Measurement Software for Real Time Brain Insights

WujiTech Inc., Menlo Park, CA
April 2016

Brainwave data has long been seen as pivotal in providing insights into a person's health, performance potential, and the choices they make in life. Breakthroughs in quantitative brainwave data analytics are now showing statistically high cross-correlation with user supplied qualitative input. This development opens a new dimension to linking big data with mobile brainwave monitoring for a variety of solutions.

A recent study sponsored by a public company utilized WujiTech's software solution to gather qualitative and quantitative data and provide analytics on the results. The findings showed a positive cross-correlation alignment between qualitative and quantitative data to be +/- 10%.

This may not be extraordinary when looking at hundreds of study participants over several months, but there are two significant aspects to this study:

1) A relatively small N and relatively short study period provided these findings
2) Quantitative biometric data was derived from user brainwaves

Qualitative personal data – typically what people perceive about themselves, and Quantitative personal data – measurable, biometric information, have traditionally been two very separate metrics rarely gathered concurrently. When they are gathered side-by-side, typically a large N and a lengthy time frame are required to derive statistically valid results.

The study took place in October 2015 over two weeks with an N of 21 participants – all employees of the same sponsoring, public company. There was a relatively even distribution of male and female subjects ranging in age from 35 – 62 years of age.

Data was gathered in a controlled environment, replicated by each participant at random times during the workday.

The theme of inquiry revolved around mindfulness, with a particular focus on Joy, Attention, and Inner Calm.

Qualitative data was gathered daily using WujiTech's mobile Survey Engine software and Participants answered a series of approximately 14 written questions via a consistent onscreen, Dashboard interface. Inquiry volume varied as some questions were contextual and were only asked at appropriate times during the study.

Quantitative data was gathered daily using WujiTech's mobile WujiBrainwave app software and a wireless, single-sensor EEG-style brainwave hardware interface. Study Participants placed the hardware on their heads and the automated WujiTech software confirmed proper and consistent placement before any data was recorded. Sessions lasted approximately 3 minutes and each participant experienced the exact visual and audio input which was controlled by WujiTech's Patented MindMedia interface to insure sensory stimuli was precisely time-synched to Participant brainwave response. Brainwave response resolution was .5 Hz.

Qualitative data was collected immediately after Quantitative brainwave data was recorded to reduce the influence of any external stimuli that could affect the self-assessment responses. This pairing of Qualitative self-assessment information and Quantitative brainwave data created the aggregate pool from which analytics were applied. The goal of the Study was to look at how closely Participant self-perception (self-assessment) correlated with their collected brainwave data. Though Participants could consciously decide how they would choose answers to Questions posed to them in the Qualitative section of the Study, their brainwave data was collected in a real-time stream with no opportunity for conscious intervention while they were in a relatively relaxed state viewing and listening to consistent stimuli. This approach was designed to provide a built-in control, which significantly reduced variables.

Additionally, the same, one-minute video - white-text of a non-descript nature on a black background – was viewed in silence by each Participant immediately before their brainwave session. The intention of this was to also provide a variable-reducing leveling of the Participant experience.

At the end of the two-week Study, all data was aggregated and graphed using WujiTech's Admin backend analytics software. Outliers were removed where necessary and median plots were generated for all Qualitative and Quantitative data collected. Self-assessment questions that related to Joy, Attention, and Inner Calm were compared to brainwave data that measured these same three metrics using WujiTech's Patented algorithms for each.

The results of the Study were as follows:

Self-Assessment Qualitative Data

- 80% found brainwave monitoring was insightful and helped them feel more mindful

- ✓ 10% perceived an increase in Attention AFTER the brainwave sessions
- ✓ 18% perceived an increase in a sense of calm AFTER the brainwave sessions
- ✓ 11% perceived an increase in a sense of joy AFTER the brainwave sessions

Quantitative brainwave data

- ✓ 9% displayed an increase in attention
- ✓ 14% displayed an increase in a sense of calm
- ✓ 18% displayed an increase in a sense of joy

The fact that there was such a close cross-correlation between *perceived* change in the three metrics and the *actual* brainwave data collected points to a significant and practical efficacy in the use of brainwave data. The potential exists for brainwave data to substantiate human responses to surveys and assessment *and* eventually stand alone as valid measurements of key human performance evaluations.

From these findings there appears to be applications in the areas of job skill assessments, post-traumatic stress disorder (PTSD) monitoring, clinical trial

effectiveness, neurology pain management, and a variety of healthcare measurements using a low-cost, mobile solution such as WujiTech offers.