*Methods*

*Study Site*

Describe research pods. Cite betsy? an indoor research

area, called the Research Pods (three interconnected

rooms that total 26.50 m2),

*Apparatus*

Except when physically closed off from interaction by a steel slide, participants had free access to a 17 inch ELO IntelliTouch touch panel monitor during the research times. The touch panel was controlled by a customized PC, running Linux Mint. A Bio-Medica Ltd Universal Feeder and pair of speakers were also attached to the computer, while operation of the apparatus was controlled by keyboard, mouse, and an additional monitor which mirrored what was displayed on the touch panel. All experimental programs were written in Python 3, using Kivy libraries.

*Participants*

During the testing phase of the project all 18 adults (not including the infant born between the end of study two and the beginning of study three) were given the opportunity to participate. If an individual approached the touchscreen and successfully initiated the training session their progress would be recorded. Ten individuals never reached this stage. One additional chimpanzee started training but did not complete it. Seven individuals completed training but only six took part in individual testing. During group testing all individuals has access to the research pods and could interact with the touchscreen, even individuals who had not actively participated in earlier touchscreen training. 6 individuals used it during these sessions.

*General Procedure*

The experimental task consisted of a start stimulus, holding screen, and choice screen. The task always opened displaying the start stimulus, which consisted of a large green circle. Pressing the circle would display the choice screen. The choice screen consisted of three equally sized horizontally tiled monochrome buttons. A unique pattern identified each button, and the while the buttons changed position on the screen depending on the individual trial and session, the patterns always matched to a specific button behaviour (play classical music, play pop music, or stop all music).

Upon pressing a button, the button’s specific behaviour would occur, a food reward would be dispensed, and for 3 seconds, all buttons would be greyed out and disabled. After the 3 second behaviour was completed, the choice screen would be redrawn and become responsive to touches again. If after 30 seconds, a participant did not press any button on the choice screen, the participant would be taken back to the start stimulus screen.

After a pre-specified number of successful touches to the choice screen, the session would end, and that participant would move on to the next stage of training or testing, if any remained.

*Training*

When an individual approached the touchscreen they would first see the green start button. Once this was pressed a blue holding screen would appear for 1.5 seconds before the choice screen was displayed. There were three buttons in total. One with a striped pattern representing Pop/Rock music, one with a zigzag pattern for Classical and the final had a spotted pattern and turned music off (figure X) Individuals were first presented with a single button (four with classical and three with pop/rock). If the chimpanzee had not pressed the button within 30 seconds the green start screen would reappear and need to be pressed to continue the session. When the button was pressed the associated music (a song chosen randomly from a playlist of seven) would play for 3 seconds whilst the individual would receive half a grape as a reward. The holding screen would appear again for another 1.5 seconds before the training screen reappeared. The position of the button within the screen was random. 10 successful presses were required to complete the training. Once an individual had completed training for the first button they were then presented with the button for the other type of music (e.g. classical music followed by pop/rock music). Another 10 presses were required for this training. After completing both types of music a button that turned off music was presented in the same manner. After another 10 successful presses, a mixed block of 9 trials with each of the three buttons presented one at a time with the order randomised, so each button was seen 3 times. Once all four levels of training were complete individual testing could begin.

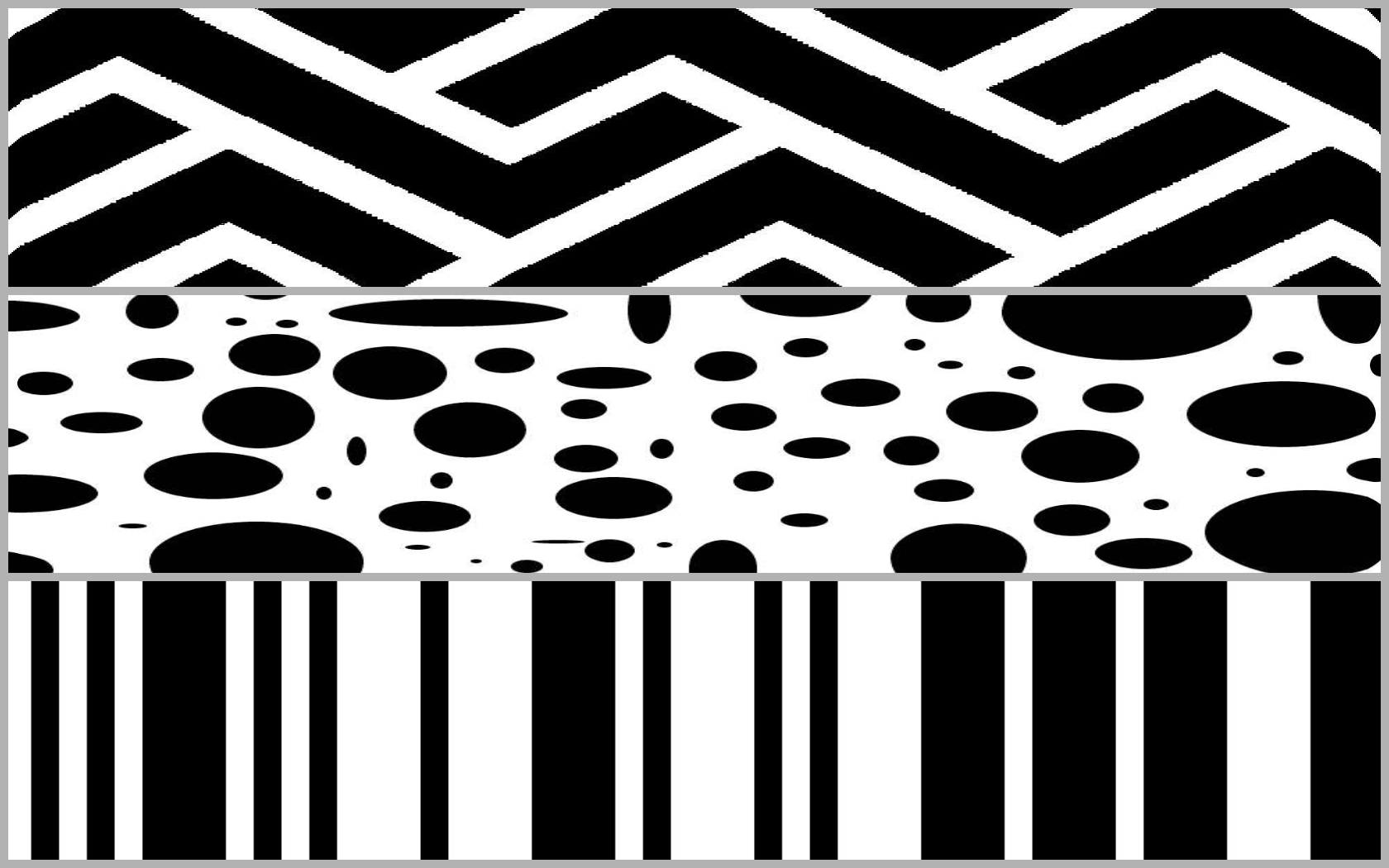
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Figure X Buttons representing Classical music, turning music off and Pop/Rock music

*Individual Testing*

Individual testing began after all individuals had reached criterion on at least half of the training stages. Testing would start with the start screen and holding screen, as in training. However, instead of presenting one button singly, all three buttons were presented at once with their position on the screen randomised (Figure X). Individuals had to complete 40 trials; 10 in which classical music began playing when the buttons appeared on the screen, 10 in which pop/rock was playing, and 20 where no music was played. If the classical or pop/rock buttons were pressed the associated music would play for three seconds before returning to the holding screen and starting a new trial. If the ‘off’/silence button was pressed no music would be played for three seconds before the holding screen and next trial. All button presses were rewarded.

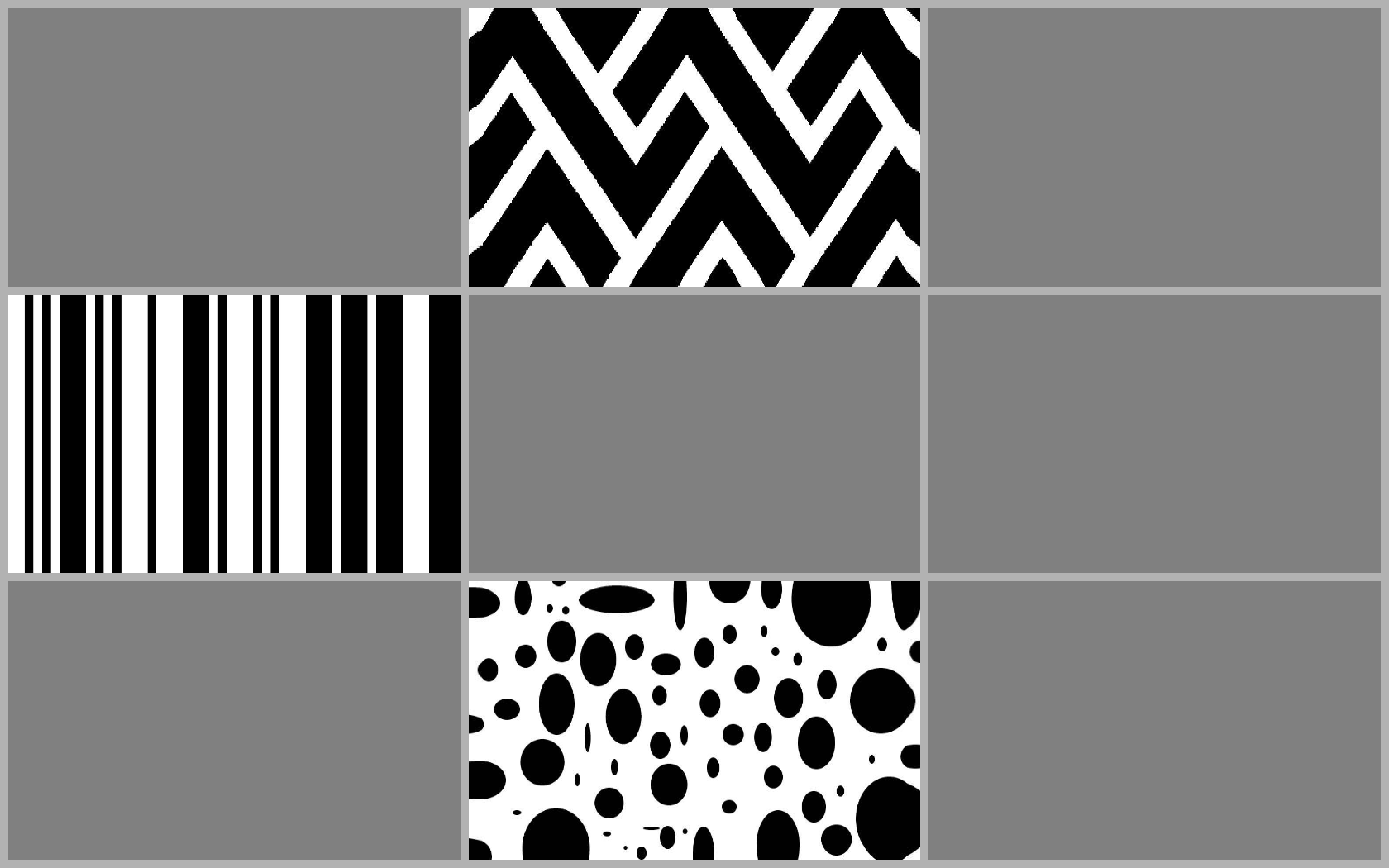


Figure XX Image of how touchscreen looked during Individual and Group testing

*Group Testing*

To encourage the chimpanzees into the research pods a bale of hay (approximately 10kg) and 7kg of primate pellets were spread across the two pods. As the chimpanzees were let into the research pods the touchscreen was already displaying the three buttons in a randomised position. For three sessions classical music was already playing as the individuals entered the pods, for three pop/rock music was playing, for three sessions there was silence, and for three sessions the touchscreen was not physically available to the participants and no music was played. If an individual approached the touchscreen and pressed a button, the corresponding genre of music would play or the music would be turned off. No rewards were given for pressing the touchscreen during this phase. After a button was pressed no holding screen was displayed; the next trial began immediately. The music or silence would last until the next button was pressed. If the touchscreen was silent and the ‘off’/silence button was pressed the silence would continue. Data was collected on the number and type of buttons pressed by each individual and how long all individuals were present in the pod.

*Observational Data Collection*

Observations were recorded simultaneously from within the Research Office and from the visitor window into the Research Pods using a Panasonic SDR-S26 video camera and Olympus DM-650 Dictaphone. The times of all entries into and exits out of the Research Pods were recorded as well as all approaches to the Touchscreen. An approach was defined as an individual coming within 20 cm of the touchscreen and with eyes directed towards the touchscreen. To be included in analyses an individual must stay in front of the touchscreen for more than five seconds to indicate genuine interest in the touchscreen. An approach was considered terminated as soon as the individual started moving away as long as eyes are not directed towards the touchscreen. The start and end time of all approaches were recorded as well as if any buttons were pressed, what type of button was pressed, how many times and which sound condition was in effect prior to the button being pressed.