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# emoTouch Web - A Web-Based Research System for Continuous Real-Time Studies with Mobile Devices and Desktop Computers

**Music perception is a dynamic phenomenon** that evolves and changes over time during the listening process. Therefore, the study of such a dynamic phenomenon also **requires dynamic research instruments** that make the development processes observable continuously and in real time. .

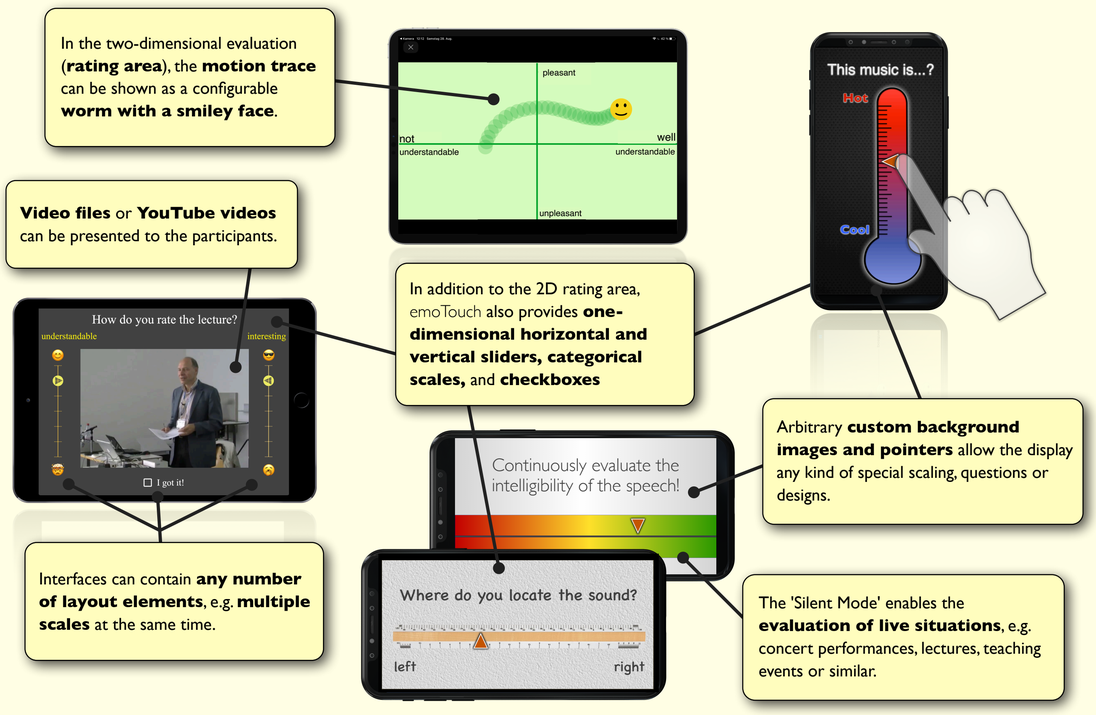
emoTouch Web **turns any modern smartphone, tablet or desktop computer into a research tool for real-time assessment** in live situations, online studies, or laboratory settings. Subjects can participate by using their own device **('Bring-Your-Own-Device'),** which is particularly important for audience research in live situations, such as speeches, presentations, or lectures as well as in music, dance, or sports. Although emoTouch Web was developed in the field of music psychology, the system is **completely freely configurable and thus not limited to a specific research question or discipline**.

emoTouch Web already integrates extensive capabilities for **numerical and graphical analysis** of the stored real-time data. In addition, emoTouch Web offers the **export** of the collected data, an access option to the data for external software systems via an API and an interface to **Python** and **JavaScript**.

emoTouch Web
Demo

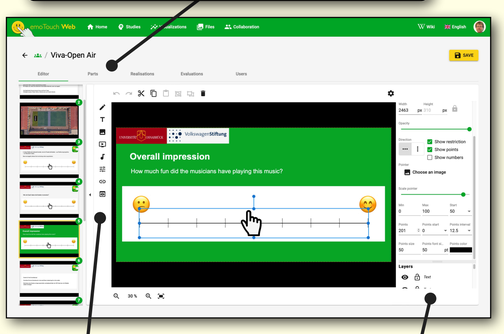
## 1 Options in the Participant Interface

emoTouch Web displays a **freely configurable, device-optimized rating interface** on all current smartphones, tablets and desktop computers. Media played from the device (audio, videos) or live situations can be continuously assessed 'in real time' according to freely selectable criteria. Some **examples**:




## 2 Design of studies in the Researcher Interface

In the **Part Editor**, the interfaces for the individual parts of a study can be designed.




**Layout elements:**
- Stimulus media (audio, video, YouTube)
- Rating scales
- Rating area (2D scales)
- Category scales
- Shapes, texts and images
- Interface Buttons
- iFrame boxes to integrate external websites, e.g. questionnaire tools

**Inspector:** Detailed control of all parameters of the interface elements, e.g. the subdivision of scales, and the arrangement within the graohical layers.

The Participant Interfaces can be **freely designed** in the **graphical editor of the Researcher Interface** with **numerous layout elements (scales, etc.)**. The layouts dynamically adapt to the display ratios of the various user devices.

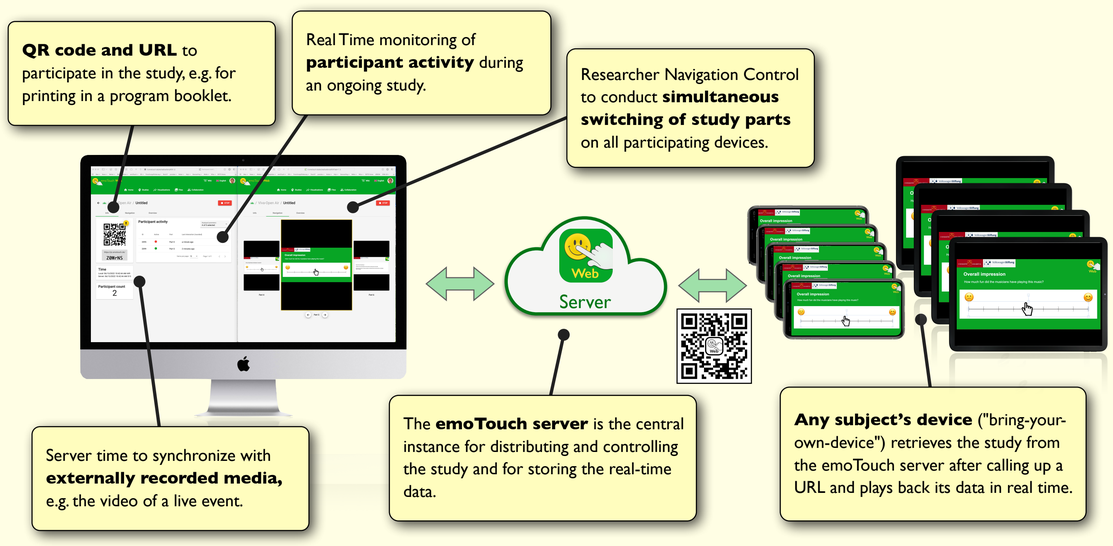
The **overall course of a study** can be flexibly composed of **several parts**, each with its own layout.

Simple **questionnaires** can be created directly in emoTouch Web. More extensive external questionnaires can be integrated via iFrame or linked and later cross-linked with the real-time data using the transferred session ID.

The user administration of emoTouch Web allows the **collaboration of several researchers** on the same study.

## 3 Execution of studies

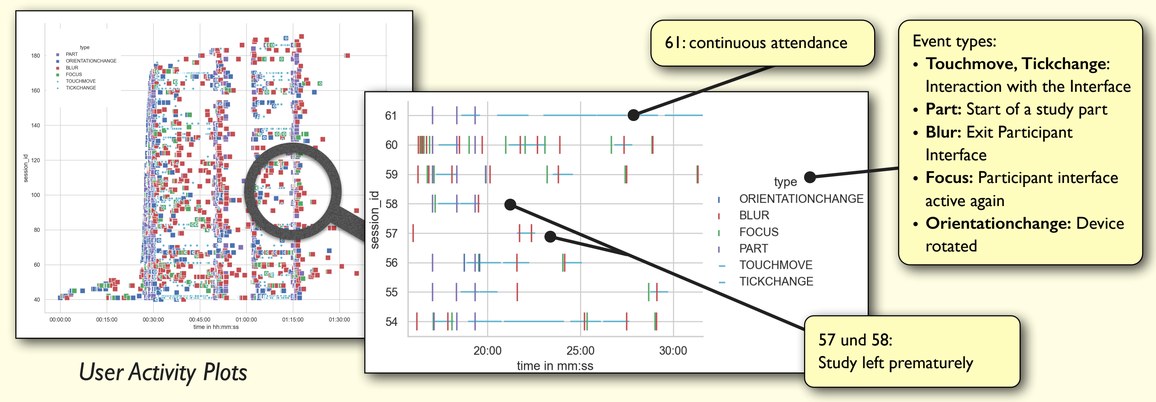
The execution of a study can be **controlled, monitored and observed in real time via the Researcher Interface**.




## 4 Graphical and numerical data analysis

The Researcher Interface has **coordinated tools for the graphical and numerical review and evaluation** of the collected data in longitudinal and cross-section. Since, especially in live situations, subjects use their devices autonomously and on their own responsibility, an **overview of user behavior is essential for assessing data quality**.

By integrating the scripting languages **Python** and **JavaScript**, the analysis can be extended by any own evaluation scripts. Furthermore, the data collected can be used by other applications via **data export in common file formats** and **open API interfaces** for data access.




*User Activity Plots*

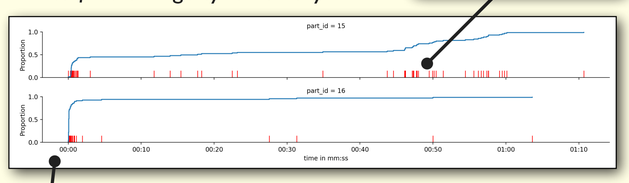
Time during which the Participant Interface was not visible and active on the device.

*User behavior statistics*

| Session ID | Event-count | Total Sessiontime | Total Absencetime | Absence % |
|---|---|---|---|---|
| 41 | 2528 | 1:17:10.639 | 0:24:03.797 | 31.18 |
| 170 | 2445 | 0:47:09.682 | 0:00:00.095 | 0.0 |
| 42 | 1716 | 1:15:54.797 | 0:02:20.838 | 3.09 |
| 83 | 1466 | 0:49:34.258 | 0:03:44.774 | 7.56 |
| ... | ... | ... | ... | ... |
| 190 | 4 | 0:00:05.739 | 0:00:00.000 | 0.0 |
| 189 | 3 | 0:03:40.246 | 0:03:37.314 | 98.67 |
| 43 | 3 | 0:00:29.465 | 0:00:00.000 | 0.0 |

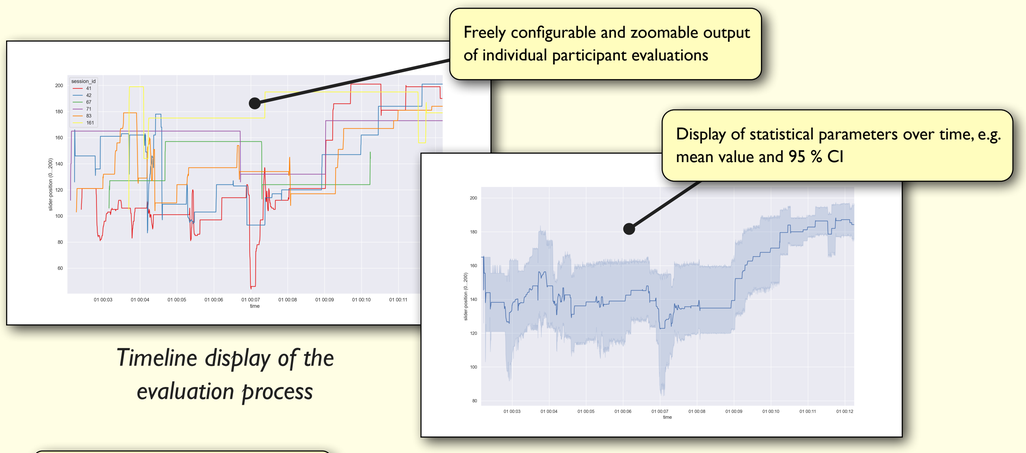
Number of evaluation operations on the touchscreen (events).

*Interface change synchronicity*



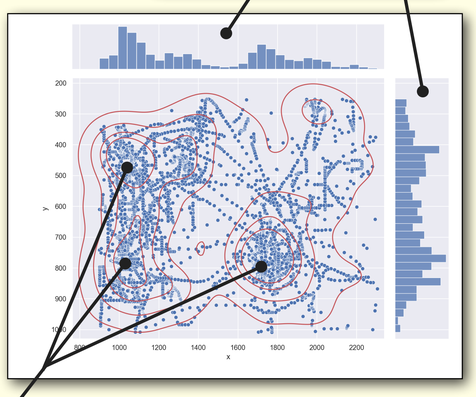

Part 15: Almost 50% of the test subjects start with a delay of more than 40 s.

Part 16: Almost all participants are active immediately, only individual outliers with a long delay.




*Timeline display of the evaluation process*

Histograms of the activity in both evaluation dimensions




*Heat plot of a 2D rating area*

"Hotspots" of user activity

**Other analysis options** already integrated or planned:

- a **scrollable replay** of the evaluation processes running synchronously to the stimulus;
- Output of **descriptive statistics** for test parts and subjects in longitudinal and cross-sectional data;
- Calculation of **interrater reliabilities** and **autocorrelations**;
- Output of **Granger causalities** (Barnett & Seth, 2014) between ratings;
- **Resampling** of event-based data to freely configurable fixed sampling rates.

## References

Barnett, L., & Seth, A. K. (2014). The MVGC multivariate Granger causality toolbox: a new approach to Granger-causal inference. *Journal of neuroscience methods,* 223, 50-68.

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