behaviorcloud

Automated Video Tracking Uploaded Video

Objective

This application guide describes how to upload video files and generate tracked video traces and tabulated data including ambulatory vs. resting time, distance traveled, velocity, time spent in zones, zone latencies, number/sequence of zone entries, and spontaneous alternation.

Common use cases include: testing rodent, zebrafish, or insect behavior in mazes and other enclosures (e.g., elevated plus maze, open field, Y-maze, T-maze, novel object recognition, Barnes maze, etc.)

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Uploaded Video

1. Creating an Account

To get started you will need a BehaviorCloud account. Set up an account at the BehaviorCloud website using your institutional/company email address. You will receive an email prompting you to validate your email address and sign in to your new account.

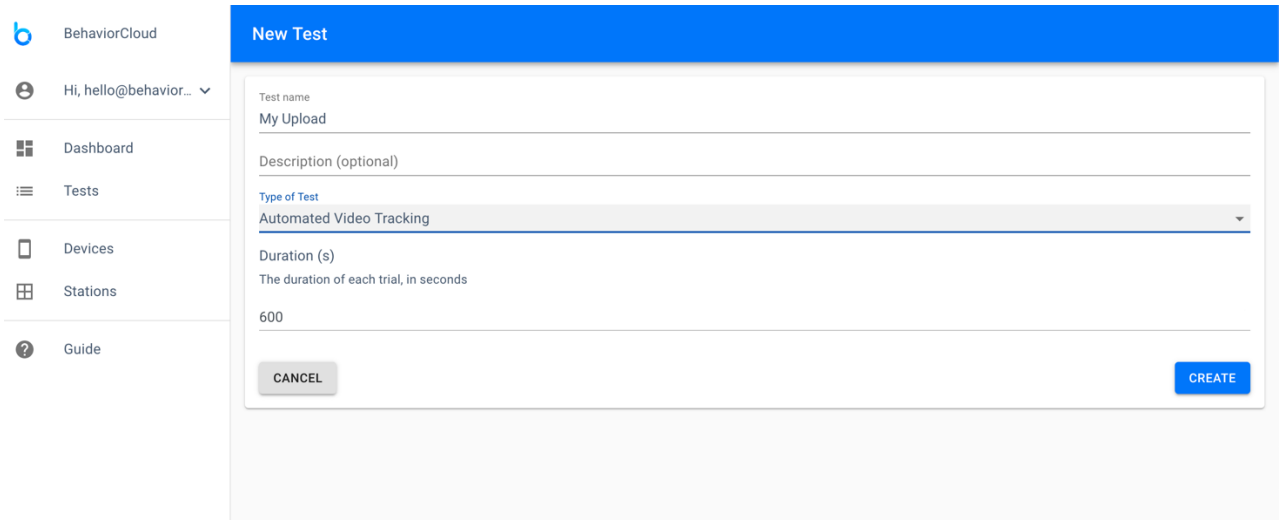
2. Uploading Video

a. Supported Video Formats

BehaviorCloud supports the upload of most major video formats; however, large files such as 4k or HD video will take significantly more time to upload. If you have 4k or HD video, or if you experience long upload times, we recommend transcoding your files to a lower resolution or frame rate to accelerate upload and analysis times. Time to upload other files will vary depending on size and the current level of traffic on our servers. Feel free to get your uploads started and then log out and come back later.

b. Uploading Video

Log in to your BehaviorCloud account and navigate to Tests. Click Create Test. Enter a name for your new test and select your primary analysis strategy from the dropdown menu – in this case, Automated Video Tracking. Enter the duration of your trials in seconds.



On the next page, click Upload Existing Files and select the files you wish to upload.

Automated Video Tracking
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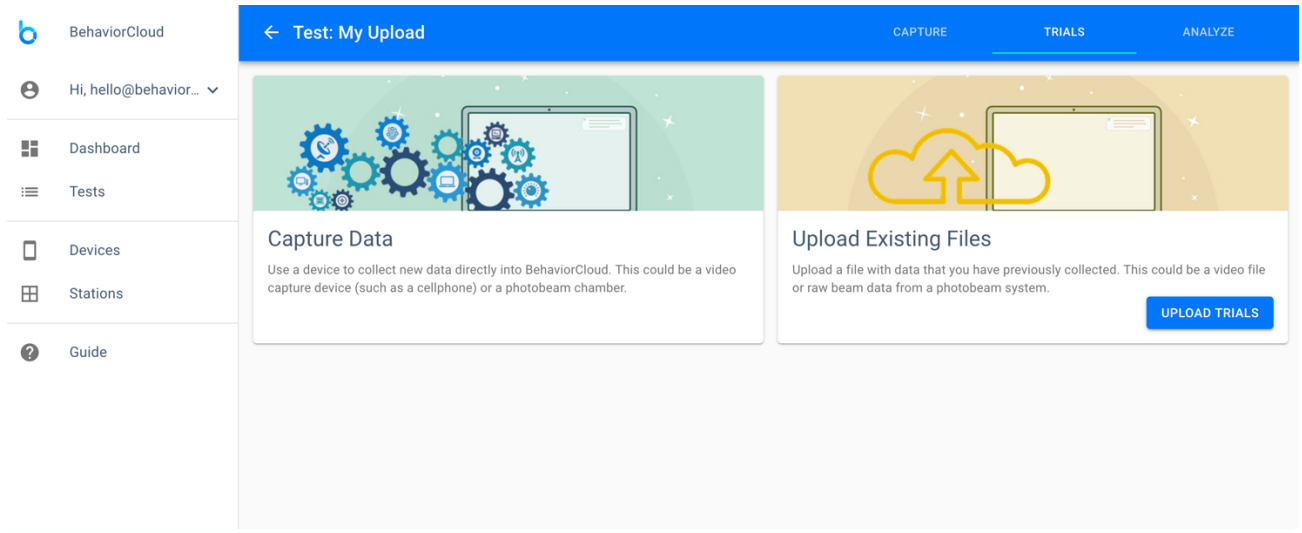
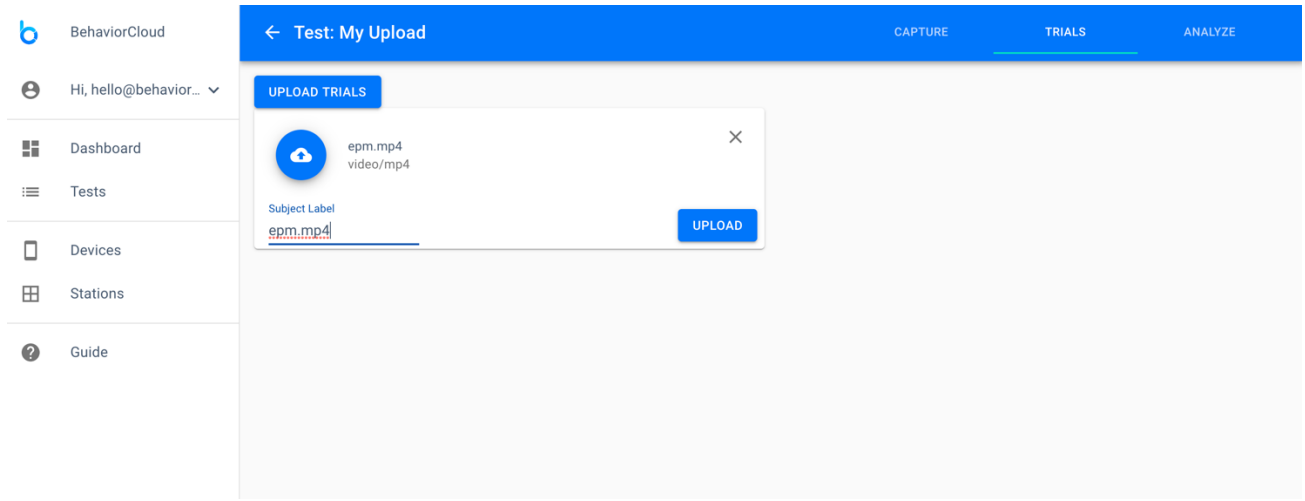


Edit the name of your video if desired and click Upload to begin the upload. This may take some time so feel free to log out and come back later. If your videos are very large or high resolution, we recommend transcoding them to a lower resolution or frame rate to accelerate upload times.



After a file uploads successfully you will see the following screen as the file is automatically converted to a format compatible with BehaviorCloud. Please wait for the file to be converted successfully before proceeding.

Automated Video Tracking
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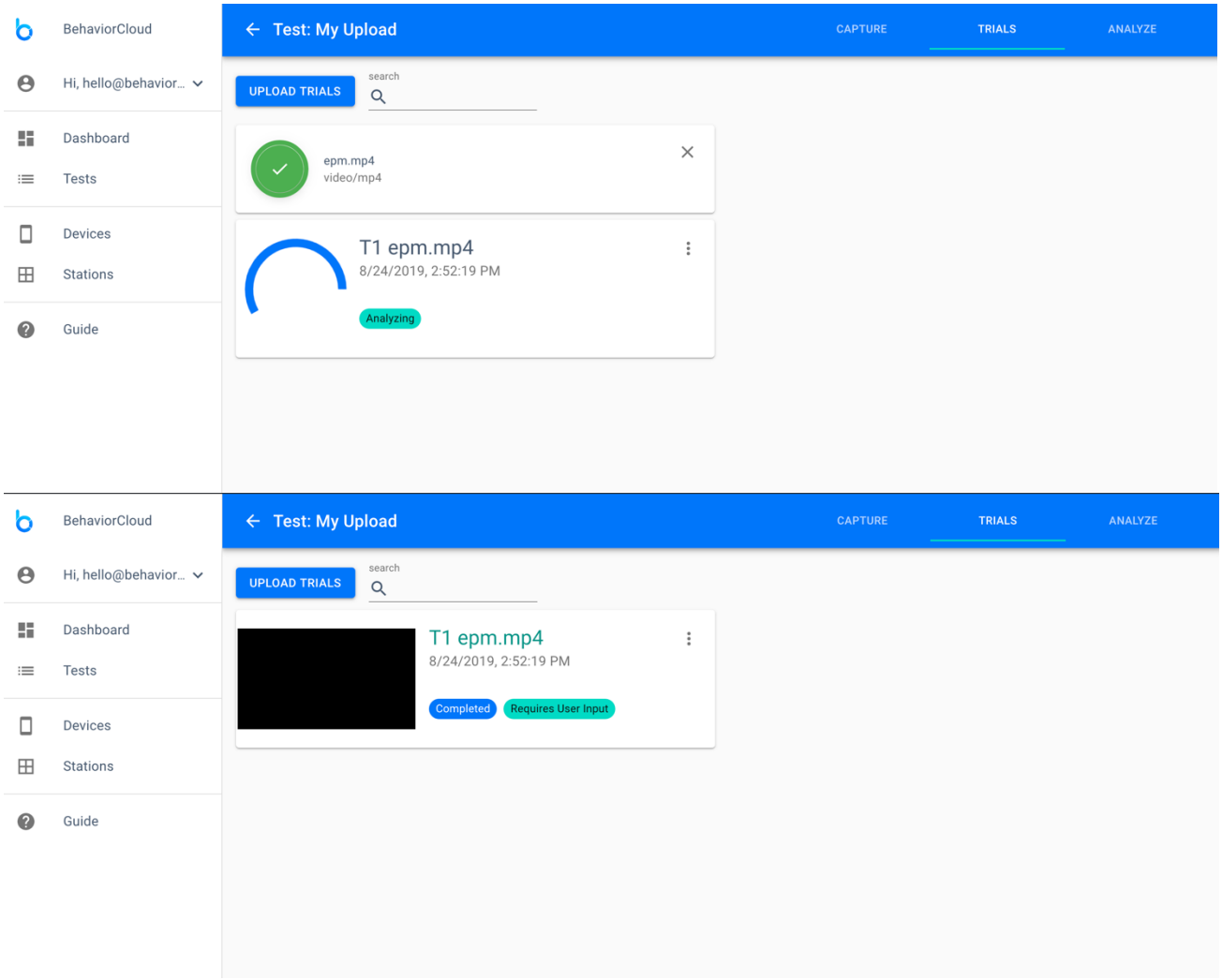
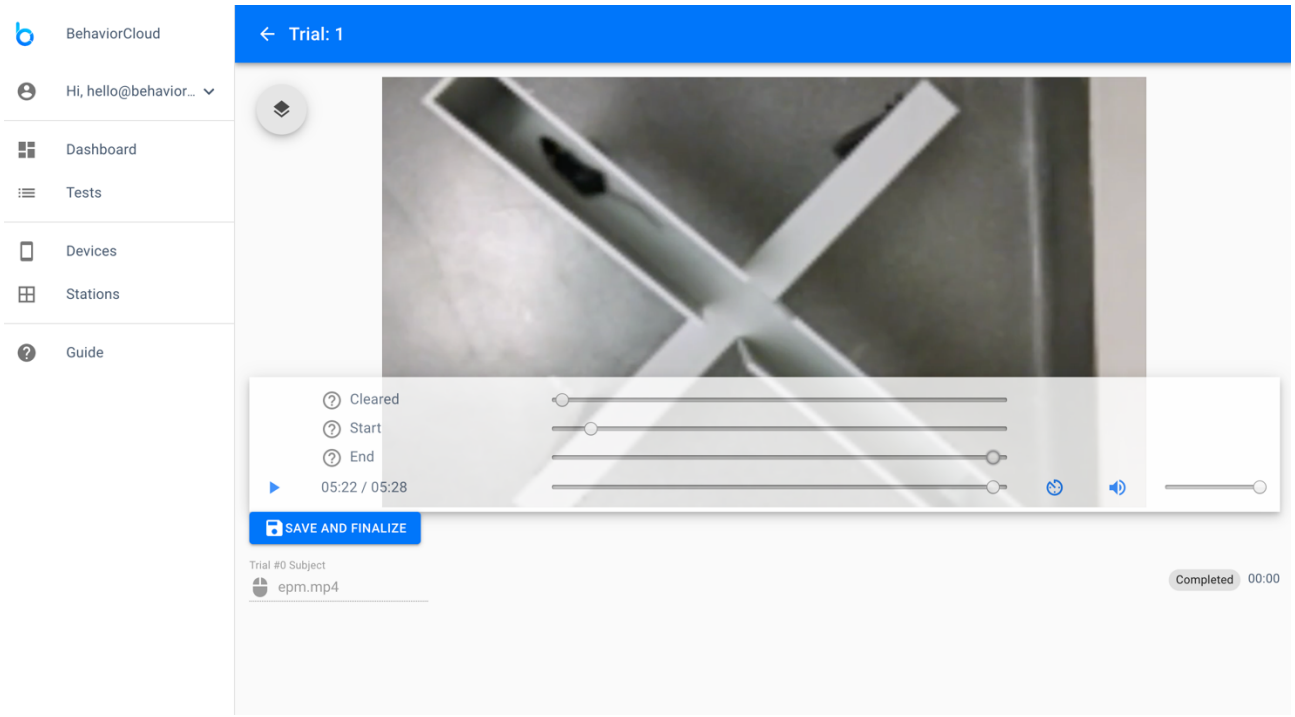


c. Setting Timestamps

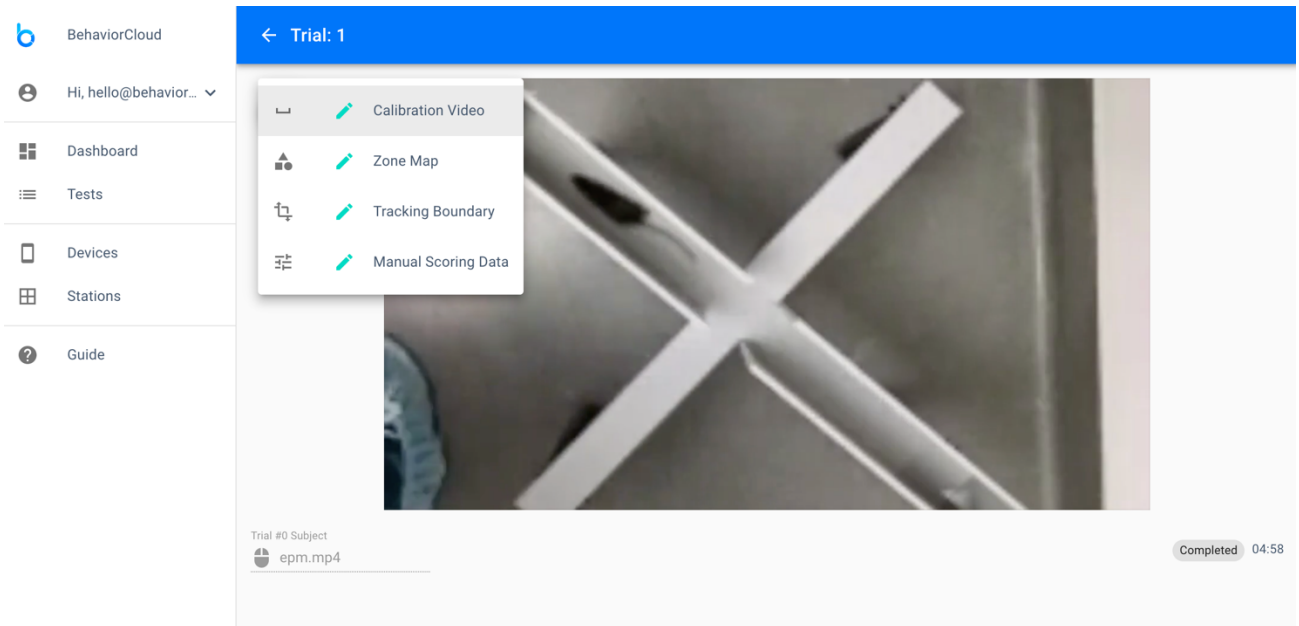
When the upload and conversion process is complete you will see a card representing your video and it will indicate that user input is required. Click into the detail view for your video. Here you will need to set three timestamps so the system knows when the video is cleared (i.e., showing a clean background image with no subjects, shadows, or other movements), when the trial starts, and when the trial ends. Clearing the arena is critical to obtain the best possible video tracking. Click Save and Finalize when you are finished.



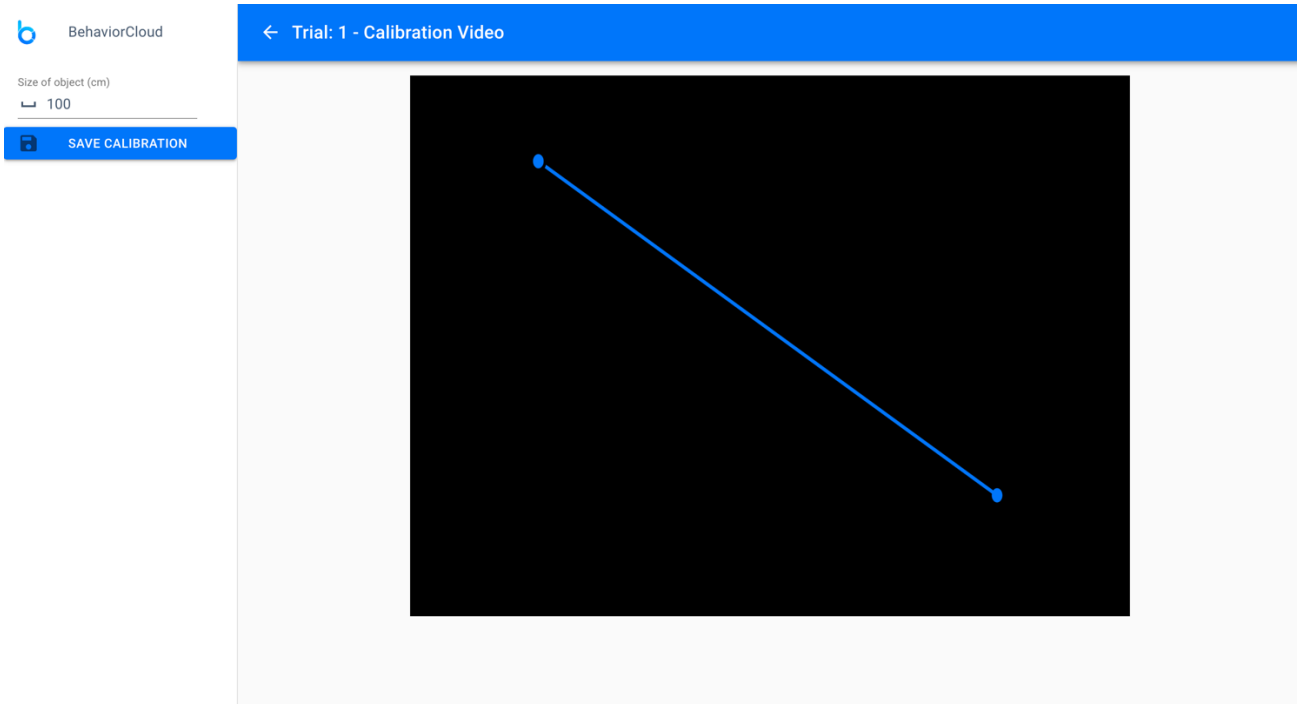
3. Configuring Trials

a. Distance Calibration

In the detail view for one of your trials, click the overlay icon and then click on the pencil icon next to Calibration.



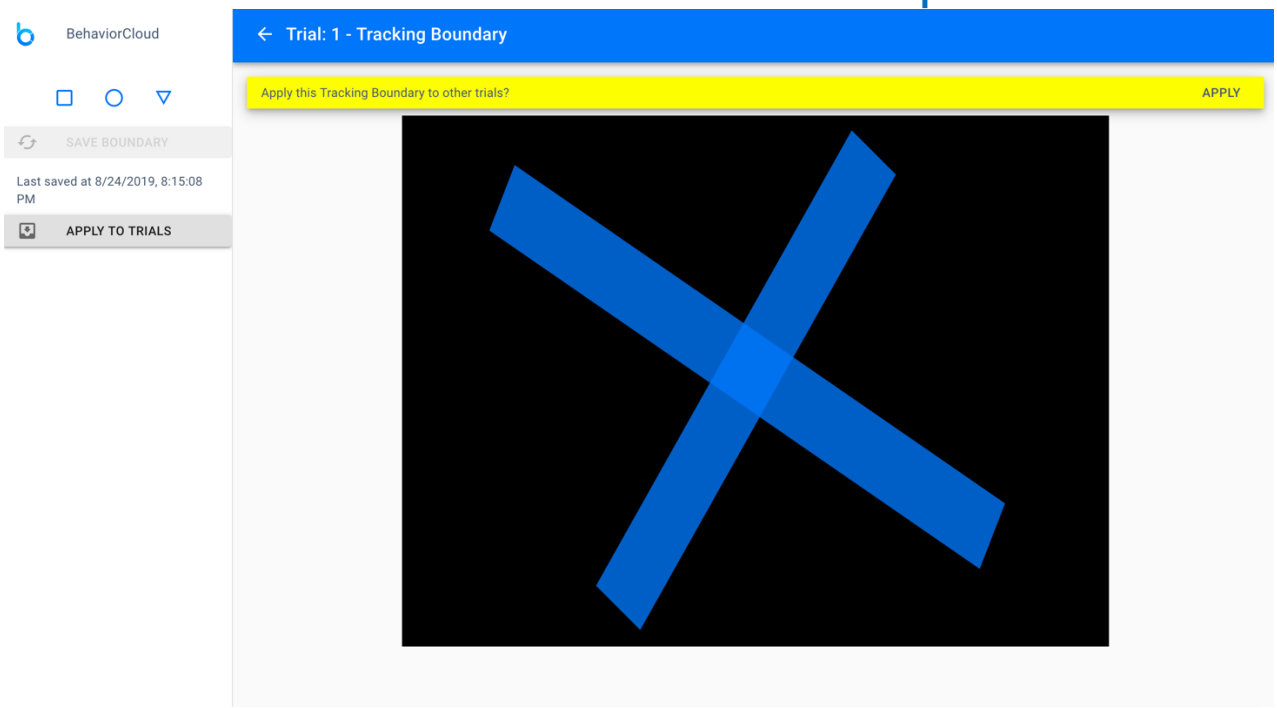
Drag the line to represent a length of known distance and enter that measure in centimeters in the left-hand menu. Click Save. You will be asked if you would like to apply this calibration to any other trials. If you have uploaded multiple trials using the same maze/cage you can use this function to quickly select all of those trials and apply your calibration across all of them.



The calibration that you set in this step will be used for downstream analysis to calculate distance traveled, velocity, etc.

b. Tracking Boundary

Back on the trial detail view, click the pencil icon next to Tracking Boundary. The tracking boundary is important for automated video tracking analysis because it tells the system what areas of the video frame to use for tracking analysis vs. what areas to exclude. This is especially important if there are other subjects or people moving around in the areas adjacent to the maze/cage you are tracking.



Use the provided shape tools to cover the area you would like to track. Anything outside of this will be excluded from the automated video tracking analysis. Click save and then apply to other trials if desired.

c. Zone Map

Similar to the tracking boundary, the zone map is used for automated video tracking analysis to distinguish certain areas of a maze or cage for independent analysis. In the zone map view, use the provided shape tools to cover the areas you would like to set as zones. Name your zones if desired. These names will be carried through to the analyzed results output by BehaviorCloud. Click save and then apply to other trials if desired.

4. Analyzing Data

Once you have uploaded all of your trials and configured them as needed, you can check that everything is complete and correct by visiting the Trials tab of your test. Each trial is shown as a separate card with a thumbnail video preview that includes any tracking boundaries and/or zone maps that you have set, and a list of all of the associated meta-data with that trial (e.g., distance calibration). You can also see if any initial analyses are already underway. BehaviorCloud begins to generate raw position data for automated video tracking experiments as soon as the calibration is set.

a. Tracked Position Video

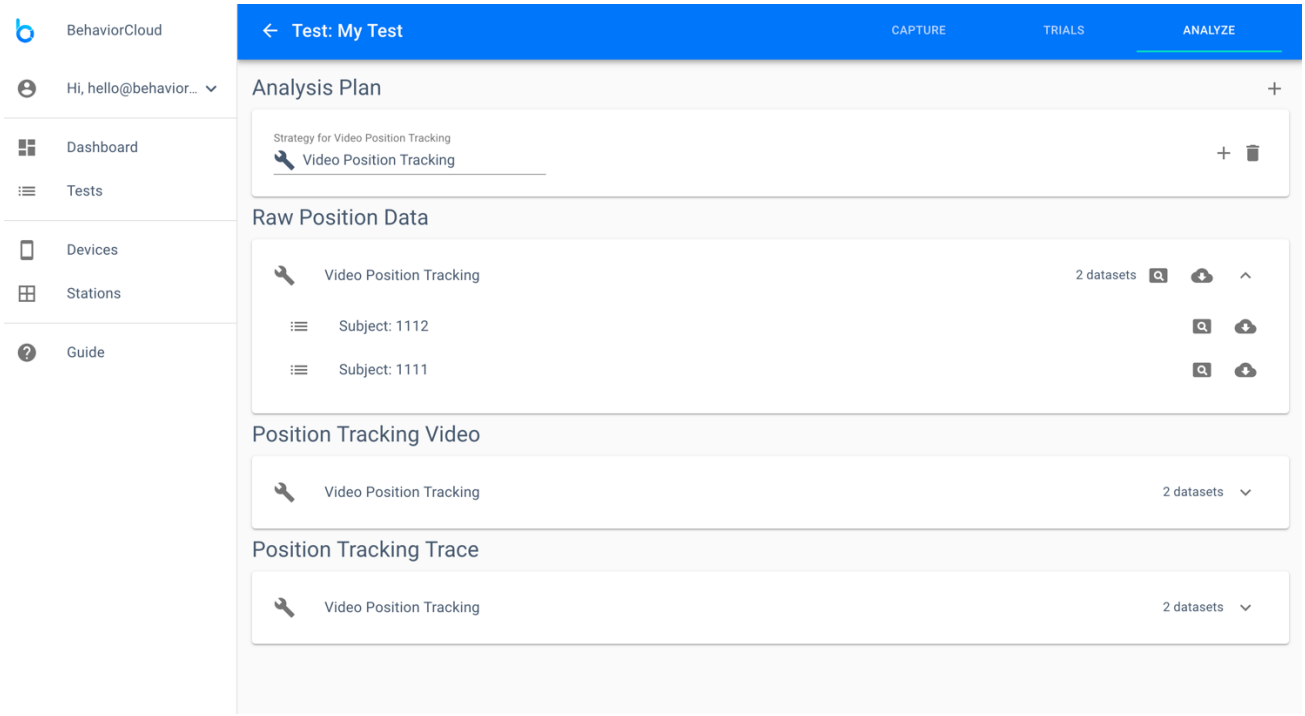
The tracked position video is a duplicate of your uploaded video with a mask applied to show the centroid position being tracked for analysis. This video will appear in the overlay menu on each trial's detail view when it is ready. It is automatically generated as soon as a calibration and tracking boundary is available. The tracked position video for each trial is also available in the Analysis tab.

b. Tracked Position Trace

The tracked position trace is an image showing the entire path that was tracked during the course of the trial. This image will appear as an option to view in the overlay menu on each trial's detail view when it is ready. It is automatically generated as soon as a calibration and tracking boundary is available. The tracked position trace for each trial is also available in the Analysis tab.

c. Analysis Plan

Navigate to the Analysis tab and you will see a space for your Analysis Plan at the top of the page. This is where you can choose the relevant analyses for your test. Use the plus icon to add an analysis. It will begin processing as soon as it is added. Use the trash icon to cancel or delete an analysis. The results of your analyses will appear in the drawers below your plan. You can expand those drawers to see which results are ready, which results are still being analyzed, and you can view or download your analyzed data.



d. Activity Analysis

Select Activity Analysis to generate activity-related variables for each subject. BehaviorCloud will use the raw position data generated for each video from the Position Tracking Video to calculate distance traveled, ambulatory time, resting time, and average velocity.

e. Zoned Activity Analysis

Select Zoned Activity Analysis to generate zoned activity-related variables for each subject. BehaviorCloud will use the raw position data generated for each video from the Position Tracking Video along with the zone map you configured above to calculate distance traveled, ambulatory time, resting time, and average velocity for each zone. It will also output the latency to enter each zone.

f. Spontaneous Alternation

Spontaneous Alternation is an analysis mainly used for Y-maze and T-maze videos. This will calculate the percent alternation for each trial (number of triads divided by number of arm entries minus two).

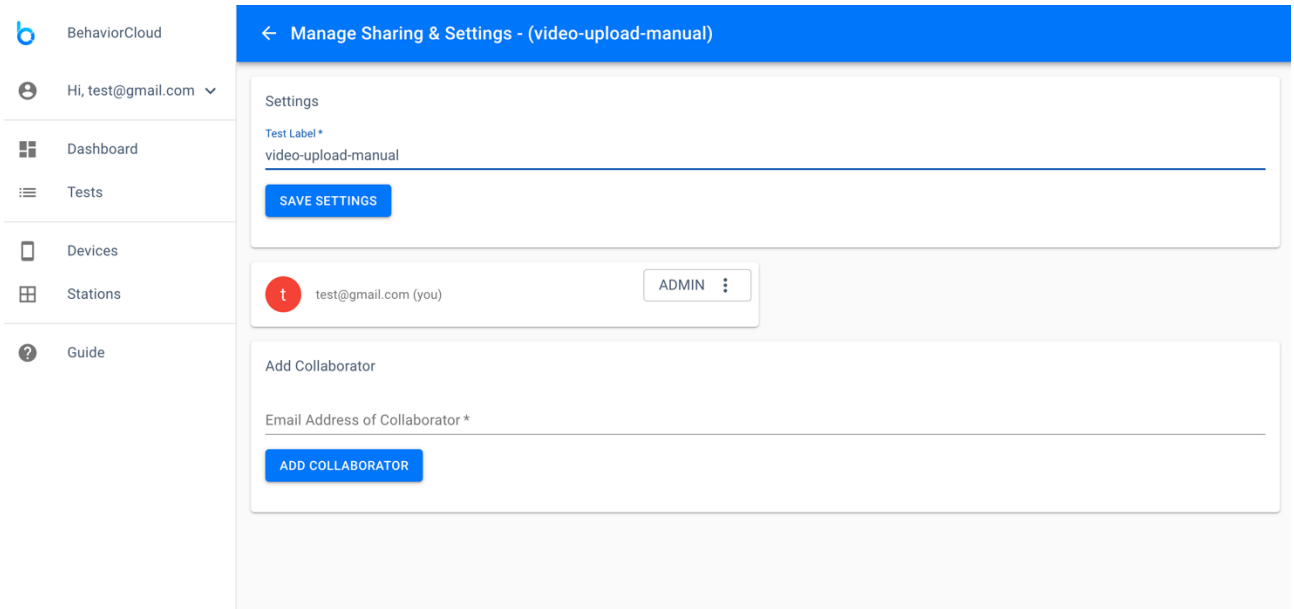
g. Zoned Sequence Analysis

Select Zoned Sequence Analysis to generate a list providing the sequence of zone entries for each trial.

5. Sharing a Test

a. Adding Collaborators

You can share your data and invite collaborators to contribute to any phase of the experiment through your BehaviorCloud account. Go to Tests to view all of your experiments. Private experiments are indicated by a lock icon and shared experiments are indicated by a share icon. To add a collaborator, select the three dots menu icon to the right of a test and click Manage Sharing and Settings. You will be able to enter the email address of the person you would like to invite to your test. Your collaborator will receive an email notification prompting them to login and access the shared experiment.



b. Managing Permissions

The default level of permission is read only. You can manage their level of permission: read only (can view data but cannot edit), read/write (can view, contribute, and edit), or admin (full permission, including to delete an experiment).

6. Downloading Data

All of your data are available for download at any time. Your data come in multiple forms depending on the analyses that were run. The full tracked video showing centroid position and the subject outline is available from the trial detail view by clicking the overlay icon and then clicking Position Tracking Video. The path tracked during the course of the trial can also be found in the overlay icon under Position Tracking Trace. The trace can be toggled on and off in overlay mode to be shown on the video background if desired. You can also access and download these data from the analysis tab of your test. Other data generated such as durations, counts, etc. are available after running them on the Analysis tab.

Additional Information

Further details can be found in our User Guide at www.behaviorcloud.com/guide.html

For support and inquiries, contact support@behaviorcloud.com