is pressed.

    b. This routine takes raw data files (Table I) from the **C:\SPRANL** directory and converts them into readable data.

    c. The output is written to two special directories, **C:\SPRDAY** and **C:\SPRMON**.

    d. If more than one animal's files for more than one day are being analyzed, then the output files in **C:\SPRDAY** will be separated not only by animals but also by the date the data was collected.

    e. The output to **C:\SPRMON** is updated during each analysis session. The newly analyzed data is added to the animal's monthly data unless the data was analyzed previously.

    f. The daily and monthly files are divided into four pages of information (Tables II and III).

        1. The first page (Table II) contains the total information for the session; session(s) date (**Date**), sequence file name (**Program**), session number (**#**), probe delay (**Del**), list length (**Llr**), stimulus viewing time (**L-ON**), stimulus off-time (**L-OFF**), total number of trials (**N**), total correct responses (**Ncr**), total incorrect responses (**Nwr**), total percent correct (**%corr**), total latency (**Lat**), first response timeouts (**Nto**), total timeouts (**Tto**), non-match trials (2nd **N**), correct non-match trials (2nd **Ncr**), percent of correct non-match trials (2nd **%corr**), latency of non-match trials (2nd **Lat**), match trials (3rd **N**), correct match trials (3rd **Ncr**), percent of correct match trials (3rd **%corr**), latency of match trials (3rd **Lat**). The matching trials data is followed by the percent correct in each block of data up to five blocks.

        2. The second page of data lists the date (**Date**), session number (**#**), session time (hours: minutes: seconds) (**Box-Time**), probe response time (**Del**), number of trials (**N**), percent correct (**%**) and the latency (**Lat**) for each of seven serial positions (Table III).

        3. Pages three and four are similar to page two as the pages list the data for seven serial positions from eight to fourteen on page three and fifteen to twenty-one on page four.

IV.3.7. Analyze files with daily files grouped.

    a. The **B** is pressed to activate this routine.

    b. This analysis file is similar to that described in section IV.3.6. with the exception that the daily output is separated by animal and not by date in the **C:\SPRDAY** directory.

    c. As with the previous routine, the output is divided into four pages as previously described.

```
SESSION FILE for REX
SESSION DATE       10/07/1993
Starting time      16:11:05
Animal Identification Number  : RH6EX
DATE                          : 1993
TIME                          : HH:MM:SS
Operator for today's session  : Finger
Session Label                 : REX07OCT
Doctor                        : Finger
Referral                      : 551
Hospital                      : ICD
Patient                       : REX
Medication                    : None
Classification                : Baseline
State                         : Alert
Age                           : 5y
Hand                          : R
```

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
(column numbers)																
1	1	6	0	1	1	0	1	0	2	1	3	12	0	380	1	0
1	2	6	1	0	3	0	1	0	3	0	0	0	0	3000	0	1
1	3	6	0	1	3	0	1	0	3	0	0	0	0	3000	0	1
1	4	6	1	0	3	0	1	0	1	10	10	80	0	710	0	0
1	5	6	0	1	1	0	1	0	3	0	0	0	0	3000	0	1
1	6	6	0	1	4	0	1	0	2	5	6	25	0	390	1	0
1	7	6	0	1	1	0	1	0	2	7	9	10	0	610	1	0
1	8	6	1	0	2	0	1	0	3	0	0	0	0	3000	0	1

```
SESSION END AT     16:12:55
------------end of data-------------
Num chars in sequence name    :        7
Sequence file to be used      : SIXTY6A
Repeat Trial if NOT Correct   :        0
List image "on" delay time    :      500
List image "off delay time    :      500
Pre probe delay time          :      500
Time limit for probe response :     3000
```

Table I: Raw data file. Column **1**-block number, **2**-Trial number, **3**-list length, **4**-match probe 1 (1=yes, 0=no), **5**-match probe 2 (1=yes these are non-match trials, 0=no), **6**-serial position, **7**-observation delay, **8**-stimulus viewing time, **9**-interstimulus interval, **10**-subject's response (1-correct, 2-incorrect, 3-no response), **11**-X position of touch, **12**-Y position of touch, **13**-strength of touch, **14**-inter-trial interval, **15**-latency (milliseconds), **16**-total incorrect, **17**-total non-responses.

IV.3.8. Format diskette **A**:.

a. The **F** is pressed to activate the formatting routine.

b. This routine will format a disk in drive **A** only.

c. A warning will appear on the screen to help avoid the loss of data which may be on a disk currently in the **A** drive (Figure 8).

d. After the warning, place a new disk in drive **A** and press **<enter>**.

Monthly Summary for REX   for SEP   Page 1 of 4

#	Date	Program	Del	Llr	L-on	L-off	N	Ncr	Nwr	Lat	%cor	Lat	Nto	Tto	NM N	NM Ncr	NM %	NM Lat	M N	M Ncr	M %	M Lat	B1	B2	B3	B4	B5
1	01SEP93	SIXTY6C	1	6R	1.5	.5	60	54	5	1.2	90.0	1.2	1	28	30	27	90.0	1.2	30	27	90.0	1.2	90	90	90	-1	-1
2	01SEP93	SIXTY6D	1	6	1.5	.5	60	35	25	1.2	58.3	1.2	0	0	30	20	66.7	1.2	30	15	50.0	1.2	65	40	70	-1	-1
1	02SEP93	SIXTY6B	1	6	1.5	.5	60	48	9	1.2	80.0	1.3	3	3	30	23	76.7	1.2	30	25	83.3	1.4	90	90	60	-1	-1
2	02SEP93	SIXTY6C	1	6	1.5	.5	60	51	7	1.2	85.0	1.2	2	2	30	29	96.7	1.1	30	22	73.3	1.3	90	85	80	-1	-1
1	03SEP93	SIXTY6A	1	6R	1.5	.5	60	52	6	1.2	86.7	1.2	2	5	30	25	83.3	1.3	30	27	90.0	1.3	90	80	90	-1	-1
2	03SEP93	SIXTY6D	1	6	1.5	.5	60	34	26	1.3	56.7	1.3	0	0	30	22	73.3	1.5	30	12	40.0	1.1	60	50	60	-1	-1
3	03SEP93	SIXTY6D	1	6	1.5	.5	60	30	18	1.4	50.0	1.3	12	12	30	18	60.0	1.3	30	12	40.0	1.2	60	35	50	-1	-1
1	04SEP93	SIXTY6D	1	6R	1.5	.5	60	38	21	1.3	63.3	1.4	1	15	30	19	63.3	1.4	30	19	63.3	1.2	95	70	60	-1	-1
2	04SEP93	SIXTY6C	1	6	1.5	.5	60	54	6	1.2	90.0	1.2	0	0	30	26	86.7	1.2	30	28	93.3	1.2	95	85	90	-1	-1

Note: header columns read: # Date Program Del Llr | L-on L-off | N Ncr %cor Lat | N Ncr Nwr %corrLat | Nto Tto | ---NOT MATCHING--- | ---Matching--- | %Corr by BLOCK

Table II: Page 1 of the monthly analyzed data files. The **R** in the **Llr** column means the correction factor was on and the animal saw the same trial until a correct response was given. This page is divided into total, non-match and matching trials. The last five columns represent the percent of correct responses by block of trials (maximum of five blocks).

Monthly Summary for REX   for SEP   Page 2 of 4

#	Date	Box-Time	Del	SP1 N	SP1 %	SP1 Lat	SP2 N	SP2 %	SP2 Lat	SP3 N	SP3 %	SP3 Lat	SP4 N	SP4 %	SP4 Lat	SP5 N	SP5 %	SP5 Lat	SP6 N	SP6 %	SP6 Lat	SP7 N	SP7 %	SP7 Lat
1	01SEP93	00:35:59	10	13	100.0	1.3	6	100.0	1.3	9	88.9	1.1	10	90.0	1.0	11	90.9	1.2	11	72.7	1.2	0	.0	—
1	01SEP93	00:17:00	10	11	45.5	1.5	10	50.0	1.5	7	57.1	1.1	11	63.3	1.1	14	71.4	1.3	7	57.1	1.0	0	.0	—
1	02SEP93	00:23:20	10	7	71.4	1.2	7	85.7	1.2	15	93.3	1.1	12	58.3	1.6	8	100.0	1.1	11	72.7	1.2	0	.0	—
1	02SEP93	00:17:12	10	13	100.0	1.2	6	83.3	1.0	9	85.7	1.1	10	80.0	1.4	11	90.9	1.3	11	72.7	1.3	0	.0	—
1	03SEP93	00:28:58	10	6	83.3	1.0	10	80.0	1.7	7	77.8	1.1	8	100.0	1.0	18	83.3	1.3	11	90.9	1.5	0	.0	—
1	03SEP93	00:17:08	10	11	45.5	1.7	10	70.0	1.7	7	42.9	1.1	11	36.4	1.2	14	71.4	1.1	7	71.4	1.7	0	.0	—
1	03SEP93	00:32:35	10	11	54.5	1.3	10	40.0	1.3	7	57.1	1.1	11	45.5	1.6	14	64.3	1.1	7	28.6	1.1	0	.0	—
1	04SEP93	00:17:33	10	11	36.4	1.3	10	60.0	1.3	7	100.0	1.1	11	45.5	1.3	14	78.6	1.4	7	71.4	1.3	0	.0	—
1	04SEP93	00:28:32	10	13	92.3	1.0	6	100.0	1.0	9	100.0	1.1	10	70.0	0.9	11	90.9	1.8	11	90.9	1.0	0	.0	—

Table III: Page 2 of the analyzed monthly data files. Included on this page are the number of trials, percent of correct responses, and the latency for seven serial probe positions. The session time is also included on this page.

e. The routine will verify that the disk is properly formatted and notify the user when the formatting routine is completed.


```
You are about to format the floppy

in DRIVE 'A'   If you do not wish

to continue type CONTROL-BREAK key.
```

Insert new diskette for drive A:
and press ENTER when ready...

Checking existing disk format.
Saving UNFORMAT information.
Verifying 1.44M
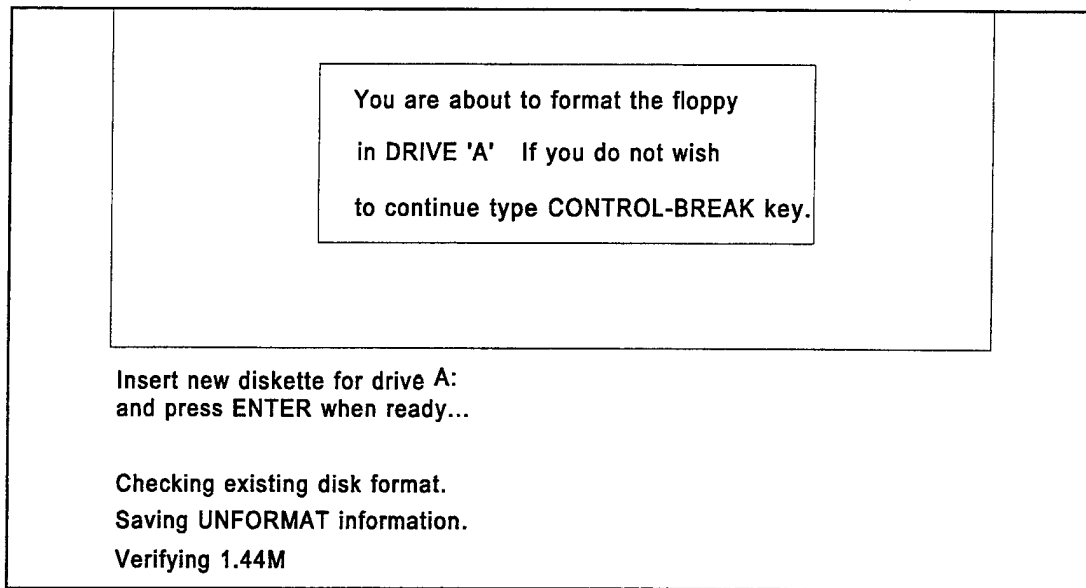
Figure 8: Warning screen appears at the start of the disk formatting procedure.

f. After successful completion of the formatting procedure, the program will ask for a volume name.

   1. The volume name must be less than 11 letters. Volume names are arbitrary and do not affect the formatting process.

   2. If no name is given **<enter>** is pressed.

   3. If a name is given to the disk, the name is typed and **<enter>** is pressed.

g. The routine will check and display the memory capacity of the disk and ask if another disk is to be formatted.

   1. The **Y** is pressed if another disk is to be formatted. The system will display a request to place a new disk into the drive.

   2. The routine will continue when **<enter>** is pressed a second time.

3. An **N** is pressed if no other disks are to be formatted.

4. The system will return to the Disk Management Menu at the completion of this routine.

IV.3.9. Quit and return to DOS.

a. In all Menus, pressing **Q** will return the system to the previous Menu unless otherwise stipulated.

b. From the disk Menu, if **Q** is pressed once the program will return to the SPR Menu. If **Q** is pressed twice, the program will return to the Main Menu. If **Q** is pressed three times the program will return to **DOS** in the **C:\NEWSPR** directory.

IV.4 Sequence File Management Menu (Figure 9)

```
┌─────────────────────────────────────────────┐
│  ┌────────────────────────────────────────┐  │
│  │  SEQUENCE FILE MANAGEMENT MENU       ║  │
│  └────────────────────────────────────────┘  │


        G - Generate sequence file

        N - Named image sequence file listing

        P - Print sequence file

        D - Directory of sequence files

        F - Future expansion



        Q - Quit and return to DOS
        Press a key to enter your choice ...
```

Figure 9: Sequence File Management Menu.

IV.4.1. From the SPR Menu, S is pressed to activate the Sequence File Management Menu.

a. This Menu is used to generate sequence files that display a list of images depending on the list length, produce a list of the sequence files that include the name of the images within each sequence file, print a sequence file for reference, and display a directory of sequence files.

18

IV.4.2. Generate a Sequence file.

a. To activate this subroutine, **G** is pressed.

b. Writing down the planned performance of the sequence file will aide in answering the questions presented by the sequence file generation routine. Table IV enables the user to answer these questions prior to enabling the sequence file generator routine.

c. When the sequence file generator is activated, a sequence file screen (Figure 10) will appear.

d. The arrow keys are used to move the highlighted box down the first serial position column until it is across from the desired list length.

e. To create a sequence file for a list length of six with three blocks of twenty trials each and an equal number of match and non-match trials, for a total of 60 trials, the following responses are made:

    1. Using the down arrow key move the highlighted box to a list length of six in the first serial position.

    2. Using the right arrow key the following entries are made beginning in serial position 1 column: **1 → 2 → 2 → 2 → 2 → 1.**

    3. The number in the **No tot** column will read **10**.

    4. **F3** is pressed **10** times to add the appropriate number of non-match trials.

        (a) The **No tot** column should read **20**.

    5. **F1** is pressed to move to the next block of the session.

    6. The match trials are entered as before with the sequence beginning from sequence position one column being: **2 → 1 → 2 → 2 → 1 → 2.**

        (a) The non-match trials will remain unchanged and do not require adjustments.

    7. **F1** is pressed to move to the third and final block.

```
       SEQUENCE FILE GENERATION QUESTIONNAIRE
What will be the list length? (1-20)
How many trials in each session?
Are the trials to be split into blocks? (Y/N)
     How many blocks?
     How many trials per block?
How many match trials to non-match trials? (1:1, 1:2)
How many trials in each serial position? (max.9)
What will the name of the file be? (i.e., SIXTY6A [sixty = the
     number of trials, 6 = list length, A = version number])


List a four or five digit number for random seed.
List the number of images in the image pool.
Will the delays be random or fixed? (R/F)
     If fixed what is the delay? (seconds)
     If random what is the range? (seconds) LOW_____HIGH
Will the trial delays be random or fixed? (R/F)
     If fixed what is the delay? (seconds)
     If random what is the range? (seconds) LOW_____HIGH
Will the probe delays be random or fixed? (R/F)
     If fixed what is the delay? (seconds)
     If random what is the range? (seconds) LOW_____HIGH
What is the preprobe delay time? (seconds)
```

Table IV: The sequence file generation questionnaire.

8. The serial entries beginning from sequence position one column will be:
$2 \rightarrow 2 \rightarrow 1 \rightarrow 1 \rightarrow 2 \rightarrow 2.$

(a) This entry will make a total of five repetitions at each serial position placed randomly throughout the sequence file (Figure 11).

9. **F10** is pressed to exit this portion of the program and begin the second phase of the sequence file generator.

f. The additional information required for a complete sequence file is provided in Table IV.

1. Naming a sequence file.

   (a) The sequence file name should reflect the number of trials, the list length and version number.

      (1) SIXTY6A.

      (2) The above name indicates 60 trials of a list length of six and it is the first version.

   (b) The extension .SEQ is not added to the name. This will be done automatically by the program when the sequence file generator program is completed.

2. Entering the seed value.

   (a) The seed value is a four or five digit number that identifies the sequence order of the images for a particular set of trials.

3. Range of image numbers from the image pool.

   (a) This identifies which of the pool images will be used as probe images and list images.

   (b) The lowest number must be greater than zero. The highest number must be equal or lower than the highest valid image number in the image pool.

      (1) A valid number is a number which has an identifiable image assigned to it.

      (2) The image pool is the portion of the SPR program which stores the image files. These numbered image files are accessed during the program and are displayed on the monitor screen.

4. Pre-block delay.

   (a) The first entry for the pre-block delay determines whether it will be (**F**) fixed or (**R**) random.

      (1) If the preblock delay is to be zero, then it must be fixed.

      (2) If the delay is to be random for a set range of delays the **R** is pressed.

   (b) If the fixed delay is used then a value in seconds is given.

   (c) If a random delay is used then the shortest delay and the longest delay are entered.

5. The pre-trial delay time is entered the same as the pre-block delay time.

    (a) This is the time between the end of the previous trial and the beginning of the following trial or the inter-trial interval (**ITI**).

6. The pre-probe delay time is entered the same as the pre-block delay.

    (a) The pre-probe delay is the time between the last list item and the appearance of the probe. The pre-probe delay is also known as the probe delay (**PD**).

7. The pre-block, pre-trial and pre-probe delays can be set in the individual configuration files.

    (a) The delays changed in the configuration file can only be fixed.

    (b) If a random delay is required, it must be set in the sequence file generator.

8. A completed section for this portion of the sequence generator is seen in Table V.

```
1.  What (up to 8 char) name for sequence file?          SIXTY6A
2.  What seed value will be used for this sequence file?    1661
3.  What is the lowest sequential image number to use?        1
4.  What is the highest sequential image number to use?     260
      NUMBER of BLOCKS called for is      3

5.  RANDOM (R) or FIXED (F) delay before each block?          F
6.  What is the pre-block delay time (seconds)?              0

      NUMBER of TRIALS per block called for is 20
      10 Matches in 20 trials is an overall
      match percentage % of 50.0

7.  RANDOM (R) or FIXED pre-trial delay?                     F
8.  What is the pre-trial delay time (seconds)?             0
9.  RANDOM (R) or FIXED (F) delay before probe image?        F
10. What is the pre-trial delay time (seconds)?             0
```

Table V. Completed sequence file generator section two.

SERIAL POSITION

LIST No. Trials																						
LEN	tot.	Diffr	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
20	0	0	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o
19	0	0	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
18	0	0	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o		
17	0	0	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o			
16	0	0	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o				
15	0	0	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o					
14	0	0	o	o	o	o	o	o	o	o	o	o	o	o	o	o						
13	0	0	o	o	o	o	o	o	o	o	o	o	o	o	o							
12	0	0	o	o	o	o	o	o	o	o	o	o	o	o								
11	0	0	o	o	o	o	o	o	o	o	o	o	o									
10	0	0	o	o	o	o	o	o	o	o	o	o										
9	0	0	o	o	o	o	o	o	o	o	o											
8	0	0	o	o	o	o	o	o	o	o												
7	0	0	o	o	o	o	o	o	o													
6	0	0	o	o	o	o	o	o														
5	0	0	o	o	o	o	o															
4	0	0	o	o	o	o																
3	0	0	o	o	o																	
2	0	0	o	o																		
1	0	0	o																			

F1 - F2 = Change blks
F3 - F4 = Change tot.
0 - 9 = Set Matches
@ ser. pos.
F10 = Exit (save)
CNTR-Q = Quit

SPECIFY THE TRIALS FOR EACH BLOCK

Block # Trials 0   Number of Block   1   Grand Total 0

Figure 10: The sequence file generation table (Blank).

Figure 11: The sequence file generation table (completed) for a list length of six, three blocks with a total of 60 trials.

IV.4.3. Named image sequence file listing.

    a. The **N** is pressed to activate this routine.

    b. This routine is used to produce a printed sequence file with the name of the images an animal will see in the list and probe. It also provides notations as to which are match and non-match trials.

    c. Make sure the printer is on-line before using this routine.

    d. This routine will make a temporary file **NAMELIST.TMP** (Table VI and VII).

    e. The **NAMELIST.TMP** can be imported into WordPerfect® for printing if the printer is not compatible with this program.

    f. After activating this routine, a directory of sequence files is displayed. A sequence file is chosen by using the arrow keys and pressing **<enter>**.

```
              IMAGE NAMES FOR SEQUENCE - SIXTY0A
          ---------- BLOCK   1  ( 10 trials )  ---------
trial  1 - length   1 ---------------------------
MATCH --> lobster
probe image 1 : lobster                              IS   A MATCH
probe image 2 : needle                           IS NOT A MATCH
trial  2 - length   1 ---------------------------
MATCH --> gorilla
probe image 1 : gorilla                              IS   A MATCH
probe image 2 : shoe                             IS NOT A MATCH
trial  3 - length   1 ---------------------------
MATCH --> nail file
probe image 1 : nail file                            IS   A MATCH
probe image 2 : star                             IS NOT A MATCH
trial  4 - length   1 ---------------------------
         sweater
probe image 1 : asparagus                        IS NOT A MATCH
probe image 2 : sweater                              IS   A MATCH
trial  5 - length   1 ---------------------------
MATCH --> ostrich
probe image 1 : ostrich                              IS   A MATCH
probe image 2 : moon                             IS NOT A MATCH
trial  6 - length   1 ---------------------------
         vase
probe image 1 : tiger                            IS NOT A MATCH
probe image 2 : vase                                 IS   A MATCH
```

Table VI: A sample of a printout of the **NAMELIST.TMP** file made for the sequence file **SIXTY0A**. If the first probe image is a match, a match sign will appear in the list (**MATCH -->**).

g. After pressing **<enter>**, the routine is automatic. The routine will display messages on the status of the routine but is not interactive.

h. If the printer is not on-line, the program routine must be exited (Table VIII).

1. The **Q** is pressed three times to exit the program.

2. In the **NEWSPR** directory **DIR *.TMP** is displayed then **<enter>** is pressed.

(a) A list of the temporary files will be listed.

C:\NEWSPR\>**dir *.tmp <enter>**
Volume in Drive C is MS-DOS_5
Volume Serial Number is 2B9B-19F1
Directory of C:\NEWSPR
NAMELIST.TMP   15432   06-17-93 2:19
          1 file(s)   15432 bytes
                      159756788 bytes free

```
        IMAGE NAMES FOR SEQUENCE - SIXTY6A
--------- BLOCK   1  ( 10 trials ) ---------
trial  1 - length  6 ------------------------
                screwdriver     barn
                fly          skirt
                ear                    lobster
probe image 1 : refrigerator             IS NOT A MATCH
probe image 2 : screwdriver              IS  A MATCH
trial  2 - length  6 ------------------------
                mitten      record player
                foot                   button
MATCH --> cigar            peach
probe image 1 : cigar              IS  A MATCH
probe image 2 : tomato             IS NOT A MATCH
trial  3 - length  6 ------------------------
                well       beetle
                house                 mountain
                accordian             lock
probe image 1 : drum              IS NOT A MATCH
probe image 2 : mountain          IS    A MATCH
```

Table VII: A sample of a printout of the **NAMELIST.TMP** file made for the sequence file **SIXTY6A**. If the first probe image is a match, a match sign will appear in the list (**MATCH -->**).

```
sequence file                   21 - TWOHUN20 was selected
        C:\NEWSPR\IMAGES\IMAGENAM.NIM
        THERE ARE       5 BLOCKS

        C:\DOS\PRINT NAMELIST.TMP    (if printer not on-line -
        error on list device indicate that it may be off-line.
        Please check it.)
        NAMELIST.TMP file sent to printer
        Note that if the printer is not ready, we hang here!

        Stop - Program terminated
```

Table VIII: The message for creation of the NAMELIST.TMP file. The file would automatically be sent to the printer.

    i.   This file can be directly imported into WordPerfect® for printing.

    j.   If the printer is off-line, the file will be printed when the printer is put on-line during any portion of the primate SPR program.

IV.4.4. Print a sequence file.

    a.   The P is pressed to activate this routine.

    b.   This routine is identical to the previous routine except it prints out raw sequence files.

    c.   The sequence file provides image numbers, the numbers of the first and second probe images, delay times set within the sequence file, the number of blocks, and the number of trials per block.

    d.   This file is directly importable into WordPerfect® (see Table IX).

```
Number of blox:    3
Preblock xtime:    0
Number trials :    20
Pre-trial xtime:   0
Number in list:    6
Sequence 1-10: 199  83 142  17  93 205   0   0   0   0
Sequence 11-20:  0   0   0   0   0   0   0   0   0   0
Preprobe xtime:    0
probe image 1 : 185
probe image 2 : 199
Random probe  :   1
Pre-trial xtime:   0
Number in list:    6
Sequence 1-10: 144  94  58 184  41 163   0   0   0   0
Sequence 11-20:  0   0   0   0   0   0   0   0   0   0
Preprobe xtime:    0
probe image 1 : 236
probe image 2 :  58
Random probe  :   2
Pre-trial xtime:   0
Number in list:    6
```

Table IX: A sample of the printout of the SIXTY6A sequence file.

IV.4.5. Directory of sequence files (Table X).

    a. The D is pressed to activate this routine.

    b. This is a MS-DOS directory command and will list the current directory of sequence
       files.


```
Volume in drive C is MS-DOS_5
Volume Serial number is 2B9B-19F1

SIXTY0A.SEQ  SIXTY0B.SEQ  SIXTY1A.SEQ  SIXTY1B.SEQ  SIXTY2A.SEQ
SIXTY2B.SEQ  SIXTY3A.SEQ  SIXTY3B.SEQ  SIXTY4A.SEQ  SIXTY4B.SEQ
        10 file(s)        366175 bytes
              159756988 bytes free
```

Table X: Sample directory of sequence files created with the primate SPR program.

c. By pressing any key, the program will return to the Sequence File Management Menu.

IV.5. Animal selection, configuration and information upgrades (Figure 12).

```
┌─────────────────────────────────────────────────┐
│ ┌─────────────────────────────────────────────┐ │
│ │          ANIMAL  SELECTION  MENU            │ │
│ └─────────────────────────────────────────────┘ │

     Currently selected animal is      ┌─ DANIEL ─┐
     A - Choose a different animal      └──────────┘

     I - Edit/Review the animal's  information file

     C - Edit/Review the  animal's  c onfiguration  file

     F - FULL ACCESS Edit/Review of  configuration file

     N - Create subdirectory and files for new animal

     D - Delete subdirectory and files for this animal


     Q - Quit and return to DOS
     Press a key to enter your choice ...
```

Figure 12: The Animal Selection Menu.

a. From the SPR Menu an **A** is pressed to transfer to the Animal Selection Menu.

b. This Menu is used to choose from the animal directories, add and delete animal directories, edit animals' configuration files, and edit animals' information files.

IV.5.1 Choose a different animal.

a. To activate this routine an **A** is pressed.

b. A list of animal directories will appear on the screen with one animal's name highlighted (Table XI).

c. Using the arrow keys, the desired animal is highlighted and **<enter>** is pressed.

29

SELECTING ANIMAL FROM KNOWN ANIMAL DIRECTORIES

ARTHUR	ASTIN	BERNIE	COODIE	DALLAS
HOPE	DIZZY	GERRY	GUY	[HITCH]
XERETES	NEWT	SILLY	PUNK	ERTA

Table XI: Animal directory in normal mode. No name is missing in the right column. All animals can be chosen.

d. The routine will return to the Animal Selection Menu after the selection is made.

e. **CAUTION**. Occasionally when an animal is chosen from the right column, a wrap-around system is activated when **<enter>** is pressed to select the animal.

1. If there is a missing space in the right column, or a small highlighted area in this column, a wrap around has occurred (Table XII). **DO NOT PRESS <enter>**!

2. The highlight is moved to the top center name and **<enter>** is pressed to select another animal.

SELECTING ANIMAL FROM KNOWN ANIMAL DIRECTORIES

ARTHUR	ASTIN	BERNIE	COODIE	DALLAS
HOPE	DIZZY	GERRY	GUY	[ ]
HITCH	NEWT	SILLY	PUNK	ERTA
XERETES				

Table XII: The animal directory with an animal name missing from the right column. No animals in the left or right column can be chosen. The cursor is moved to the top center animal name "BERNIE" and **<enter>** is pressed. The screen wrap will be eliminated when animal selection is re-entered.

3. Re-enter the animal selection routine and the wrap around should be corrected and appear as in Table XI. Any animal may now be chosen.

IV.5.2 Edit/Review the animal's information file (Table XIII).

```
┌──────────────────────────────────────────────────┐
│                                                    │
│    INFORMATION FILE FOR Rex                        │
│                                                    │
│  Animal Identification Number  : RH777             │
│  DATE                : 1993                         │
│  TIME                : HH:MM:SS                     │
│  Operator for today's session  : Finger            │
│  Session label              : REX07OCT             │
│  Doctor              : Finger                      │
│  Referral            : 123                         │
│  Hospital            : ICD                         │
│  Patient             : Rex                         │
│  Medication                : None                  │
│  Classification            : Intro                 │
│  State               : Alert                       │
│  Age                 : 5                           │
│  Hand                : R                           │
└──────────────────────────────────────────────────┘
```

Table XIII: Animal Information File.

a. An **I** is pressed to activate this routine.

b. This section is used to enter the animal's personal and identifying information.

c. The data is entered by moving the highlight box to the line to be corrected and pressing **<enter>**. The correct information is typed in and **<enter>** is pressed.

d. The date and time parameters will be automatically entered into the data file by the system when the animal is run.

e. Most entries are self explanatory.

    1. Animal Identification - tattoo number.

    2. Operator - the person beginning the session for the animal.

    3. Session Label - the program labels the session by using the first three letters of the animal's name, the day and a three-letter month identifier: **REX11JAN.*****

        (a) The session is further identified in the raw data as **.001, .002...** in the animal's subdirectory. When it is copied out of the system it is then identified by **.DTA, .DTB,... DTZ**.

4. Doctor - Identifies the principle investigator of the project.

5. Referral - Identifies the project number.

6. Hospital - Identifies the hospital or institution where the testing is being conducted.

7. Patient - The name of the animal is placed here.

8. Medication - If the animal has had any medications, even those which may not affect behavior it is noted here.

9. Classification - This is an entry of the animal's level of proficiency such as shaping, training, or baseline.

10. State - This is used to identify the animal's home cage behavior prior to placement in the chamber (i.e., alert, depressed, hyper-excited).

11. Age - The animal's age in whole years is entered here.

12. Hand - The hand the animal most often uses to respond is entered here as right (**R**), left (**L**) or both (**B**).

f. When all changes have been completed, **F1** is pressed and all changes will be saved. The system will return to the Animal Selection Menu after saving the changes.

g. Pressing **<control> Q** will allow the system to return to the Animal Selection Menu without saving the changes.

IV.5.3 Edit/Review the Animal's Configuration file (Table XIV).

a. The **C** is pressed to begin this routine.

b. This is a shortened version of the FULL configuration file (Table XV).

c. This version is used to make changes which do not require access to the complete configuration file.

d. Use the arrow keys to move to the line which requires change then **<enter>** is pressed. The changes are typed in and **<enter>** is pressed again.

e. When all changes have been made press **F1**. The changes will be saved and the system will return to the Animal Selection Menu.

f. Pressing **<control> Q** will cause the system to return to the Animal Selection Menu without saving the changes.

g. All sections of the configuration file are explained in the next section.

1	num chars in sequence name	:	7
2	Sequence file to be used	:	SIXTY6A
3	REPEAT TRIAL IF NOT CORRECT	:	1
4	Hold last list image at probe	:	0
5	flag to select (1) obs phase	:	0
6	list image "on" delay time	:	1500
7	list image "off" delay time	:	500
8	flag to select probe phase	:	1
9	Include probe image 1 if <>0	:	1
10	x pos of probe image 1 80 col	:	20
11	y pos of probe image 1 25 lin	:	20
12	x position of left of target	:	56
13	x position of right of target	:	76
14	y position of top of target	:	16
15	y position of bottom of target	:	23
16	x pos of left of image 1 valid	:	5
17	x pos of right of image 1 valid	:	45
18	y pos top of image 1 valid	:	12
19	y pos bottom of image 1 valid	:	25
20	x pos of left of target valid	:	50
21	x pos of right of target valid	:	80
22	y pos top of target valid	:	12
23	y pos bottom of target valid	:	25
24	time limit for probe response	:	10000
25	time delay wrong probe resp	:	1500
26	time delay correct probe resp	:	1500
27	time delay timeout probe resp	:	5000
28	PROBE CORRECT action is done	:	1
29	PROBE CORRECT port to pulse	:	888
30	PROBE CORRECT bits pulsed	:	255
31	PROBE CORRECT pre-action wait	:	0
32	PROBE CORRECT milliseconds	:	250
33	PROBE WRONG action is done	:	0
34	PROBE WRONG port to pulse	:	888
35	PROBE WRONG bits pulsed	:	0
36	PROBE WRONG pre-action wait	:	0
37	PROBE WRONG milliseconds	:	0
38	RESP. MUST BE IN TARGET ZONE	:	1
39	DELAY READS OF FILES TIL LAST	:	0
40	SOUND ERROR TONE IF LONG READ	:	0
41	BOXES DRAWN AROUND TARGETS	:	0

Table XIV: Configuration File (Short Version).

IV.5.4. FULL ACCESS edit/review of configuration file (Table XV).

1 num chars in sequence name	: 7
2 Sequence file to be used	: SIXTY6A
3 REPEAT TRIAL IF NOT CORRECT	: 1
4 Hold last list image at probe	: 0
5 TIME DELAYS - before blocks	: 0
6 before trial	:1500
7 flag to select (1) obs phase	: 0
8 delay before observation phase	: 0
9 Left column of observe blotch	: 30
10 Right column of observe blotch	: 50
11 top row of observe blotch	: 9
12 bottom row of observe blotch	: 15
13 time limit for observe resp	: 5000
14 time delay for wrong resp	: 0
15 time delay for correct resp	: 0
16time delay for obs timeout	: 0
17 flag to select list phase	: 1
18 pre-list delay time	: 0
19 list image "on" delay time	: 1500
20 list image "off" delay time	: 500
21 x pos of list images (80 col)	: 40
22y pos of list images (25 lin)	: 9
23 flag to select warning phase	: 1
24 Pre warning delay time	: 0
25 flag to select probe phase	: 1
26 pre probe delay time	: 1000
27 Include probe image 1 if <>0	: 1
28 x pos of probe image 1 80 col	: 20
29 y pos of probe image 1 25 lin	: 20
30 include probe image 2 if <>0	: 0
31 x pos of probe image 2 80 col	: 60
32 y pos of probe image 2 25 lin	: 10
33 Include target blotch if <>0	: 1
34 x position of left of target	: 56
35 x position of right of target	: 76
36 y position of top of target	: 16
37 y position of bottom of target	: 23
38 x pos of left of image 1 valid	: 5
39 x pos of right of image 1 valid	: 45
40 y pos top of image 1 valid	: 12
41 y pos bottom of image 1 valid	: 25
42 x pos of left of image 2 valid	: 40

43 x pos of right of image 2 valid	: 80
44 y pos top of image 2 valid	: 0
45 y pos bottom of image 2 valid	:10

46 x pos of left of target valid	: 50
47 x pos of right of target valid	: 80
48 y pos top of target valid	: 12
49 y pos bottom of target valid	: 25

50 time limit for probe response	: 10000
51 time delay wrong probe resp	: 1500
52 time delay correct probe resp	: 1500
53 time delay timeout probe resp	: 5000

54 OBS TIMEOUT action is done	: 0
55 OBS TIMEOUT port to pulse	: 888
56 OBS TIMEOUT bits pulsed	: 0
57 OBS TIMEOUT pre-action wait	: 0
58 OBS TIMEOUT milliseconds	: 0
59 OBS CORRECT action is done	: 0
60 OBS CORRECT port to pulse	: 888
61 OBS CORRECT bits pulsed	: 0
62 OBS CORRECT pre-action wait	: 0
63 OBS CORRECT milliseconds	: 0
64 OBS WRONG action is done	: 0
65 OBS WRONG port to pulse	: 888
66 OBS WRONG bits pulsed	: 0
67 OBS WRONG pre-action wait	: 0
68 OBS WRONG milliseconds	: 0

69 PROBE TIMEOUT action is done	: 0
70 PROBE TIMEOUT port to pulse	: 888
71 PROBE TIMEOUT bits pulsed	: 0
72 PROBE TIMEOUT pre-action wait	: 0
73 PROBE TIMEOUT milliseconds	: 0
74 PROBE CORRECT action is done	: 1
75 PROBE CORRECT port to pulse	: 888
76 PROBE CORRECT bits pulsed	: 255
77 PROBE CORRECT pre-action wait	: 0
78 PROBE CORRECT milliseconds	: 250
79 PROBE WRONG action is done	: 0
80 PROBE WRONG port to pulse	: 888
81 PROBE WRONG bits pulsed	: 0
82 PROBE WRONG pre-action wait	: 0
83 PROBE WRONG milliseconds	: 0

84 RESP. MUST BE IN TARGET ZONE	: 1
85 DELAY READS OF FILES TIL LAST	: 0
86 SOUND ERROR TONE IF LONG READ	: 0

87 Pre-trial beep freq (hertz)	: 440
88 num of reps	: 2

89 clock tics on	: 2
90 clock tics off	: 1
91 pre-probe beep freq (hertz)	: 880
92 num of reps	: 1
93 clock tics on	: 5
94 clock tics off	: 0
95 RIGHT RSP BEEP freq (hertz)	: 1760
96 num of reps	: 2
97 clock tics on	: 1
98 clock tics off	: 1
99 WRONG RSP BEEP freq (hertz)	: 60
100 num of reps	: 1
101 clock tics on	: 3
102 clock tics off	: 0
103 TIMEOUT BEEP freq (hertz)	: 60
104 num of reps	: 1
105 clock tics on	: 3
106 clock tics off	: 0
107 BOXES DRAWN AROUND TARGETS	: 0

Table XV: Full Configuration File.

a. The configuration file controls how the animal sees the sequence file during the session. It determines the length of each portion's presentation on the monitor screen. Delays and tones are controlled in the full configuration file.

b. The first two lines determine the sequence file.

    1. If the sequence file name is longer than seven characters, the first line must be corrected. If the sequence file name is shorter than seven characters, no change is required.

    2. Any sequence file generated by this program can be used.

    3. It is not necessary to add the extension **.SEQ** to the second line.

c. The third line toggles the correction factor "ON" and "OFF."

    1. When the correction factor is "ON" the trial will repeat until a correct response is made.

    2. A zero on this line turns the correction factor **OFF**. When the correction factor is "OFF," the program continues to the next trial regardless of the response.

d. The fourth line is used for animals on a list length of zero (**0**).

1. A list length of zero (**0**) is the same as a list length of one except that the list item and the probe item are displayed simultaneously (Figure 13).

2. If the list length is greater than zero (**0**), then this entry **must** be zero (**0**).

e. Lines 7 to 16 determine whether an animal receives a response block prior to the beginning of the trial. This is considered the READY RESPONSE. If used, an animal is required to touch the square indicating it is ready for the next trial.

1. If line 7 is zero (0), this portion of the program does not execute.

2. Lines 9 to 12 determine the position and size of the block on the screen.

3. The screen is divided into 25 rows and 80 columns. Column one/row one is located at the top left corner (Figure 14).

4. Line 8 allows a delay to occur between the time the program is started and the appearance of the observation block. The delay also appears at the end of a trial and the appearance of the block.

5. Line 13 controls the amount of time the animal has to touch the screen to begin the trial.

6. The remaining lines regulate the time delays to move to the beginning of the following trial. These delays are dependent on the response given during the trial.
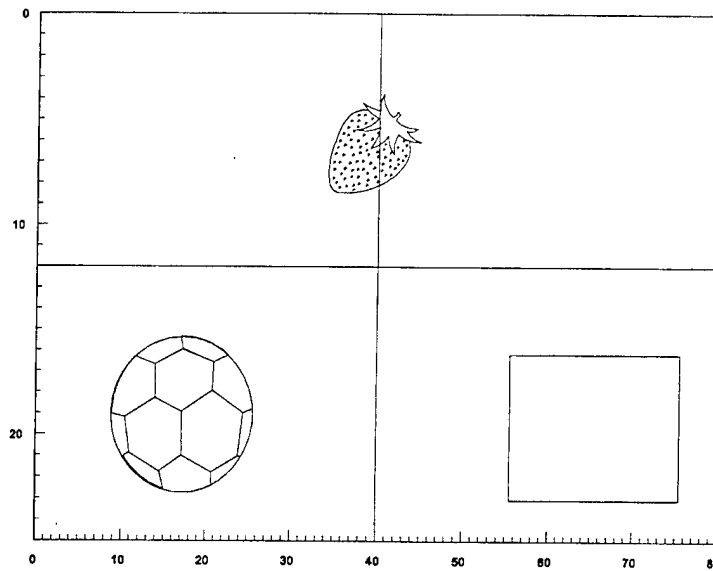
Figure 13: A graph of how the computer monitor screen would appear during a trial on a list length of zero (**0**) [without the scale]. The list position (strawberry) and the probe position (ball) may be changed in the configuration file of each animal. The white block is touched if the probe image does not match the list image.
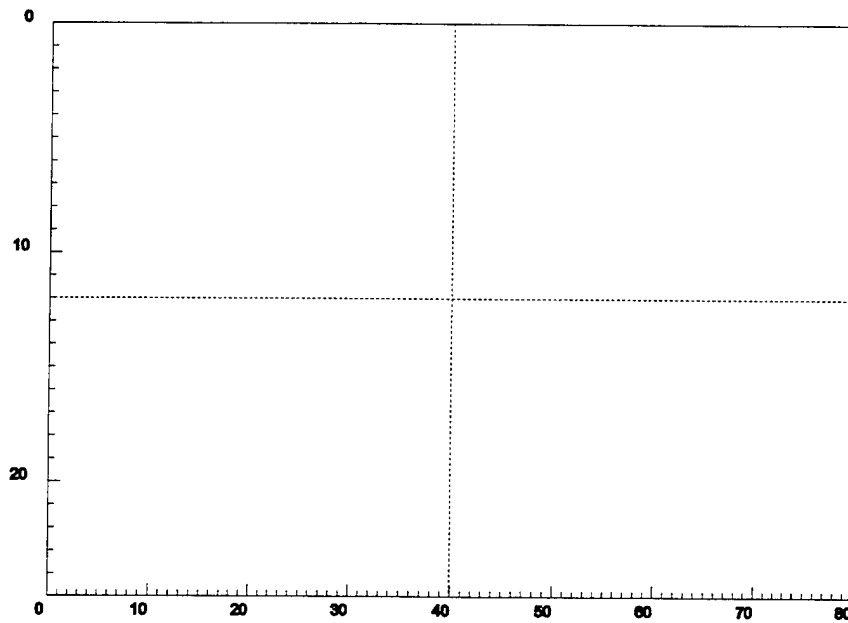
Figure 14: Blank Screen Graph [25 rows x 80 columns].

f.   Lines 17 to 22 control the list phase. This activates the display of the list images presented on the screen.

1. Line 17 must contain a "1" to activate this portion of the program.

2. The pre-list delay time refers to the inter-trial interval (**ITI**).

   (a) The amount of time between trials.

3. The **ON** time refers to the stimulus viewing time (**SVT**).

   (a) The amount of time an animal sees each list image.

4. The **OFF** time is the inter-stimulus interval (**ISI**).

   (a) The amount of time an animal must wait until the next image in the list appears.

5. The **X-Y** position of the list image governs the center position of the list images.

g. Lines 23 and 24 regulate the warning an animal may receive before the display of the probe item. If line 23 is set to zero, "0," this portion of the program will not be active.

h. Lines 25 to 32 control what an animal will see during the probe position of the program.

   1. To activate the probe phase, line 25 must have a **1** as an entry.

   2. The pre-probe delay (PPD) time is the span of time between the last ISI and the display of the probe item.

   3. Each sequence file generated has two probes randomly selected for each trial. One of the two probe images will match an image in the list.

   4. It is possible to select both probe images to be displayed while not displaying the white block.

   5. The **X-Y** position of the probe image determines the location of the center of the probe image.

i. Lines 33 to 37 allow for adjustments in the size of the white block for non-match trials, its location, and whether it will be activated and viewed.

   1. If the white block is to be used a **1** must be entered on line 33.

   2. Using the 25 X 80 monitor scale, the next four entries determine the location and size of the non-match block.

3. The entries in Table XV would make the block 20 columns wide and seven rows high.

j. Lines 38 to 45 allow the user to select the location on the screen the animal must touch for a correct match response.

1. This value also uses the 25 X 80 monitor scale.

k. Lines 46 to 49 determine where the animal must touch over the non-match block area for a correct response. These values use the 25 X 80 monitor scale.

l. Lines 50 to 53 control the response section (probe phase).

1. Line 50 is the amount of time in milliseconds (**Ms**) that the animal has to respond during the probe phase.

(a) In this example, the animal has 10000 Ms (10 seconds) to make a response.

2. Lines 51 to 53 specify the amount of time the animal must wait before the next trial begins. These values are dependent on the response given.

(a) Table XV indicates that the animal will wait 1500 Ms after a correct or incorrect response but must wait 5000 Ms if no response is given.

m. Lines 54 to 83 determine, depending on the animal's response, the action taken by the program and the address ports.

n. Line 84 is used primarily for animal shaping.

1. During shaping, zero **0** must be entered on this line. Touching the screen in any location will produce a reward.

2. As the animal improves, this value is changed to "1" and lines 38 to 49 will be used to limit the area the animal must touch to receive a reward.

o. Line 85 is used for list lengths greater than ten. Items will be continually read so there would be little or no delay added to the presentation of the list images other than the delays set in the sequence file or the configuration file. If this value is one **1**, then all the items to be shown in the list will be read before the first image is shown. This would add to the inter-trial interval delays with list lengths greater than ten.

p. Line 86 is used if line 85 is one **1**. If a list length greater than ten is used, a tone can be used to notify the operator that the inter-trial delay will be extended because of the length of time it takes to read the image files.

q. Lines 87 to 106 are used to set the tone frequency and the length of the tone an animal will receive depending of the animal's response.

r. Line 107 activates a block appearing around the active sites determined in the configuration file.

s. A complete trial with the different phases is depicted in Figure 15.

1. All trials begin with the observation phase. If the observation phase is **ON**, the pre-observation delay (**POD**) begins. If the observation phase is **OFF**, the trial begins at the pre-block delay (**PBD**) which is determined in the sequence file.

2. After the POD, the animal is given a set time to respond to the observation response block. This is the observation response time (**ORT**).

3. Once the animal responds, an observation response delay time (**ORDT**) is activated. The time for this delay is dependent on the animal's response or lack of response.

4. If the observation phase is not selected "0" the trial moves to the PBD. If the observation phase were selected (**1**) the trial would begin at the pre-observation delay.

5. The list phase begins with the pre-trial delay (**PTD**) or the inter-trial interval (**ITI**).

6. The ITI is followed by the list image **ON** time which is the same as the stimulus viewing time (**SVT**). This is the span of time the animal is allowed to see each item in the list.

7. The SVT is followed by the list image **OFF** time. This is the same as the inter-stimulus interval (**ISI**) The SVT/ISI chain is repeated for each list image.

Begin Session

Begin Trial

Observation Phase   List Phase   Warning Phase   Probe Phase

| P O D | ORT | O R D T | P B D | P T D | SVT | I S I | SVT | I S I | SVT | P P D | PRT | P R D T 1 | P R D T 2 | P R D T 3 | I T I |

T 1/0   T 1/0   T   T   T
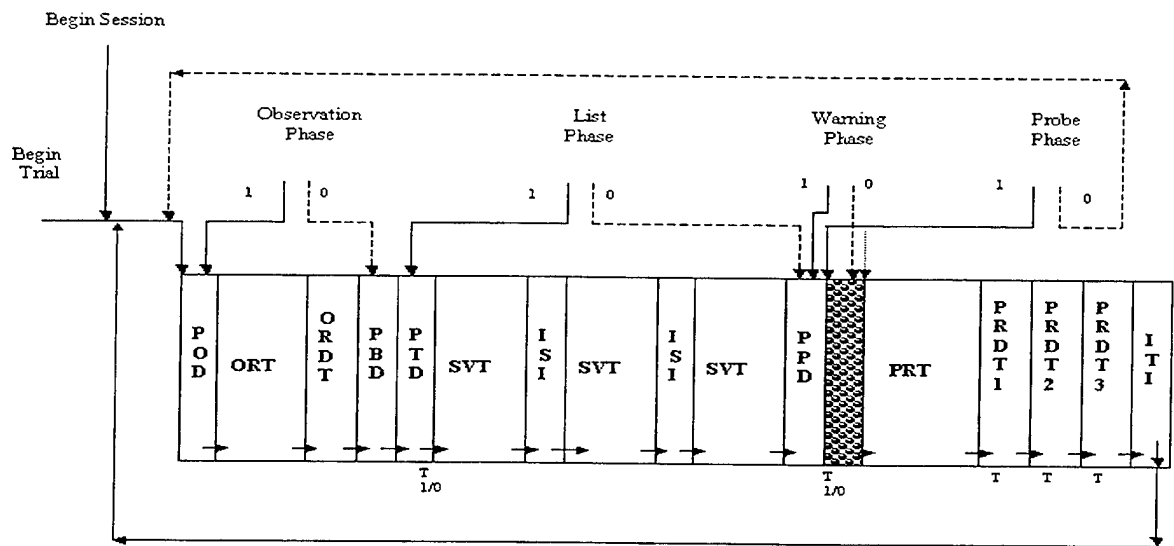
Figure 15: An SPR Trial. POD - pre-observation delay, ORT - observe response time, ORDT - observation response delay time, PBD – pre-block delay, PTD – pre-trial delay, SVT - stimulus viewing time, ISI - interstimulus interval, PPD – pre-probe delay, PRT - probe response time, PRDT1 - correct response, PRDT2 - incorrect response, PRDT3 - non-response (timeout), T - tone, ITI – inter-trial interval, 1 - on, 0 - off, 1/0 - toggle on/off, online (--- and ———), off-line (·······).

8. After the list phase is completed, the warning phase begins.

   (a) This identifies the end of the list and the onset of the probe phase.

   (b) If the warning phase is active, **1,** a tone will sound before the display of the probe.

   (c) If the warning phase is not active, **0,** the program will advance to the probe phase.

9. The probe phase begins with the pre-probe delay (**PPD**), if the probe phase is active, **1.** If the probe phase is not active, **0,** the trial returns to the observation phase.

10. The PPD is followed by the probe response time (**PRT**).

11. The PRT ends with a response or at the end of the time limit set for no response. Depending on the animal's response, the PRT is followed by one of three probe response delay times (**PRDT#**).

   (a) If a correct response is given the trial moves to **PRDT1**.

   (b) If an incorrect response is made the trial moves to **PRDT2**.

   (c) If no response is made the trial moves to **PRDT3**.

12. At the completion of the **PRDT**, the program returns to the observation phase for the next trial.

13. A typical trial might be **OP=0 □ PBD=0 □ LP=1 □ PTD=0 □ SVT=5000 Ms □ ISI=500 Ms □ SVT=10000 Ms □ ISI=500 Ms □ WP=0 □ PP=1 □ PPD=1000 Ms □ PRT=10000 □ PRDT=(1=1500 Ms, 2=1500 Ms, 3=5000 Ms) □ ITI**.

14. A tone can be activated after the pre-trial delay, after the warning phase, and after the probe response delay time.

t. After all changes have been made to the configuration file, **F1** is pressed to save the file and return to the Animal Selection Menu.

1. If the changes to the configuration file are not to be saved **<control> Q** is pressed. The program will return to the Animal Selection Menu without saving the changes to the configuration file.

IV.5.5. Create a subdirectory and files for a new animal.

a. To activate this routine, **N** is pressed.

b. This routine is used to add an animal to the animal selection directory.

c. An animal name is entered using eight letters or less. No spaces can be in the name. After the name is entered **<enter>** is pressed.

1. If the name has already been entered for another animal, the program will ask that another name be entered.

2. To exit without entering a name **<enter>** is pressed.

d. After an acceptable name has been entered, the program will make a subdirectory for that animal.

1. Included in the subdirectory is a default information file (*.**INF**) and a default configuration file (*.**CNF**).

2. Each time the configuration file is changed, the previous configuration file is relabeled as old configuration file (*.**OCF**).

e. When the files and directories for the animal are completed, the system will return to the Animal Selection Menu.

IV.5.6. Delete subdirectory and files for this animal (Figure 16).

a. Make sure the animal to be deleted is in the **CURRENTLY SELECTED ANIMAL** box.

43

1. If the animal to be deleted is not highlighted, an **A** is pressed and the correct animal chosen.

2. **ALL** data files for the animal to be deleted should be copied to a floppy disk.

c. Once an animal is chosen, a **D** is pressed to activate the deletion routine.

1. A warning will be displayed on the screen prior to the deletion of the animal's directory and files.

2. If all files for this animal were not previously copied to a floppy and removed from the system, **N** is pressed.

```
┌──────────────────────────────────────────────────┐
│ ┌────────────────────────────────────────────────┐
│ │  ┌──────────────────────────────────────────┐  │
│ │  │  ANIMAL DELETION VERIFICATION            │  │
│ │  └──────────────────────────────────────────┘  │
│ │                                                 │
│ │  Currently selected animal is    |_DANIEL__|    │
│ │  IF YOU CONTINUE, THE CONFIGURATION FOR THIS ANIMAL │
│ │  WILL BE DELETED!  ANY RAW DATA MUST HAVE BEEN COPIED │
│ │  TO DISKETTE BY NOW.  DO YOU WISH TO CONTINUE ? │
│ │                                                 │
│ │                                                 │
│ │  N - Go back to the animal maintenance menu     │
│ │                                                 │
│ │  Y - Delete subdirectories for this animal      │
│ │                                                 │
│ │  Press a key to enter your choice ...           │
│ │  ──────────────────────────────────────────────┘
│ └
└──────────────────────────────────────────────────┘
```

Figure 16: Animal Deletion Verification

3. If all data files have been copied and this is the animal to be deleted, the **Y** is pressed.

4. All files and directories for this animal will be removed from the SPR program system.

IV.5.7. To quit the Animal Selection Menu and return to the SPR Menu, the **Q** is pressed.

IV.6 Image File Management Menu (Figure 17).

44

a. This portion of the program produces a hard copy of the images and their corresponding identification numbers, lists the image directory on the monitor screen and views various images.

b. From the SPR Menu, an **M** is pressed to access this portion of the program.

```
┌──────────────────────────────────────────────┐
│  ╔══════════════════════════════════════╗     │
│  ║    IMAGE FILE MANAGEMENT MENU    ║     │
│  ╚══════════════════════════════════════╝     │
│                                                │
│        G - Generate image file                 │
│        L - List image directory                │
│        V - View an image                       │
│        P - Print picture names and numbers     │
│                                                │
│                                                │
│        Q - Quit and return to DOS              │
│        Press a key to enter your choice ...    │
└──────────────────────────────────────────────┘
```
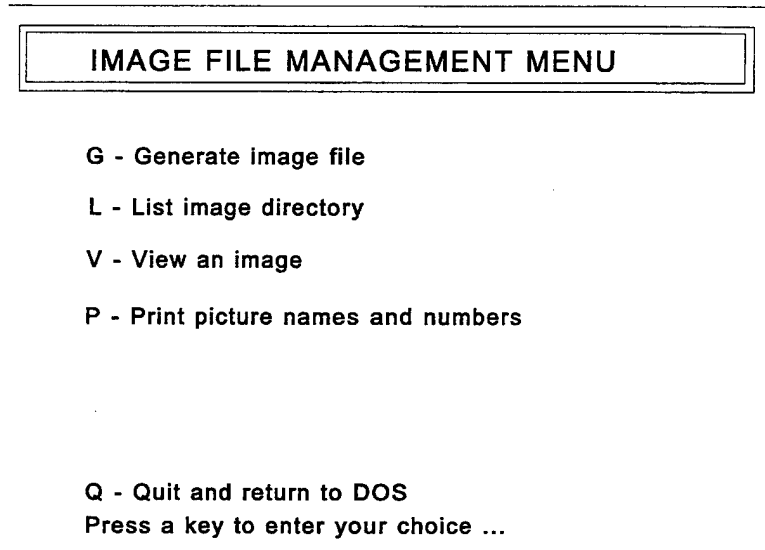
Figure 17: Image File Management Menu.

IV.6.1. Generate an image file.

a. This portion of the program is reserved for future expansion.

IV.6.2. List image directory.

a. An **L** is pressed to activate this routine.

b. This routine will list the image files in the image directory.

1. The images in the directory are classified by their corresponding identification numbers (Table XVI).

c. At the end of the directory list, **<space>** is pressed to return to the Image Maintenance Menu.

45

```
Volume in drive C is MS-DOS_5
Volume Serial Number is B9B-19F1
Directory of C:\NEWSPR\IMAGES

1.NIM        10.NIM        100.NIM       101.NIM       102.NIM
103.NIM      104.NIM       105.NIM       106.NIM       107.NIM
108.NIM      109.NIM       11.NIM        110.NIM       111.NIM

Press any key to continue...
```

Table XVI: Image Directory.

IV.6.3. View an image.

    a. The **V** is pressed to activate this routine.

    b. The program will ask for an image number.

        1. The number entered must be a valid image identification number.

        2. The correct number is entered and **<enter>** is pressed to view the image.

    c. The image will appear in the center of the computer monitor screen.

    d. To remove the image from the screen, **<enter>** is pressed.

        1. The program will remove the current image and ask for another image number. If more images are to be viewed, enter the number and press **<enter>**.

        2. To stop viewing images, **<enter>** is pressed instead of entering an image number.

IV.6.4. Print image names and numbers.

    a. The **P** is pressed to activate this routine.

    b. The program will ask for the printer port address to be entered.

        1. To use the default printer (e.g., **LPT1:**) **<enter>** is pressed.

        2. To print to an alternate printer, the port (e.g., **LPT1, LPT2, COM2**) address is entered.

c. A complete list of the image names and the corresponding identification numbers will be printed (Table XVII).

IV.6.5. To exit the Image Maintenance Menu, **Q** is pressed and the system returns to the SPR Menu.

1 accordion	53 chair	105 glasses	157 onion	209 snake
2 airplane	54 cherry	106 glove	158 orange	210 snowman
3 alligator	55 chicken	107 goat	159 ostrich	211 sock
4 anchor	56 chisel	108 gorilla	160 owl	212 spider
5 ant	57 church	109 grapes	161 paint brush	213 spinning wheel
6 apple	58 cigar	110 grasshopper	162 pants	214 spool
7 arm	59 cigarette	111 guitar	163 peach	215 spoon
8 arrow	60 clock	112 gun	164 peacock	216 squirrel
9 artichoke	61 clothes pin	113 hair	165 peanut	217 star
10 ashtray	62 cloud	114 hammer	166 pear	218 stool
11 asparagus	63 clown	115 hand	167 pen	219 stove
12 ax	64 coat	116 hanger	168 pencil	220 strawberry
13 baby buggy	65 comb	117 harp	169 penguin	221 suitcase
14 ball	66 corn	118 hat	170 pepper	222 sun
15 balloon	67 couch	119 heart	171 piano	223 swan
16 banana	68 cow	120 helicopter	172 pig	224 sweater
17 barn	69 crown	121 horse	173 pineapple	225 swing
18 barrel	70 cup	122 house	174 pipe	226 table
19 bat	71 deer	123 iron	175 pitcher	227 telephone
20 basket	72 desk	124 ironing board	176 pliers	228 television
21 bear	73 dog	125 jacket	177 plug	229 tennis racket
22 bed	74 doll	126 kangaroo	178 pocket book	230 thimble
23 bee	75 donkey	127 kettle	179 pot	231 thumb
24 beetle	76 door	128 key	180 potato	232 tie
25 bell	77 door knob	129 kite	181 pumpkin	233 tiger
26 belt	78 dress	130 knife	182 rabbit	234 toaster
27 bicycle	79 dresser	131 ladder	183 raccoon	235 toe
28 bird	80 drum	132 lamp	184 record player	236 tomato
29 blouse	81 duck	133 leaf	185 refrigerator	237 toothbrush
30 booze	82 eagle	134 leg	186 rhinoceros	238 top
31 boot	83 ear	135 lemon	187 ring	239 traffic light
32 bottle	84 elephant	136 leopard	188 rocker	240 train
33 bow	85 envelope	137 lettuce	189 roller skate	241 tree
34 bowl	86 eyes	138 light bulb	190 rolling pin	242 truck
35 box	87 fence	139 light switch	191 rooster	243 trumpet
36 bread	88 finger	140 lion	192 ruler	244 turtle
37 broom	89 fish	141 lip	193 sail boat	245 umbrella
38 brush	90 flag	142 lobster	194 salt shaker	246 vase
39 bus	91 flower	143 lock	195 sandwich	247 vest
40 butterfly	92 flute	144 mitten	196 saw	248 violin
41 button	93 fly	145 monkey	197 scissor	249 wagon
42 cake	94 foot	146 moon	198 screw	250 watch
43 camel	95 football	147 motorcycle	199 screwdriver	251 watering can
44 candle	96 football helmet	148 mountain	200 seahorse	252 watermelon
45 cannon	97 fork	149 mouse	201 seal	253 well
46 cap	98 fox	150 mushroom	202 sheep	254 wheel
47 car	99 french horn	151 nail	203 shirt	255 whistle
48 carrot	100 frog	152 nail file	204 shoe	256 windmill
49 cat	101 frying pan	153 necklace	205 skirt	257 window
50 caterpillar	102 garbage can	154 needle	206 skunk	258 wine glass
51 celery	103 giraffe	155 nose	207 sled	259 wrench
52 chain	104 glass	156 nut	208 snail	260 zebra

Table XVII: Image list with corresponding identification numbers.

IV.7. Run an SPR session.

    a. To run an SPR session, the **R** is pressed from the SPR Menu.

    b. This activates a daily session for the selected animal.

    c. The information file and the configuration file will scroll on the screen and then the screen displays a white screen.

        1. This feature allows the operator to setup a chamber before an animal enters.

        2. Once the animal is in the chamber **<space>** is pressed to begin the session.

    d. At the completion of the session, a summary of the animal's performance will appear on the screen. To return to the SPR Menu **<enter>** is pressed.

V. SPR Program from scratch.

    a. This section describes the creation of a sequence file, animal files, editing an information file and configuration file, running an animal through a session using the sequence file created, removing and analyzing data, and deleting an animal from the system.

V.1. Making the sequence file.

    a. This allows the SPR program to display images for the list and probe, sets timing, sets list length, block size and session length.

    b. Enter the primate SPR program: **NS <enter>**

    c. Move into the SPR Menu: **S**

    d. Move to the Sequence File Management Menu: **S**

    e. Activate the Sequence File Generator: **G**

    f. Move to the space in the first serial position, across from list length six (Figure 18).

        1. Press **1 <□>** until there is a **(1)** in each serial position.

        2. Press **<F3>** four times until the trials Diff column reads **(4)** and the No. tot. column reads **(10)**.

    g. Press **<F1>** twice to change the number of blocks to **(3)**.

h. The bottom line in the sequence generator block should read:

BLOCK # TRIALS 10   Number of blocks 3   Grand Total 30

1. If this line does not match repeat the steps **a** through **f,** above.

2. If this line is correct press **<F10>** to continue.

i. The sequence file name should be typed as **THIRTY6 <enter>.**

j. Enter the seed number **6301 <enter>.**

1. The seed number should end with an odd number and be at least four numbers in length. The seed number is arbitrary.

k. Enter **1 <enter>** for the lowest image number.

l. Enter **260 <enter>** for the highest image number.

m. Press **F** for fixed preblock delay **<enter>.**

1. Press **0 (Zero) <enter>** for the delay value.

2. Overall match percentage (%) of **60.0.**

n. For the pre-trial delay enter **F** for a fixed interval **<enter>.** Press **0 (Zero) <enter>** for the delay value.

o. For the preprobe delay enter **F** for a fixed delay **<enter>.**

1. Press **0 (Zero) <enter>** for the delay value.

p. The program returns to the Sequence File Management Menu.

q. Press **Q** to return to the SPR Menu.

V.2. Entering a new animal, editing information file, and editing the configuration file.

V.2.1. Entering a new animal into the SPR directory.

a. From the SPR Menu go to the Animal Selection Menu: **A**

b. Activate the routine for adding a new animal: **N**

c. Enter the new animal's name: **Rex <enter>**

49

       1. If this animal's name is already in the system, enter another name: **ASTIN \<enter>**

   d. The system will return to the Animal Selection Menu.

V.2.2. Selecting an animal from the animal directory.

   a. Active this routine: **A**

   b. Using the arrow keys, highlight the animal: **Rex \<enter>**.

   c. You will be returned to the Animal Selection Menu.

V.2.3. Editing information file. **\<Rex>**

   a. Activate this routine: **I**

   b. Using the arrow keys highlight the first line and press **\<enter>**.

       1. Type **RH777** (animal identification number)**\<enter>**.

LIST Len	No. tot.	TRIALS Diffr	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
11	0	0	0	0	0	0	0	0	0	0	0	0	0									
10	0	0	0	0	0	0	0	0	0	0	0	0										
9	0	0	0	0	0	0	0	0	0	0	0											
8	0	0	0	0	0	0	0	0	0	0												
7	0	0	0	0	0	0	0	0	0													
6	10	5	1	1	1	1	1	1														
5	0	0	0	0	0	0	0															
4	0	0	0	0	0	0																
3	0	0	0	0	0																	
2	0	0	0	0																		
1	0	0	0																			

BLOCK # TRIALS 10   Number of blocks 3   Grand Total 30

F1-F2 = Change blks

F3-F4 = Change tot.

0-9 = Set MATCHES @ ser. pos.

F10 = EXIT (save)

CNTR-Q = QUIT

SPECIFY THE TRIALS FOR EACH BLOCK

Figure 18: Complete Sequence File Generation Table.

c. Move to the fourth line, "**Operator...**". and press **<enter>**.

    1. Type **YOUR LAST NAME <enter>**.

d. Move to the next line and press **<enter>**.

    1. Type the session label: **REX07OCT <enter>**.

    2. This session file identifies the animal and the date the data was collected.

e. Move to the next line and press **<enter>**.

    1. Enter the last name of the primary investigator for the project, **FINGER <enter>**.

f. Move to the next line and press **<enter>**.

    1. Enter the project number here, **12345 <enter>**.

g. Move to the next line and press **<enter>**.

    1. Enter the institute where the session is being performed, **ICD <enter>**.

h. Move to the next line and press **<enter>**.

    1. Enter the animal's name, **Rex <enter>**.

i. Move to the next line and press **<enter>**.

    1. Enter any medications given to the animal the day of the session, **NONE <enter>**.

j. Move to the next line and press **<enter>**.

    1. Enter the type of training or the level of training for the current animal, **BASELINE <enter>**.

k. Move to the next line and press **<enter>**.

    1. On this line enter the animal's general attitude as seen at the beginning of the day or prior to the animal's entry into the chamber, **ALERT <enter>.**

l. Move to the next line and press **<enter>**.

    1. Place the animal's age here, **9 <enter>**.

m. Move to the next line and press **<enter>**.

1. If known, place the hand the animal prefers to use when giving responses during the session. If this is not known enter **R**, for right.

n. Review all entries and if they are correct press **<F1>** to return to the Animal Selection Menu.

V.2.4. Updating the configuration file.

a. Since this is a new animal, it is best to use the full configuration file. Press **F** to access the full configuration file.

1. Access to the full configuration file is restricted and requires the correct password; **ANITA <enter>**.

b. Using the arrow keys highlight the lines called for using Table XVII as a guide.

1. This is a standard written for an example. Parameters may need adjustment in accordance to needs of the experiment and level of training.

1	num chars in sequence name	:	7
2	Sequence file to be used	:SIXTY6A	
3	REPEAT TRIAL IF NOT CORRECT	:	1
4	Hold last list image at probe:		0
5	TIME DELAYS – before blocks	:	0
6	before trials	:	1500
7	flag to select (1) obs phase	:	0
8	delay before observation phas:		0
9	left column of obsrve blotch:		30
10	right column of obsrve blotch:		50
11	top row of obsrve blotch:		9
12	bottom row of obsrve blotch:		15
13	time limit for observe resp.	:	5000
14	time delay for wrong resp.	:	0
15	time delay for correct resp.	:	0
16	time delay for obs timeout	:	0
17	flag to select (1) list phase:		1
18	Pre list delay time	:	0
19	list image "on" delay time	:	1500
20	list image "off" delay time	:	500
21	x pos of list images (80 col):		40

22	y pos of list images (25 lin):	9

23	flag to select warning phase :	1
24	Pre warning delay time :	0

25	flag to select probe phase :	1
26	Pre probe delay time :	1000
27	Include probe image 1 if <>0 :	1
28	x pos of probe image 1 80 col:	20
29	y pos of probe image 1 25 lin:	20
30	Include probe image 2 if <>0 :	0
31	x pos of probe image 2 80 col:	60
32	y pos of probe image 2 25 lin:	10

33	Include target blotch if <>0 :	1
34	x position of left of target :	56
35	x position of right of target:	76
36	y position of top of target :	16
37	y position of bottom of trgt :	23

38	x pos of left of image1 valid:	5
39	x pos of right image1 valid :	45
40	y pos of top of image1 valid:	12
41	y pos of bottom image1 valid :	25
42	x pos of left of image2 valid:	40
43	x pos of right image2 valid :	80
44	y pos of top of image2 valid:	0
45	y pos of bottom image2 valid :	10

46	x pos of left of target valid:	50
47	x pos of right target valid :	80
48	y pos of top of target valid:	12
49	y pos of bottom target valid :	25

50	time limit for probe response:	10000
51	time delay wrong probe resp :	1500
52	time delay correct probe resp:	1500
53	time delay timeout probe rsp:	5000

54	OBS	TIMEOUT action is done :	0
55	OBS	TIMEOUT port to pulse :	888
56	OBS	TIMEOUT bits pulsed :	0
57	OBS	TIMEOUT pre-action wait:	0
58	OBS	TIMEOUT milliseconds :	0
59	OBS	CORRECT action is done :	0
60	OBS	CORRECT port to pulse :	888
61	OBS	CORRECT bits pulsed :	0

```
62  OBS      CORRECT pre-action wait:        0
63  OBS      CORRECT milliseconds   :        0
64  OBS        WRONG action is done :        0
65  OBS        WRONG port to pulse  :      888
66  OBS        WRONG bits pulsed    :        0
67  OBS        WRONG pre-action wait:        0
68  OBS        WRONG milliseconds   :        0

69  PROBE TIMEOUT action is done :        0
70  PROBE TIMEOUT port to pulse  :      888
71  PROBE TIMEOUT bits pulsed    :        0
72  PROBE TIMEOUT pre-action wait:        0
73  PROBE TIMEOUT milliseconds   :        0
74  PROBE CORRECT action is done :        1
75  PROBE CORRECT port to pulse  :      888
76  PROBE CORRECT bits pulsed    :      255
77  PROBE CORRECT pre-action wait:        0
78  PROBE CORRECT milliseconds   :      250
79  PROBE     WRONG action is done :       0
80  PROBE     WRONG port to pulse  :     888
81  PROBE     WRONG bits pulsed    :       0
82  PROBE     WRONG pre-action wait:       0
83  PROBE     WRONG milliseconds   :       0

84  RESP. MUST BE IN TARGET ZONE :        1
85  DELAY READS OF FILES TIL LIST:        0
86  SOUND ERROR TONE IF LONG READ:        0

87  Pre-trial beep freq (hertz)  :      440
88          "          num of reps   :        2
89          "          clock tics on :        2
90          "          clock tics off:        1
91  pre-probe beep freq (hertz)  :      880
92          "          num of reps   :        1
93          "          clock tics on :        5
94          "          clock tics off:        0
95  RIGHT RSP BEEP freq (hertz)  :     1760
96          "          num of reps   :        2
97          "          clock tics on :        1
98          "          clock tics off:        1
99  WRONG RSP BEEP freq (hertz)  :       60
100         "          num of reps   :        1
101         "          clock tics on :        3
102         "          clock tics off:        0
103 TIMEOUT   BEEP freq (hertz)   :       60
104         "          num of reps   :        1
```

| 105 | " | clock tics on : | 3 |
| 106 | " | clock tics off: | 0 |

| 107 BOXES DRAWN AROUND TARGETS | : | 0 |

Table XVII: Full Configuration File.

c. Move to line 2 and press **<enter>**.

   1. Type the sequence file created earlier, **THIRTY6 <enter>**.

d. Move to line 3 and press **<enter>**.

   1. Enter **0 <enter>** to make sure correction is off.

   (a) After the completion of each trial, the program will continue to the next trial irrelevant of the response.

   (b) If this value is **1** then the program will repeat the trial until a correct response is given.

e. Move to line 4.

   1. If The value is zero **0** move to line 7.

   2. If the value is **1** press **<enter> 0 <enter>**.

   3. Move to line 7.

   4. If the value is zero move to line 17.

   5. If the value is **1** press **<enter> 0 <enter>**.

f. Move to line 17. (For the following section the line number will be given and bold keystrokes will be followed by a brief explanation.)

   1. Line 17 - **<enter> 1 <enter>** activates the list phase.

   2. Line 18 - **<enter> 0 <enter>** makes the list delay time 0 Ms.

3. Line 19 - **<enter> 1500 <enter>** makes the SVT 1500 Ms (1.5 sec.).

4. Line 20 - **<enter> 500 <enter>** makes the ISI 500 Ms (0.5 sec.).

5. Line 21 - **<enter> 40 <enter>** places the center of the list item in the center of the specified column of the screen.

6. Line 22 - **<enter> 9 <enter>** places the center of the list item in the 9th row in the upper half of the screen (Figure 19).

g. Move to line 23 press **<enter> 0 <enter>** to deactivate the warning phase.

h. Move to line 25.

1. Line 25 - **<enter> 1 <enter>** activates the list phase.

2. Line 26 - **<enter> 1000 <enter>** makes the pre-probe delay 1000 Ms (1.0 sec.).

3. Line 27 - **<enter> 1 <enter>** activates probe image 1 as the probe item.

4. Line 28 - **<enter> 20 <enter>** places the center of the probe item in column 20 on the left side of the screen.

5. Line 29 - **<enter> 20 <enter>** places the center of the probe item in row 20 on the bottom half of the screen.

6. Line 30 - **<enter> 0 <enter>** deactivates probe image 2.

7. See Figure 19.

i. Move to line 33.

1. Line 33 - **<enter> 1 <enter>** activates the non-match block (target).

2. Line 34 - **<enter> 56 <enter>** places the left side of the non-match block in column 56.

3. Line 35 - **<enter> 76 <enter>** places the right side of the non-match block in column 76.

4. Line 36 - **<enter> 16 <enter>** places the top of the non-match block in row 16.

5. Line 37 - **<enter> 23 <enter>** Places the bottom of the non-match block in row 23.

6. See Figure 19.

j. Move to line 38.

1. Line 38 - **<enter> 5 <enter>** makes the left side of the active response block for the probe item in column 5 on the left side of the screen.

2. Line 39 - **<enter> 45 <enter>** makes the right side of the active response block for the probe item in column 45 on the right half of the screen.

3. Line 40 - **<enter> 12 <enter>** makes the top line of the active response block for the probe item in row 12.

4. Line 41 - **<enter> 25 <enter>** makes the bottom line of the active response block for the probe item in row 25.

5. See Figure 19.

k. Move to line 46.

1. Line 46 - **<enter> 50 <enter>** makes the left side of the active response block for the non-match block in column 50 on the right side of the screen.

2. Line 47 - **<enter> 80 <enter>** makes the right side of the active response block for the non-match block in column 80 on the right half of the screen.

3. Line 48 - **<enter> 12 <enter>** makes the top line of the active response block for the non-match block in row 12.

4. Line 49 - **<enter> 25 <enter>** makes the bottom line of the active response block for the non-match block in row 25.

5. See Figure 19.

l. Move to line 50.

1. Line 50 - **<enter> 10000 <enter>** this create a time limit for the probe phase of 10000 Ms (10 sec.).

2. Line 51 - **<enter> 1500 <enter>** this makes a delay between trials after a correct response 1500 Ms (1.5 sec.).

3. Line 52 - **<enter> 1500 <enter>** this makes the delay before the next trial after an incorrect response of 1500 Ms (1.5 sec.).

4. Line 53 - **<enter> 5000 <enter>** allows a delay before the next trial after a non-response of 5000 Ms (5.0 sec.).

m. Move to line 84.

    1. Line 84 - **\<enter\> 1 \<enter\>** insures the animal is given a reward only when the correct active site previously outlined is touched.

    2. Line 85 - **\<enter\> 0 \<enter\>** this allows the program to read the images while the previous image is being displayed.

n. Move to line 107.

    1. Line 107 - **\<enter\> 0 \<enter\>** this eliminates the active site template. If the value is **1** the active sites are outlined.

o. If all entries are correct press **F1.**
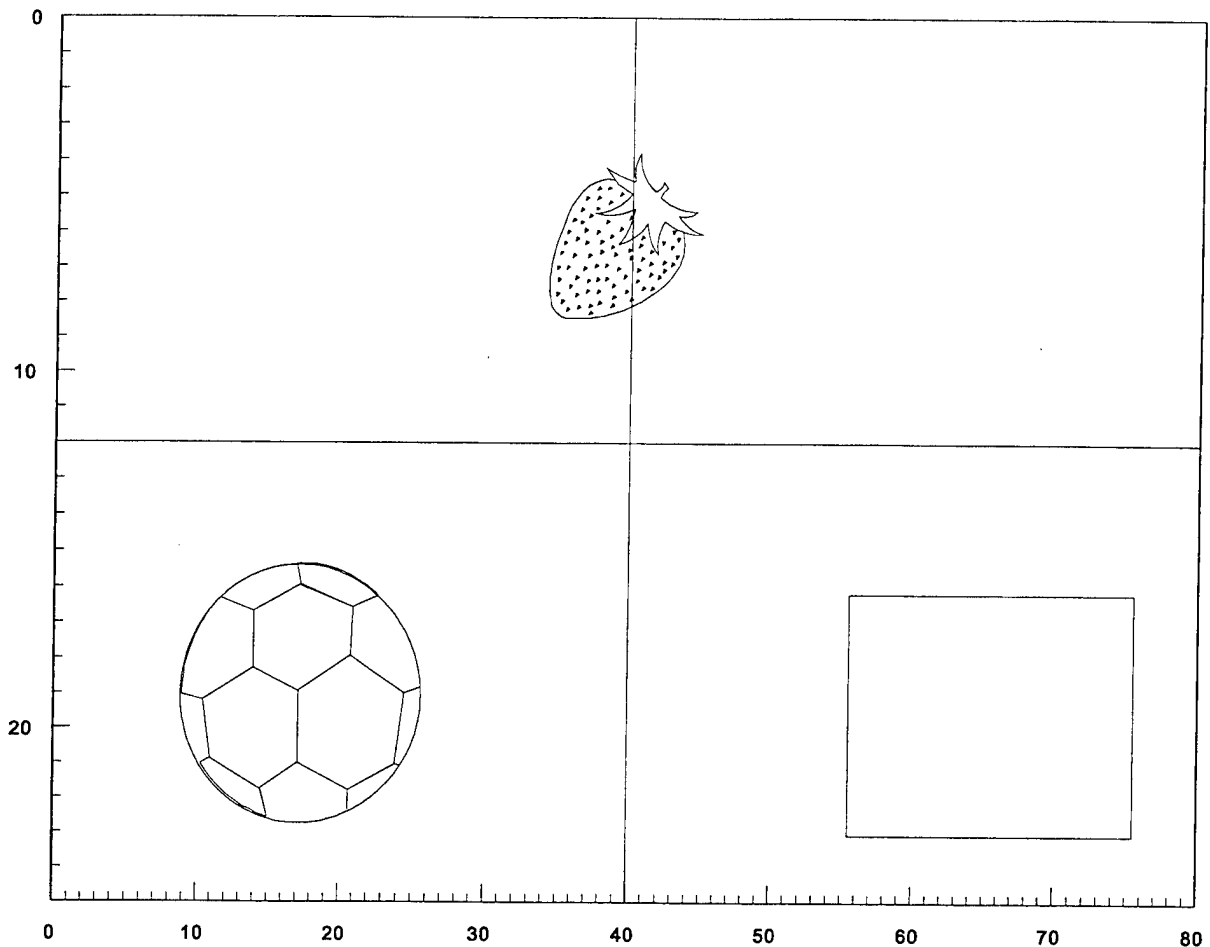
Figure 19: Screen graph of a list length of zero (0) trial. The list position (Strawberry) and the probe position (Ball) may be changed in the CONFIG portion of the SPR program. The white block in the lower right corner would be touched if the probe picture did not match the list picture.

V.2.5. Press **Q** to return to the SPR Menu.

V.3. Running a session.

    a. From the SPR Menu press **R** to activate this routine.

    b. If you are testing the system from the keyboard respond as follows:

> **1 = match to probe 1**
> **2 = match to probe 2**
> **T = non-match**

60

c. After the information and configure file have scrolled off the screen leaving a blank screen, place the animal **Rex** in the chamber.

d. Immediately activate the system by pressing **<space>**.

    1. Wait no longer than 10 seconds.

e. At the completion of the session **<enter>** is pressed to returned to the SPR Menu.

f. To run another session without making changes to the configuration file or the information file, repeat steps **a** to **e** press **R**.

g. To end a session in progress, for any reason, press **<Control> Q** during the probe phase.

V.4. Removing, loading, and analyzing data files.

V.4.1. Removing files from the animal's directory.

a. From the SPR Menu press **D**.

b. Place a floppy disk in drive **A**.

c. From the Disk Management Menu press **C**.

    1. This is the safest way to copy ALL animals' data files from their directories because it creates an archive file of the data. This prevents accidental loss of data.

d. Highlight the animal "**REX**" and press **<enter>**.

e. The system will return to the Disk Management Menu after all files from the selected animal have been copied and archive files have been created.

V.4.2. Loading data files from a floppy. (Done after all files are retrieved from other chambers allowing for analysis on a single computer.)

a. While still in the Disk Management Menu press **L**.

b. All data files on floppy disk **A** will be copied to the **C:\SPRANL** directory.

c. The system will return to the Disk Management Menu.

V.4.3. Analyzing the data.

    a. From the Disk Management Menu press **A**.

    b. The files copied into the **C:\SPRANL** directory will be analyzed and the analyzed data placed in the **C:\SPRMON** and the **C:\SPRDAY** directories.

    c. The program will return to the Disk Management Menu.

    d. Press **Q** once to return to the SPR Menu.

    e. A hard copy of these files may be printed to review data.

V.4.4. Deleting an animal's directories from the system.

    a. From the SPR Menu press **A** to enter the animal selection Menu.

    b. Press **A** to select an animal.

    c. Using the arrow keys highlight the animal **REX** and press **<enter>.**

    d. Press **D** to activate deletion.

    e. Make sure the animal name in the animal selection box is **REX**. If it is, press **Y**. If it is not, press **N** and follow directions from **a to c.**

    f. After returning to the Animal Selection Menu, press **Q** three times to exit the SPR program.

VI. Removing data files from archive files.

    a. From **C:\>** drive type **mkdir archive <enter>.**

        1. This will make a separate directory and prevent the remaining archive files from being altered or deleted.

    b. Go into the SPR directory **cd newspr <enter>.**

        1. Type **copy pk*.* c:\archive <enter>.**

            (a) Two files will be copied to the new directory, **PKARC.COM** and **PKXARC.COM**.

2. Type **copy rex*.arc c:\archive <enter>**.

    (a) This will copy this animal's archive files to the new directory.

c. Type **cd\ <enter>** to return to the main directory **C:\>**.

d. Go into the archive directory **CD ARCHIVE <enter>**.

e. Type **pkxarc *.arc**.

1. All files with the extension **.ARC** will be unarchived to their full size.

f. Copy the needed files to a floppy. **copy rex*.* A: <enter>**.

g. Type **del rex*.* <enter>**

1. All files in this directory will be removed from this directory only. No files in other directories will be affected.

VII. Archiving data files.

a. At the end of a month of data collection archive all raw data files and monthly analyzed files to reduce the amount of storage space required.

b. Enter the archive directory. **CD archive <enter>**

c. Copy the files you wish to archive to the archive directory. **Copy a:*.dt* <enter>**.

d. After all required files are copied type **PKARC \A REXJUN93.ARC <enter>**.

1. ALL files in this directory will be archived for storage.

e. Copy the archived file to the appropriate storage disk and delete the data files from the directory. **del *.dt* <enter>**.

VIII. Touch Plot

a. The touch plot portion of the program was developed to utilize the X-Y location data. This data, located in the raw data file, provides a graph of the areas the animal is responding to on the touch screen. The program requires the use of Lotus Freelance® (Lotus Development Corporation, Cambridge, MA). The program **TUCHPLOT.EXE** is located in the **\NEWSPR** directory. A second directory must be created for the ***.PT*** files which are created. This program does not require the activation of the SPR program.

VIII.1. Creating the \CHART directory.

    a. From the Main computer directory,

        1. type **>cd\ <enter>**

        2. type **C:>mkdir chart <enter>**

    b. The base chart with all the directions must be placed in the Freelance® directory for retrieval.

        1. type **C:>copy A:TOUCH.CH1 C:\FREEL*.***

        2. This will import new files into Freelance®.

VIII.2. Using Touch Plot.

    a. From the \NEWSPR directory,

        1. A copy of the raw data files are copied into the \SPRANL directory.

        2. **C:>copy A:*.DTA C:\SPRANL**

        3. All files with the extension ***.DT*** will be written as ***.PT*** files into the **\CHART** directory.

            (a) This program will not delete or change the original files in the **\SPRANL** directory.

    b. Activate the Touch Plot program by entering: **C:\NEWSPR>TUCHPLOT <enter>**

        1. The program will automatically change the ***.DT*** files into ***.PT*** files and place them in the **\CHART** directory.

VIII.3. Creating charts from the *.PT* files.

    a. Return to the main directory.

        1. **>cd\ <enter>**

    b. Enter the Lotus Freelance® program.

        1. Enter the Charts and Drawing section.

        2. A blank screen will appear with a Menu above it.

(a) Press the first letter of the action to be taken.

c. Retrieving the basic chart.

1. Press **(F)** file, **(R)** retrieve, **(C)** chart.

2. After entering the file retrieval section, move to the filename box and press the space bar.

   (a) The Freelance® directory will be displayed.

   (b) If the proper directory is not displayed press the escape key.

       (1) Move to the directory box and press the space key.

       (2) Highlight the Freelance® directory and press **<enter>**.

       (3) Move to the filename box and press the space bar.

   (c) Highlight the chart **TOUCH.CH1** and press **<enter>**.

   (d) Press **<enter>** twice.

   (e) The program will notify you that it is unable to find the original file used to make the **TOUCH.CH1** chart. Press **<enter>** and the program will advance correctly.

d. The program will automatically go to the charting section with the `EDIT DATA' highlighted in the Menu. Press **<enter>**.

e. Data Links.

1. Using the arrow keys, highlight `DATA LINK' and press the space bar.

2. The Data Link section (Figure 20) has the basic information required for importing the files created with Touch Plot.

3. Using the arrow keys, move to the filename section and press the space bar.

   (a) The *.PT* files created by the Touch Plot program will be listed.

   (b) Highlight the first filename and press **<enter>**.

   (c) **DO NOT CHANGE** any other information within the Data Link section.

   (d) Press the page down key until `DONE' is highlighted and press **<enter>**.

(e) The program will ask to import the new data; press **(Y)** yes.

f.   The data, headings, legends and axis titles are already set up. **DO NOT** make changes in the regular chart section.

1.   Press **F10** to exit the chart portion and then press **<enter>** twice.

```
┌─────────────────────────────────────────────┬──────────────────┐
│  ┌──────────── Datalinks ──────────────┐     │  DATA LINKS:     │
│  │                                     │     │                  │
│  │  File type:    ASCII Numbers _____ │     │                  │
│  │     File Path:    C:\CHART_____  │     │  HEADING STYLE:  │
│  │     File name:    GER01JUN.PTB_____ │     │                  │
│  │     Type of import:Specified Ranges ___ │   │                  │
│  │                                     │     │                  │
│  │     Press F6 to view the data import file. │ │  NOTE STYLE:     │
│  │                                     │     │                  │
│  │     Destinations        Ranges to Read │   │                  │
│  │     ----------------    ---------------- │  │                  │
│  │     Headings:           A201..A203____ │   │                  │
│  │     Notes:              _____   │   │                  │
│  │     Legend (Line 1):    _____   │   │                  │
│  │     Legend (Line 2):    _____   │   │                  │
│  │     X - axis Title:     _____   │   │                  │
│  │     Y - axis Title:     _____   │   │                  │
│  │     X 1 Values:         A1..A100_____  │   │                  │
│  │     Y 1 Values:         B1..B100_____  │   │                  │
│  │     X 2 Values:         A101..A200____ │   │                  │
│  │     Y 2 Values:         B101..B200____ │   │                  │
│  └─────────────────────────────────────┘     │                  │
└─────────────────────────────────────────────┴──────────────────┘
```

Figure 20. Data Link Screen. Only the filename requires change. All other data is part of the TOUCH.CH1 chart.

2.   The chart of where the animal touched the touch screen (correct and incorrect responses) will be displayed.

3.   You may print the chart directly from this program or save it and import it into a word processor program.

VIII.4. Importing charts into WordPerfect®.

a. WordPerfect® 5.0 or higher is required for easy import of Freelance® charts and drawings.

b. While in Freelance®, save the chart you have created by pressing **(F)** file, **(S)** save, **(B)** both.

c. Move to the first filename and enter an appropriate title.

    1. The easiest is three letters to identify the animal and a date.

        (a) **GER01JUN.**

    2. Press **<enter>.**

d. Move to the directory box and enter the correct directory and path.

    1. Save graph (drawing) and chart files to a floppy disk or into the WordPerfect® `WORDDOC' directory.

e. Enter the same filename and directory in the chart section of the file save portion and press **<enter>.**

f. The program will return you to the drawing screen. Now export the drawing into a WordPerfect® graphics file.

    1. Select **(F)** file, **(O)** options.

    2. Using the arrow keys, move the cursor to the extension space next to **Metafile:**

    3. Type the extension **WPG.**

    4. Move the cursor to the `DONE' and press **<enter>.**

    5. Press **(F)** file, **(E)** export.

    6. The saved file name will be displayed.

    7. Move to the directory block and enter the correct directory name and press **<enter>.**

    8. Press **<enter>.**

g. Exit the Freelance® program and enter the WordPerfect® program.

1. Press <ALT><F9> to enter the graphics portion of the program.

2. Press <1> for graphics and <1> to create a graphics block.

3. Press <1> for a filename.

4. Press <F5> to list the directory.

   (a) Type in the proper directory and press <enter>

5. Highlight the *.WPG file you wish to import and press <1>.

   (a) The system will return to the graphics Menu.

6. Press <6> and justify the graphics block either for the center <3> or for full <4>.

7. Press <7> then <3> and input the size of the graph in inches.

8. Press <9> to edit the graph.

   (a) The graphics import the horizontal positioning 0.5 to 1.0 measures to the right. To correct this press <1><-1><enter><enter>.

   (b) The graph may not fill the white screen of the graphic's box. To correct this press <2> and adjust the scale.

   (c) Press <4> and turn off the inversion.

   (d) Press <5><Y> to turn the graph from a color graph to a black and white graph.

   (e) Press <F7> twice to exit the changes and the graph.

9. The graph can now be printed like a normal document. It is possible to continue and add additional graphs and print the entire group of animals as a complete document.

VIII.5. Touch Screen Activation Sites.

a. To make sure all animals receive the same reduction in the activation sites, three target areas were set for implementation at different times during training.

b. The animals are started on shaping with a large portion of both sides of the screen active (Figure 21).
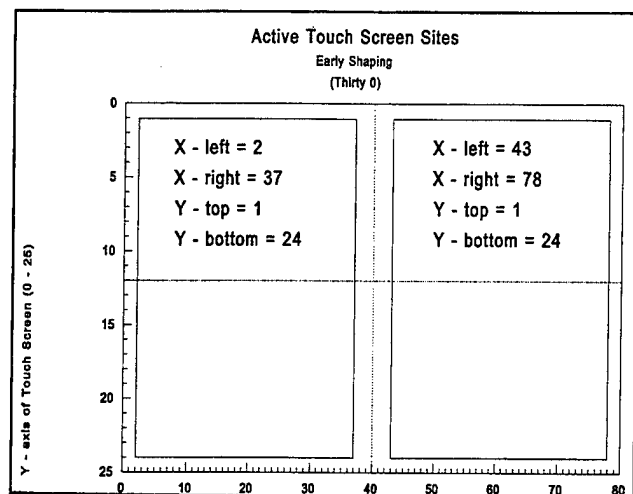
Figure 21. The active area during shaping on a list length of zero
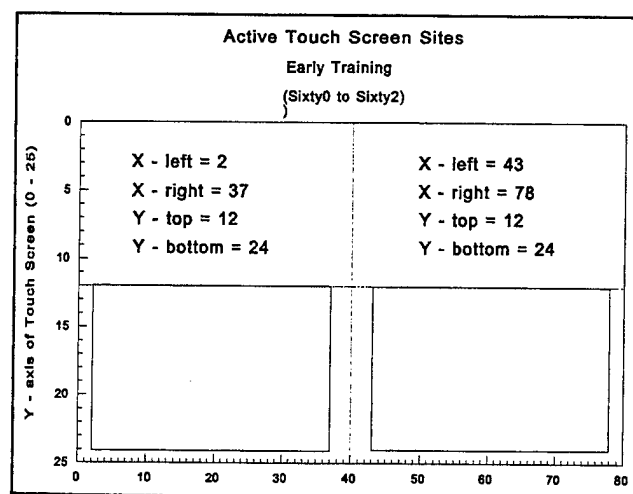

**Figure 22:** The active area during shaping on a list length of one
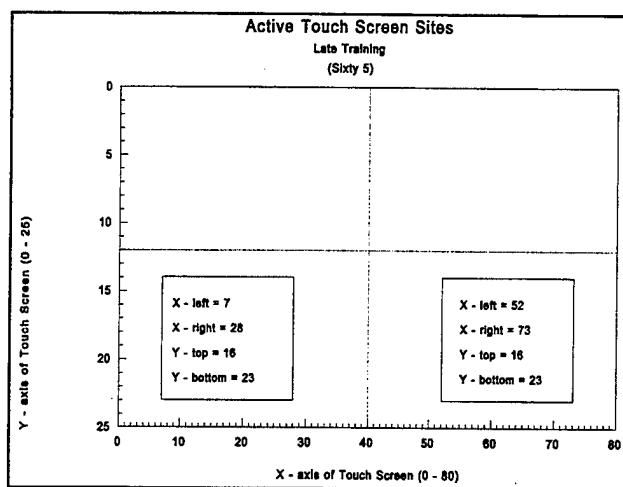
**Figure 23**. The final reduction of the scale the animals receive when they reach a list length of five.

70

c. This area is reduced slowly as the animal progresses until they are reduced to the second scale when they are on a list length of one (Figure 22).

d. The reductions continue until they respond within a small area on each side of the screen (Figure 23).

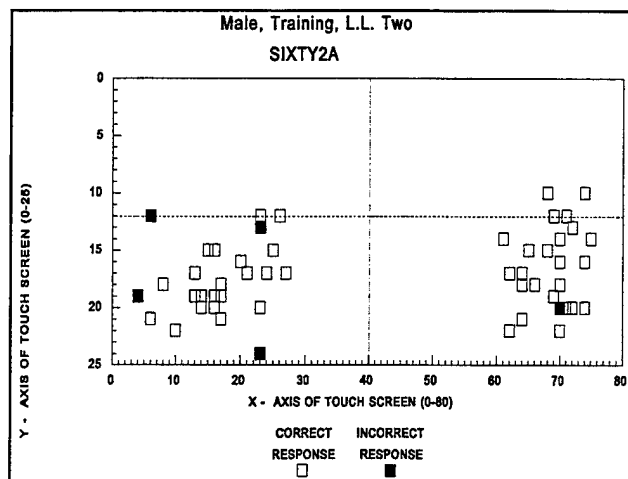e. Figures 24 to 31 are actual graphs created by Touch Plot on animals from shaping to baseline levels.
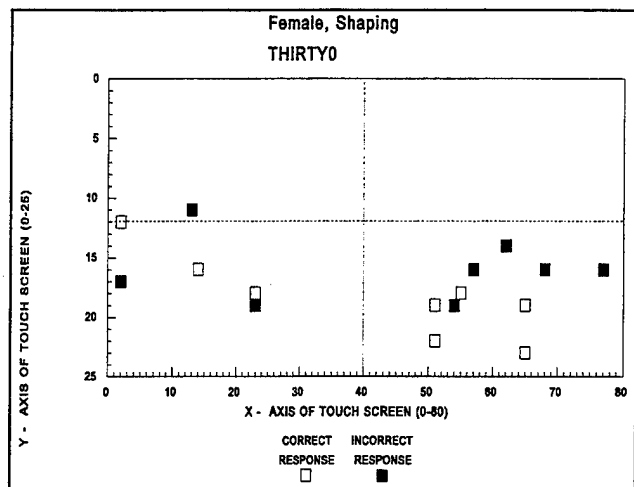
Figure 24: The response of an animal being shaped. The □ are correct responses and □ are incorrect responses.
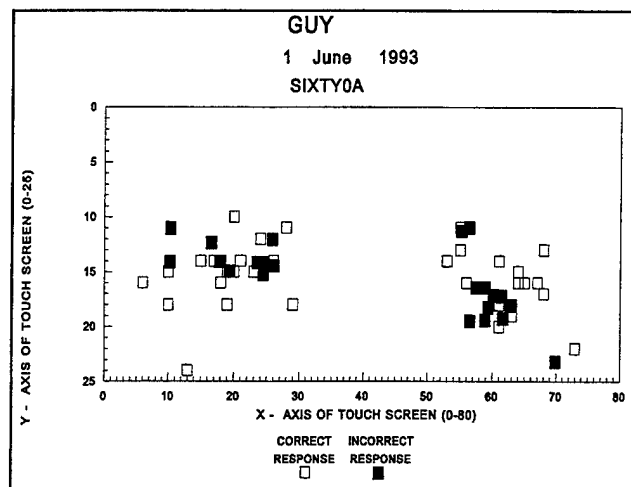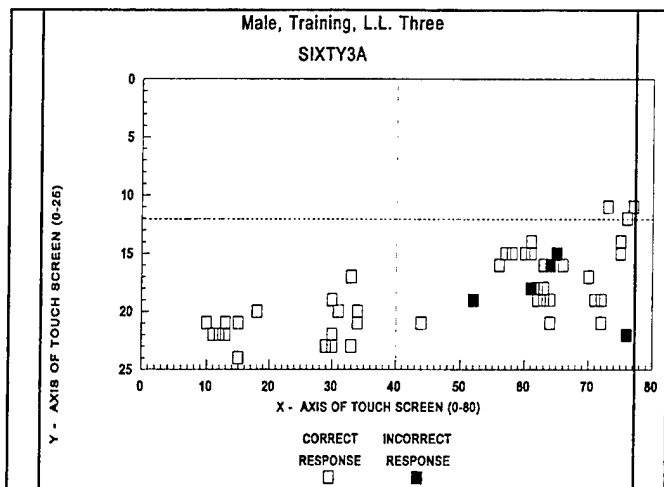

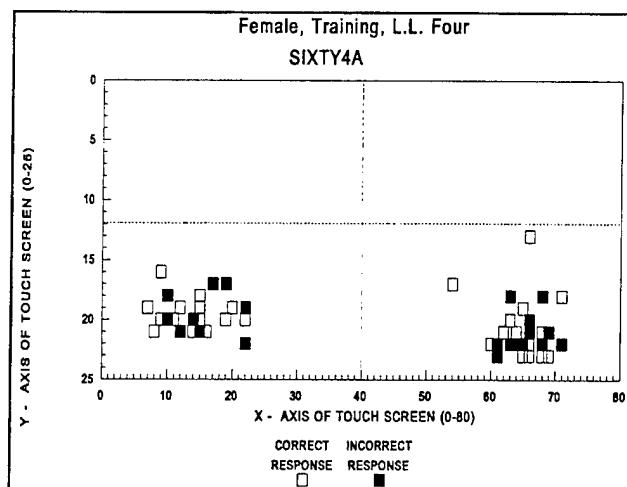**Figure 25**: The response of an animal training on a list length of zero.
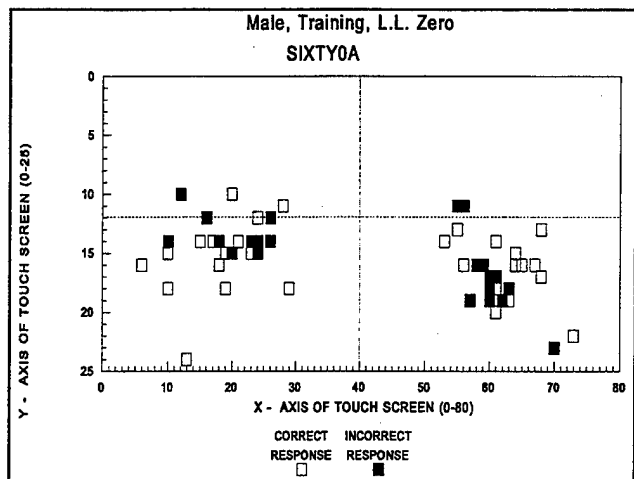
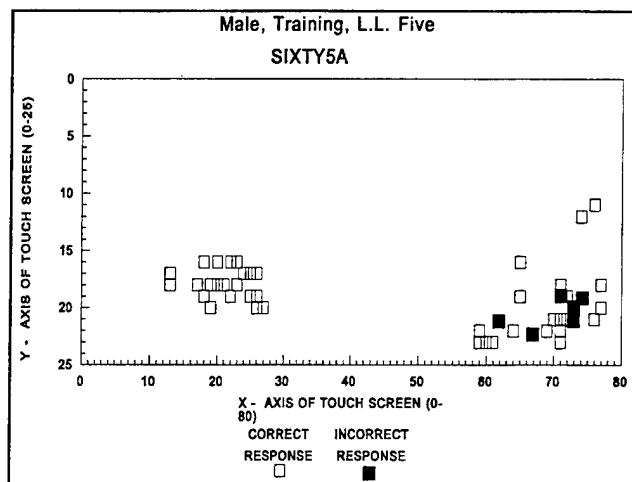**Figure 26**: The response of an animal training on a list length of one.

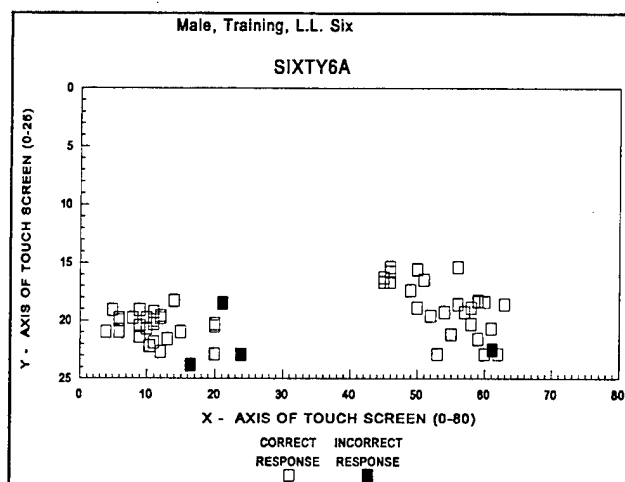**Figure 27**: The response of an animal training on a list length of two.

Figure 28: The response of an animal training on a list length of three.

Figure 29: The response of an animal training on a list length of four.

Figure 30: The response of an animal training on a list length of five.

Figure 31: The response of an animal training on a list length of six.

Glossary

Active sites - The designated areas of the touch screen that must be touched during the probe phase of a trial to illicit a response from the program.

Archive file - A file created by the PKARC.COM program. This program compresses a file so that it requires less storage space on a disk.

Batch file - A computer file containing instructions or data relevant to a program or a group of similar programs.

Box time - This time is from the beginning of the first trial onset to the end of the probe phase of the final trial. This is the session time.

Calibration - A programmed series of responses to match the response areas of the monitor screen with the location of the active sites of the touch screen during the SPR program.

Configuration file - A computer-generated, operator modifiable file from the SPR program that identifies those values used by the program to determine time of onset, delays, warnings, displays, and the actions the program will take depending on the response of the subject.

Correction factor - The portion of the configuration file that determines whether a trial is repeated until a correct response is given.

Familiarization - The portion of training when the animals are subjected to the different variables that are involved in SPR training. These include transport cage training, technician interactions, placement in the SPR chamber and the beginning of shaping.

Image - A computer-generated graphic used for the list and probe graphics.

Image pool - A series of computer generated graphics located in in a subdirectory of the SPR program.

Information file - A computer-generated, operator modifiable file in which the subject information is stored.

Interface - A device that connects two or more components allowing communication between all components.

Interstimulus interval - The timed delay between the display of two successive images in a list.

Inter-trial interval - The timed delay between the subject's response and the beginning of the next trial.

Latency - The time between the onset of the probe display and the subject's response.

List image - Those images displayed during the list phase of the SPR program. These images are displayed singly in the designated list area.

List length - The number of list images displayed before the probe image. The number of images displayed is determined by the sequence file.

List off time - The timed delay between the display of two successive images in a list. The interstimulus interval.

List on time - The time (miliseconds) each list image is displayed. The stimulus viewing time.

List phase - The portion of the SPR trial from the completion of the observation phase and the end of the stimulus viewing time for the final image in a list.

List position - The area on the monitor the list images are displayed. This area is designated by an X/Y coordinate in the configuration file.

Match trial - A trial in which the probe image matched an image displayed during the list phase of the same trial.

Metafile - A Lotus Freelance® export file. This file is written as a WordPerfect® graphic file.

Non-match trial - A trial in which the probe image does not match an image displayed during the list phase of the same trial.

Non-response - A subject fails to respond during the set time of the probe phase of a trial.

Observation response time - The time a subject takes to respond in the observation phase.

Observation phase - The time from the beginning of the pre-observation time delay to the observation response by the subject. If the observation phase is not selected in the configuration file, the observation block is not displayed and the time delay is zero.

Observation time - The time determined in the configuration file to allow for a response by the subject.

Pre-block delay - The delay set in the configuration file between a set number of trials (session block).

Pre-observation time - The time delay between the completion of the inter-trial interval and the display of the observation block.

Pre-probe delay - The delay set in the configuration file between the last image of the list and the beginning of the warning phase.

Probe image - The image displayed during the probe response time. The image is displayed according to X/Y coordinates determined in the configuration file.

Probe phase - This portion of the SPR trial begins with the Pre-probe delay. If the warning phase is active, the probe phase begins at the end of the warning phase. The probe phase is completed after the probe response delay time has elapsed.

Probe position - The area on the monitor where the probe image is displayed. This area is designated by X/Y coordinates in the configuration file.

Probe response time - The pre-determined time a subject has to respond to the probe image.

Pulse - A change in frequency, intensity or level from a computer generated port to make a tone, light, or other hardware device react.

Random number seed - A four or five-digit number identifying a images set in a sequence file and their order of appearance.

Raw data - The file produced by the computer program containing the subject's responses to the trials, the pertinent subject information and the configuration file information required for analysis.

Response delay time 1 - The predetermined time a subject must wait for the next trial after a correct response.

Response delay time 2 - The predetermined time a subject must wait for the next trial after an incorrect response.

Response delay time 3 - The predetermined time a subject must wait for the next trial when no response was made during the probe response time.

Sequence file - A file of randomly selected images, places them in a random order with or without the addition of various delays in a random or fixed pattern.

Sequence file generator - A sub-program of the SPR program that produces a list of randomly selected images, places them in a random order with or without the addition of various delays in a random or fixed pattern.

Serial position - The position of an item within a list.

Session - A session is a complete set of trials as determined by a sequence file.

Shaping - That period required to train an animal to respond in a particular manner to receive a reward.

Serial probe recognition - A task in which a response is given after a list of items is presented; the response indicates whether a probe item was or was not contained in the previously presented list.

Stimulus viewing time - A set time a list image is viewed.

Target - A white block which is pressed during non-match trials.

Timeout - The pre-determined period of time a subject must wait if no response was give during the probe response time. The response delay time 3.

Touch plot - An sub-program of the SPR program which transformsthe area of the touch screen the subject touched during the trial which is located in the raw data files. These files can be read by Lotus Freelance® for plotting.

Touch screen - A touch sensitive device made of glass which is mounted over a computer monitor.

Trial - A trial consist of an observation phase, a list phase, a warning phase, a probe phase and an inter-trial interval delay.

Warning phase - The part of the trial in which a tone is presented   prior to the display of the probe image.

White block (blotch) - An adjustable area of the monitor screen used to respond to non-match trials.

Abbreviations

*.ARC	-	Archive file extension
*.BAT	-	Batch file extension
*.CH1	-	Lotus Freelance® chart file extension
*.CNF	-	SPR program configure file extension
*.COM	-	MS-DOS® command file extension
*.DTA	-	SPR program raw data file extension (A=A to Z)
*.EXE	-	MS-DOS® execute file extension
*.INF	-	SPR program information file extension
*.NIM	-	SPR program named image file extension
*.OCF	-	SPR program old configuration file extension
*.PTA	-	Touch plot program data file extension (A=A to Z)
*.SEQ	-	SPR program sequence file extension
*.TMP	-	Temporary file extension
*.WK1	-	Lotus 1-2-3® worksheet file extension
*.WPG	-	WordPerfect® graphic file extension
%Corr	-	Percent correct
#, No, N	-	Number
\SPRANL	-	SPR program analysis directory for raw data
\SPRDAY	-	SPR program analysis directory for daily analyzed data
\SPRMON	-	SPR program analysis directory for monthly analyzed data.
0	-	Off or No
1	-	On or Yes
2	-	Incorrect
3	-	Timeout
B	-	Both
Col	-	Column
COM2	-	Printer port address
Config	-	Configure
CNTR Q	-	Keyboard keys Control and Q (To be pressed together)
Del	-	Delay
Diffr	-	Different
EGA	-	Enhanced graphic adapter
ELOCALB	-	Calibration program for Elographic☐ touch screens
ISI	-	Interstimulus interval
ITI	-	Inter-trial interval
Kb	-	Kilobyte (1 thousand bytes)
L	-	Left
L-off	-	List off time
L-on	-	List on time
Lat	-	Latency
List Len	-	List length
LLr	-	List length

LPT1	-	Printer port address
Mb	-	Megabyte (1 million bytes)
MKDIR	-	MS-DOS® command to make a directory
Ms	-	Millisecond (1/1000 of a second)
Ncr	-	Number correct
No Tot	-	Number total
NTo	-	Number of timeouts
num char	-	Number of characters for a file name
Nwr	-	Number wrong
OBS	-	Observe
ORDT	-	Observe response delay time
ORT	-	Observe response time
PBD	-	Pre-block delay
PKARC	-	Program to archive files
PKXARC	-	Program to unarchive files
POD	-	Pre-observation delay
Pos	-	Position in the serial list
PPD	-	Pre-probe delay
PRDT1	-	Probe response delay time 1 (correct response)
PRDT2	-	Probe response delay time 2 (incorrect response)
PRDT3	-	Probe response delay time 3 (no response)
PRT	-	Probe response time
PTD	-	Pre-trial delay
R	-	Right
Resp	-	Response
SP#	-	Serial position number
SPR	-	Serial probe recognition
SVT	-	Stimulus viewing time
T	-	Tone
Trgt	-	Target
TTo	-	Total timeouts

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