



Student Guide to Data Analysis in **iMotions Online**



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How to best use this guide

Getting started with biosensors, analysing and interpreting the data correctly can be daunting. Deciding how to analyze your data depends on the research question and the specific hypotheses. This determines which statistics should be used, which metrics to focus on, and how a figure or graph should look to best tell the story of your experiment. This guide will cover different images and metrics available in iMotions Online and ideas of how they can be used.

We recommend using this guide while designing your study, and then revisiting it when you are ready to analyze your data. Combinations of metrics can offer useful insights, but connecting metrics from biosensors to the larger research questions can be challenging. Having an analysis plan before conducting the study is key to an efficient and effective research experience.

iMotions Online contains three important modalities:

Web-based
eye-tracking



Facial expression
analysis

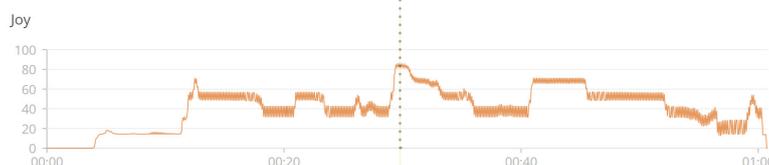
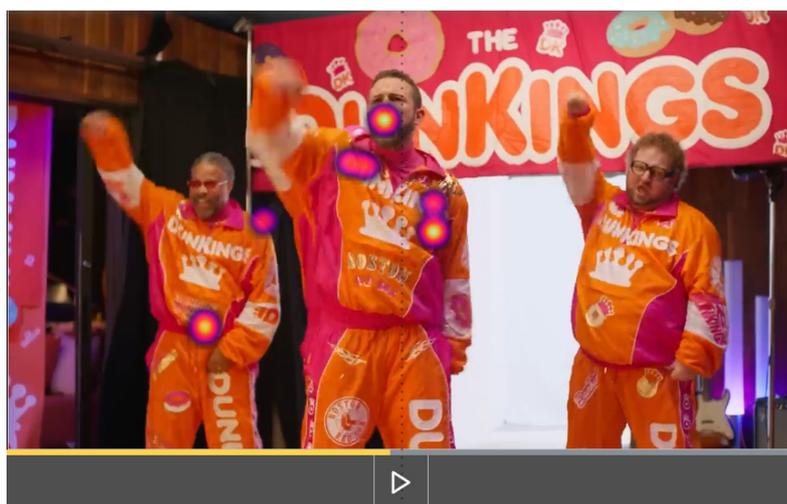


Surveys



Eye-tracking data is useful for gaining insights into what respondents were paying attention to, when and for how long. Facial Expression Analysis gives insights into how respondents react to or may feel about the stimulus presented. These modalities can be combined into a **multimodal analysis** to investigate more complex research questions and produce visuals that help you communicate your results.

Multimodal Analyses: Eye-tracking and facial expression analysis can be combined to get more complex insights. For example, you can look at when a peak in a facial expression occurred while simultaneously visualizing a heat map showing fixation data from multiple respondents on a stimulus video.



Visualizations

In iMotions Online, there are three main visualization categories. To learn about how to generate these images, see the [help guide](#).

Gaze Paths

Gaze paths are visualizations of eye-tracking data from individual respondents. In iMotions online, gaze paths give information about fixation locations, sequence of fixations and duration of fixation. Fixations tell us when the eye was stable enough to receive information. Fixations locations are represented by circles. They are numbered to indicate the order they occurred (i.e., sequence of fixations) and colored to give an impression of how long each fixation lasted relative to other fixations from that individual (i.e., relative duration of fixations).

Tip: Keep in mind that a gaze path only represents data from an individual respondent. If you want to show data representing a segment of the respondents or more than one individual, you need [Heat Maps](#).

Gaze paths are useful for seeing what part of the stimulus the individual fixated on first, gaining insights about an individual's path of navigation for a certain stimulus, or determining whether an individual is revisiting a certain part of the stimulus. It can also be used to give insights into what the individual respondent does not seem to be paying attention to.



Gaze paths for individual respondents are useful for:

- **Having an individual represent a group:** A gaze path from an individual respondent that represents a segment makes an intuitive visual for a report, poster, or presentation slide. This can accompany a graph summarizing all the data points from the segment. This is particularly useful if your presentation medium cannot include video, but you want to show where the fixations moved over time.

Tip: When choosing a representative individual from a segment, be sure to note that this data is from a representative individual from a group. Highlight which aspects of this image from the individual represent the group. It is also good practice to include data from the entire segment in a chart.

- **Visualizing revisits:** Multiple fixations in the same area indicate that the individual revisited a certain area of a static stimulus. Revisiting an area could suggest interest in that area or difficulty shifting attention from that area for various reasons. It could also indicate difficulty in understanding parts of the image that had to be revisited in connection with other areas. This is a good metric in combination with dwell time (AOI metric) that tells you more about sustained attention over time, or how long respondents spent looking at an area.
- Tip:** Use static gaze paths for static images and dynamic gaze paths for videos or websites.
- **Combine Gaze Path with Signals:** With a dynamic stimulus, such as a video, you can overlay FEAs or eye-tracking signals (See Signal Overlay) for an individual and see which correlate with the fixations from the gaze path. This is an effective visual to see what expression someone was making and what they were looking at.

Heat Maps

Heat maps represent eye-tracking data from multiple respondents (i.e., aggregate data). You can decide whether you want to see all respondents or certain segments of respondents. Similar to Gaze Paths, you can create static or dynamic heat maps. For many experimental setups, static heat maps work best for still images and dynamic heatmaps are better for videos.



Heat maps for aggregates of respondents are useful for:

- **Creating visuals:** Heat maps are a popular way to show what a group of respondents was paying attention to. In your study, you may want to create a heat map for each stimuli and compare how respondents fixated on each (this is common for AB testing). If your research question focuses on how different respondent segments responded to the same stimulus, you could also create multiple heat maps of the same stimuli, but with data from the different segments.

- **In combination with Areas of Interest:** If your hypothesis is related to an area of interest (AOI), a heatmap is a clear visual to accompany an AOI data analysis, emphasizing whether the fixations align with a certain area of interest.
- **In combination with Surveys:** The survey tool built into iMotions Online allows you to segment your respondents based on their survey responses. This means that if you ask respondents to indicate their age and/or gender, you could segment the data on age or gender. You could also ask about preferences (which brand do you prefer?), behaviors (how often do you drink coffee?), or location (work/home, continent, urban/suburban/rural?).

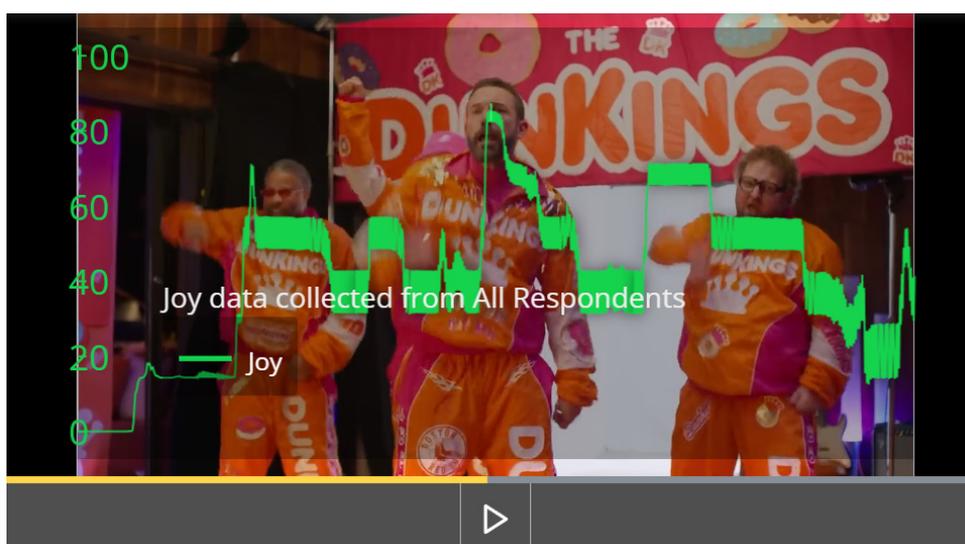
Signal Overlay

Signal overlay allows you to choose a signal to visualize over the stimulus. This can be eye-tracking or facial expression analysis metrics. You can use this visualization with individual or aggregate respondents to visualize up to two signals at a time. You can also use it alongside gaze paths (for individuals) or heatmaps (for aggregate data). Signal overlay is an excellent visualization to accompany video stimuli and is particularly powerful in combination with FEA metrics.

Signals Alone: You can also visualize signals without the stimulus. This is useful for visualizing more than two signals simultaneously. When this data is separated from the video stimuli, it may be useful to edit the image to indicate what is happening in the video at specific times.

Choices for Signal Overlay:

- Affectiva AFFDEX: Facial Expression Analysis
- I-HMM filter
- Webcam eye tracker



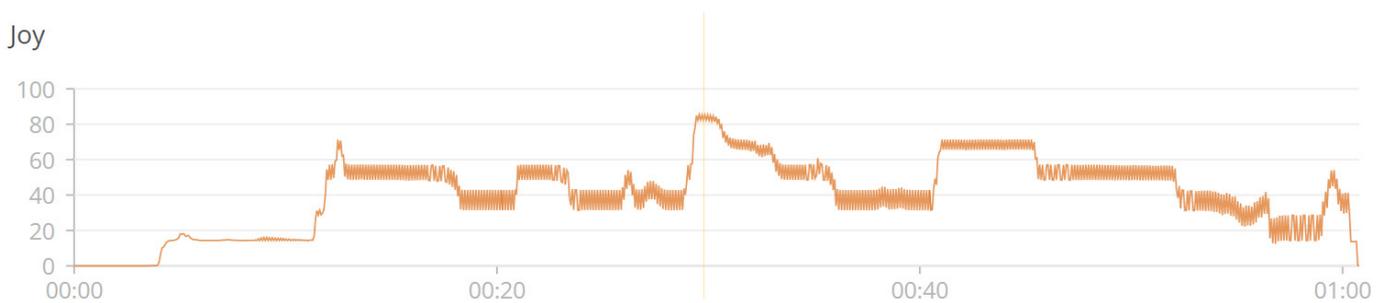
Signals

Signals are similar to the previously described [signal overlays](#), except that you can see more than two signals at a time and they are not laid over the stimulus. Signals allow you to see eye-tracking and facial expression analysis metrics separately from the stimulus. Signals are available for individual respondents as well as aggregate data.

[↗](#) For information on Action Units and the Facial Action Coding System

Signals are useful for:

- Understanding which Action Units are correlated with FACs emotion categories
- See raw eye-tracking data over time
- **Deciding which signals to incorporate for signal overlay:** This could be useful if you want to include Action Units (AUs) that support a hypothesis or show how two AUs might be inversely related.



Areas of Interest (AOIs)

Areas of interest (AOIs) are one of the most useful quantitative metrics for the eye-tracking modality in iMotions Online. You can create multiple AOIs and collect data on them simultaneously.

You can use AOIs to see if respondents notice something (respondent count or respondent ratio), how long it takes them to fixate on it (TTFF-time to first fixation), how long they spend looking at an area (dwell time), how many times they revisit that area, and the average duration of the fixations.

Eye-tracking: Fixation-based metrics give eye-tracking data related to AOIs. If you have a hypothesis based on how much attention a certain space on the stimulus is getting, AOIs are a key tool.

Fixation based metrics (12/12)

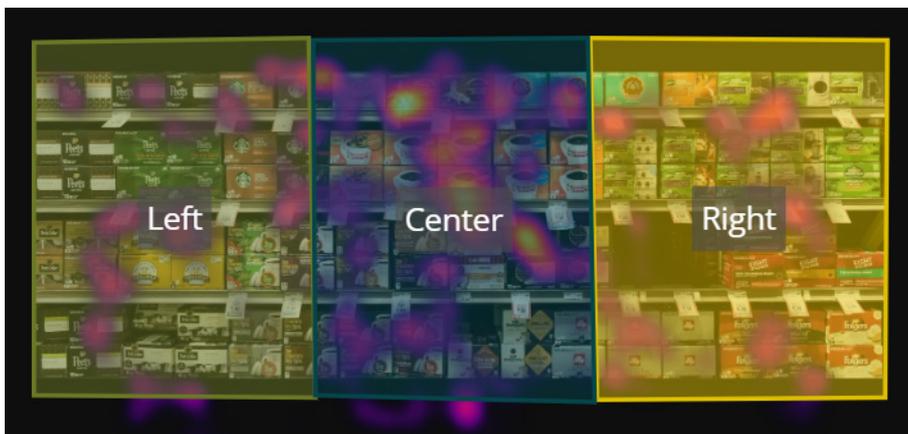
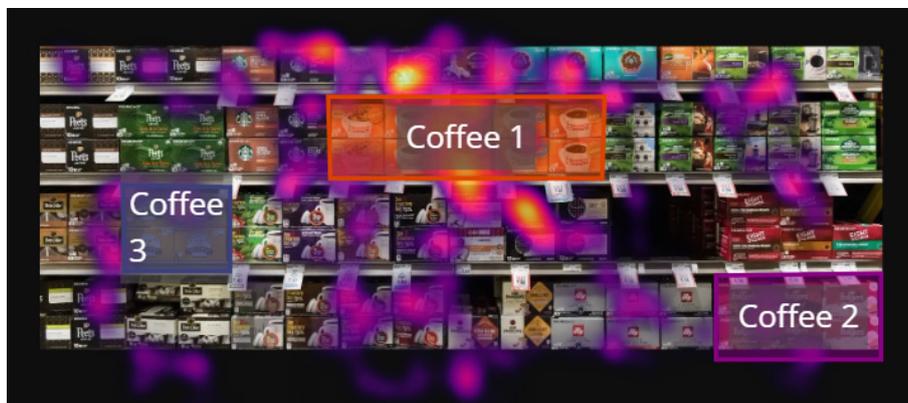
- 👁 Respondent count
- 👁 Respondent ratio (%)
- 👁 Dwells with fixations
- 👁 Revisit count
- 👁 Fixation count
- 👁 TTFF AOI (ms)
- 👁 TTFF parent (ms)
- 👁 Dwell time (ms)
- 👁 Dwell time (%)
- 👁 Fixation duration (ms)
- 👁 First fixation duration (ms)
- 👁 Last fixation duration (ms)

Choices for Signal Overlay:

Setting up AOIs should align with your hypotheses. Below are three examples of AOIs that are investigating very different questions but about the same stimulus image of a grocery store shelves with coffee.

The first AOI set-up could be used to investigate how respondents fixate on different coffee brands. **The second AOI set-up** could be used to investigate which shelf respondents focus on. **The third AOI set-up** could be used to test whether the center gets more attention than the sides or comparing the three different AOIs separately.

Additionally, **for AB testing**, any of these set-ups could be duplicated in a different stimulus image. For example, you could create another stimulus with a different presentation of grocery store shelves with coffee, but this time the coffees are rearranged, presented on taller shelves, or a certain brand is in different packaging. This way you could see how the change in coffee shelf layout affects eye-tracking or facial expression of the respondents.



Survey Results

While most analyses discussed in this guide are located under the 'Analysis' tab on the left hand-side of the iMotions Online window. As any advanced survey editor, you can also create and export charts and export data tables relating to the survey created.

How to Analyse Survey results in iMotions Online

Similar to other survey software, you can create and export charts and export data tables relating to the survey created. The main advantage in creating a survey in iMotions Online (as opposed to other survey software) is that you can easily use the survey responses to the survey to segment the respondents for other analyses.

Create new segment

Create a unique name for your segment

Respondents
Select all the respondents to include in the segment

Data quality filters
Use data quality filters to select which respondents to include in this segment

Survey response filters
Select survey answers to include in the segment

[+ ADD SURVEY FILTER](#)

Tip: The main advantage of creating a survey in iMotions Online (as opposed to other survey software) is that you can easily use the survey responses to segment the respondents for other

Useful Links

Case Studies

Here are a few examples of previous studies on how iMotions users used eye-tracking, facial expression analysis and/or surveys.

 [Detecting Respondent Deceit and Disinterest in On-Line Surveys. A Case Study](#)

 [Using Facial Expression Analysis or Our Summary](#)

 [20% profit boost from menu redesigns – thanks to eye tracking](#)

Guides and Brochures

 [Affectiva for Facial Expression Analysis Guide](#)

 [10 Most Used Eye Tracking Metrics and Terms](#)

Potential Research Areas using iMotions Online

Marketing and Advertising

- Advertisement Effectiveness
- Packaging Design
- Shelf Layout Evaluation
- Website and Digital Content Optimization
- Consumer Research and Insights
- Cross-Media Strategies

User Experience (UX) Design

- Usability Testing
- Understanding User Engagement
- Improving Information Hierarchy
- A/B Testing

Validation Resources

 [Webcam Eye Tracking Validation Study](#)

 [A Comparison of the Affectiva iMotions Facial Expression Analysis Software With EMG for Identifying Facial Expressions of Emotion](#)