Research Report

"Q - The Experience" Scientifically Evaluated

Mood and Brain Wave Testing Before and After Q-Footbaths

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Introduction. The purpose of this study was to begin to discover and to understand the range of effects of the Q-The Experience ["Q"] technology when it is used as an enhancement to a footbath with human subjects (Ss). Anecdotal reports of beneficial effects and surprising healings abound (See Appendix A), but the purpose of this study was to examine, in a more formal manner, the Q effects on alpha brain waves (EEG) and on moods and emotions in human subjects.

Design. The study design was a single blind crossover design with 30 paid subjects randomly assigned to have either a Placebo footbath or a Q footbath for 35 minutes on each of two days, with one day in between the two sessions. If a given subject was in the Placebo group on the first session, this same subject was in the Treatment group on the second session and vice versa. Batteries of personality tests were given on the first day. On both days, blood pressure was measured and subjective pain reports were collected six times per day. Computerized mood scale assessments were made three times per day to assess moods **Before**, **During**, and **After** the footbath. Following each day's first mood scale, the "Before" mood scale, there were three EEG baselines in which EEG activity was recorded from eight cortical locations (O_1, O_2, C_3, C_4, T_3, T_4, F_3, F_4). The EEG activity at each cortical location was filtered into eight different filter bands, including Broad Band Alpha, which was the EEG data used in the analysis for this study. At each of the 8 cortical locations the 8 filter bands (64 total channels of data) were scored by computer to assess the integrated amplitude scores, which were quantified every 15 seconds. The Pre-footbath EEG baseline conditions were **Eyes Open (EO)** (with lights on), **Eyes Closed (EC)** (in the dark), and **White Noise (WN)** (also in the dark). The White Noise, like the Eyes Closed, was done with eyes closed in the dark, but unlike the Eyes Closed condition, the White Noise had an auditory environment that include both the computer generated white noise and pseudo-randomly occurring auditory "beep" signals which the Ss were instructed to detect and to count, in a purely mental way (i.e. no counting on fingers was allowed).

Following these three Pre-footbath EEG baselines (EO, EC, WN), Ss were given a 35 minute footbath using tap water that had been heated to between 105 and 108 degrees Fahrenheit. Immediately after the footbath, and with their feet still in the water, Ss

completed the "During" moodscale to describe how they felt during the footbath. Then the three EEG baselines were repeated to have Post-footbath EEG measures. The Post-footbath EEG baselines were given in the following order: White Noise, Eyes Closed, and Eyes Open. Following these EEG baselines, the Ss completed the final "After" mood scale to describe how they felt right at that moment, now that the experience was over. Then their EEG electrodes were removed, there was a brief discussion, and they were free to leave the laboratory.

The second day was identical procedurally except for the fact that there was no personality testing. Ss were randomly assigned, by a random number table, to be in either a Placebo or a Q Treatment condition on Day 1. Whatever condition they did not have on Day 1 they had on Day 2. The randomization produced 15 of the 30 Ss having the Q Treatment on Day 1 and 15 of the 30 Ss having the Placebo condition on Day 1. The Placebo condition was identical procedurally to the Q Treatment condition except that the running (i.e. plugged in and turned on) power supply was not connected to the "Energizer Unit" containing the ring disk plates that was always inserted into the water between the two feet of the Ss. The Ss had no idea that only one of their two days was a Q-Treatment footbath and that the other day was a Placebo footbath. Only the Laboratory Director knew which Ss were receiving which condition on any given day.

Subjects. The 30 experimental *S*s were 16 men and 14 women who volunteered for a footbath research study. They ranged in age from 18 to 77 years. They were randomly assigned, with a random number table, to be in either the Placebo or Treatment group for their first session, with a single crossover given in a second session so the Placebo-first Ss had the Treatment in their second session, and the Treatment-first Ss had the Placebo condition in their second session. By the random assignment, the Placebo-first Ss were 5 women and 10 men, and the Treatment-first Ss were 9 women and 6 men. All *S*s were volunteers who were paid $250 for their participation.

Method (Equipment). All peripheral modality data (heart rate, blood pressure) were collected with an Omron automatic inflation electronic digital blood pressure/pulse monitoring system. All EEG data were collected with either a Biocybernaut Institute Mark 8 Hybrid Spectral Analysis system or a Biocybernaut Institute Mark 9 DSP-based Digital Spectral Analysis system, both with 64 channels of A/D converted signals. The Mark 8 had a 12 bit A/D and the Mark 9 had a 16 bit A/D. Both the Mark 8 and Mark 9 systems were calibrated so that a 50 microvolt EEG input produced an integrated amplitude output score of 1,500. Input to the A/D of each system was provided by 8 EEG amplifiers, each with 8 analog or digital filters per EEG channel. The Biocybernaut Institute EEG filters were very sharp (300-400 dB/octave roll off), and very flat in the pass band ($1/3$ dB ripple in the pass band). The filters provided delta, slow theta, fast theta, slow alpha, broad band

alpha, fast alpha, slow beta, and broad band beta signals on each of the 8 EEG channels. Both the Mark 8 and Mark 9 systems were configured to provide measurement on bilateral Occipital, Central, Temporal, and Frontal EEGs (O_1, O_2, C_3, C_4, T_3, T_4, F_3, F_4). EEG recording was monopolar to linked ears reference. Mood scales were administered and scored automatically by the Biocybernaut Institute Computerized Mood Scale Assessment Program (BICMSAP), which interacts with the Ss through a keyboard and a color monitor while they are wired for EEG and plugged into the EEG amplifiers and EEG analysis system (BIOFO).

Method (Procedure). Subjects (Ss) were recruited through newspaper ads that invited people with large English reading vocabularies to participate in two days of research studies on a footbath technology for which they could receive up to $250.00 per person. Hundreds of people responded. They responded by calling assigned phone numbers where they reached an interviewer. Then they were interviewed by phone to determine their suitability for the study. Many issues needed to be discussed and clarified in these phone calls, including the person's age (at least 18), availability on two days that were one day apart and were within a two week period during August, 2002. Transportation and location issues were discussed and clarified as well as appropriate dress for the study. For example women were requested NOT to wear dresses for modesty issues as the technician was required to crawl under a table to place and remove the footbath. The table purposely obscured the Ss' view of the footbath and the water to perfectly maintain the single blind, since in the Q-Treatment condition there is often discoloration of the water and flocculence. In addition to other screening questions, potential Ss were given a vocabulary test to ensure that they did, in fact, have a large English reading vocabulary. Words for this test were drawn from the computerized mood scales that would be used in the testing. If potential Ss achieved a perfect score on this vocabulary test, then they were accepted into the study and scheduled for sessions that were open in the testing schedule. If potential Ss did NOT achieve a perfect score on the vocabulary test, then they were invited to consider an alternative method of qualifying for the study. They could receive by fax or email the list of words used in the computerized mood scales. They could then study this list and learn the words to perfection. Once they had done this they were invited to call again and take a second vocabulary test. If they achieved a perfect score on this second vocabulary test then they were scheduled for available sessions.

Ss were told that the first day would involve personality testing prior to the other procedures of the study, and that these tests would take three or more hours. Upon arrival at the Biocybernaut Institute Laboratory, Ss were given first the Informed Consent Form (See Appendix B). Once they had read and signed the Informed Consent Form, they were given a folder containing the personality tests along with a brief explanation of how best to fill out the personality tests and in which order to fill them out. The personality tests given

included the "granddaddy" of Personality tests, the Minnesota Multiphasic Personality Inventory (MMPI), which has 566 True/False questions and is very good at detecting and quantifying degrees of dysfunctionality or psychopathology. In addition, there was also a test to assess the other end of the continuum that runs from dysfunctional to hyperfunctional. This test for the positive end of the functionality spectrum was the operationalization of Maslow's Self-Actualizing Personality concept, which is embodied in the Personality Orientation Inventory (POI). In addition, there was the Psychology of Happiness Inventory (PsychHap), and the Trait forms of the Biocybernaut Institute Emotion Survey (BIES), the Clyde Mood Scale (CMS), and the Biocybernaut Institute Mood Inventory (BIMI).

The Biocybernaut Institute computerized mood scales were given three times each day. The first administration ("Pre") was before the footbath with instructions to describe how the person felt "*right now*." This was followed by three EEG baselines: Eyes Open ("EO"), Eyes Closed ("EC"), and Eyes Closed with White Noise and beep signals to count ("WN"). Then the footbath was taken for 35 minutes. Immediately after the footbath, and while their feet were still in the warm water, Ss completed the second set of computerized mood scales ("During"), with instructions to describe how they felt "*during the footbath*". Then the three EEG baselines were run again: WN, EC, and EO. This was followed by the third and final computerized mood scale ("Post"), which asked Ss to describe how they felt "*right now*."

Results and Discussions.

Mood Scale Results.

There are 21 moods that are evaluated by the Biocybernaut Institute Computerized Mood Scale Assessment Program (BICMSAP):

Biocybernaut Institute Emotion Survey (BIES)

1] Anxiety - Total (composed of 2 parts:)
2]   Conscious Anxiety &
3]   Unconscious Anxiety

4] Depression - Total (composed of 2 parts:)
5]   Conscious Depression &
6]   Unconscious Depression,

7] Hostility - Total (composed of 2 parts:)
8]   Conscious Hostility &
9]   Unconscious Hostility

Clyde Mood Scale (CMS)

10] Friendly
11] Energy
12] Clear Thinking
13] Sleepy
14] Unhappy
15] Dizzy

Biocybernaut Institute Mood Inventory (BIMI)

16] Taut & Apprehensive
17] Dejected & Depressed
18] Befuddled & Confused
19] Angry & Hateful
20] Exhausted
21] Strong & Robust

Pre-test Comparisons of Mood Scale Scores between Placebo & Treatment Ss.

The first step of data analysis used *t*-tests to compare Treatment experimental Ss and Placebo control Ss on their <u>Pre-tests</u> to see how well the two groups of Ss were matched (significance level is *p*<.05). Comparing all 30 Ss and looking at their Treatment Vs Placebo contrasts, the two groups were <u>very well matched</u> on their pre-tests. There was

only 1 of the 21 pre-test moods that reached statistical significance to indicate a difference between the two groups on their pre-tests, and, by chance, we would expect 1 out of 20 comparisons to be significant (different) at the $p<.05$ level. The one mood that differed between Treatment and Placebo Ss in the Pre-tests was **Unconscious Depression**, $t=+2.105061$, $df=29$, $p<.025$. The Ss who were subsequently to have the Q-Treatment on the first day were significantly higher in Unconscious Depression than the Ss who were subsequently to have the Placebo condition on their first day. The difference was 1.73 points on an Unconscious Depression scale that ranges from 0 up into the mid-30's.

"During-footbath" comparisons between Placebo and Treatment Ss.

Both groups completed a 2nd mood scale each day at the end of the 35 minute footbath, and this was done while their feet were still in the water, however the power supply for the Q-The Experience unit was turned off and the energizer unit was removed from the water prior to their completing this 2nd or "During-footbath" mood scale. Mindful of the fact that, by chance, we would expect 1 of the 21 moods to be significant at the $p<.05$ level (simply by chance), it is instructive that 6 of the 21 moods showed significant differences between the Treatment Group and the Placebo Control group During the footbath. These six moods showing significant differences between Treatment and Placebo Groups were:

Table 1
During-Footbath Contrasts Between Placebo and Treatment Ss

Mood	t-score	Degrees of Freedom	Probability Level	Mood Score Difference
Conscious Hostility	-1.92055	29	$p<.05$	-0.467
Friendly	+3.063951	29	$p<.0025$	+4.933
Energy	+2.43851	29	$p<.025$	+2.133
Clear Thinking	+2.096929	29	$p<.025$	+2.800
Dizzy	+2.276389	29	$p<.025$	+3.200
Strong & Robust	+2.45135	29	$p<.025$	+3.333

The range of the Conscious Hostility and the Strong & Robust scales is from 0 up into the mid-30s. The other four scales (Friendly, Energy, Clear Thinking, and Dizzy) have a mean of 50 and a standard deviation of 10, so the large and highly significant increase of Friendly During the Treatment footbath (relative to the Placebo Control footbath) is almost half a standard deviation of difference between the two groups. The Dizzy scale has a large physical component, and it is interesting that there can be increases of both Clear Thinking

and Dizzy during the Q-Treatment footbath relative to the Placebo Control footbath. The Treatment Ss were less Hostile than the Placebo subjects during the footbath, which suggests that the footbath made them less hostile. The footbath also made the Treatment subjects more Friendly, more Energetic, and more Clear Thinking than the Placebo subjects. The Treatment footbath also made subjects more Strong & Robust than did the Placebo footbath. The Treatment Ss also had increases of Dizziness during their footbaths, more so than did the Placebo Ss. As noted above, Dizzy has a large physical component, so the Treatment Ss were both more Clear Thinking and more Dizzy than were the Placebo Ss. The Treatment clearly has an effect During the Treatment footbath process, which the Placebo footbath does not have.

"After-footbath" comparisons between Placebo and Treatment Ss.

Both groups completed a 3rd mood scale each day at the end of the session to describe how they felt at that time of completion. After the footbath, and after Ss had had their feet dried with a towel by the technician, and after they had put their shoes and socks back on and the footbath container had been removed from the experimental chamber, Ss were plugged back in for further EEG recording, and the three Post-footbath EEG baselines were run (WN, EC, EO). After these three EEG baselines, there was a 3rd and final Mood Scale for the day, the Post Mood Scale, for which the instructions were to describe how you feel "right now." The results of these contrasts between Treatment and Placebo Groups after the footbath are given in Table 2.

Table 2
Post-Footbath Contrasts Between Placebo and Treatment Ss

Mood	t-score	Degrees of Freedom	Probability Level	Mood Score Difference
Total Anxiety	-2.70643	29	$p<.01$	-0.933
Unconscious Anxiety	-4.66419	29	$p<.00005$	-1.133
Conscious Depression	+2.143376	29	$p<.025$	+1.067
Dejected & Depressed	+2.661413	29	$p<.01$	+2.867
Energy	-2.16881	29	$p<.025$	-1.467
Strong & Robust	+2.143075	29	$p<.025$	+1.533

It is clear that the very significant decrease in Anxiety is being driven by the Very Highly significant decrease in Unconscious Anxiety ($p<.00005$). It would appear that the Q-treatment has powerful Anxiety reducing effects that begin to appear within 20 minutes

following the Q-Treatment footbath. This 20 minutes was time after the footbath at which the final "after" mood scale was administered. When these anxiety reducing effects begin, they are initially unconscious, since the Conscious Anxiety actually shows a small and non-significant increase of +0.2 points. However the decrease in Unconscious Anxiety is more than five times larger and is Very Highly significant statistically (p<.00005) and is strong enough to bring Total Anxiety into a very significant decrease of -0.933 points relative to the Placebo Control footbath group. This reduction in Total Anxiety is also very significant (p<.01). The Q-Treatment has a very powerful effect in reducing Anxiety.

Also important to an understanding of the effects of the Q-Treatment footbath, and how these effects develop over time, is a careful noting of the **increase** of two different measures of Depression in the Treatment group, relative to the Placebo control group. Recall that the time of the Post-footbath mood scale is about 20 minutes after the end of the footbath. Unconscious Anxiety and Total Anxiety have significantly decreased in the Treatment Group, relative to the Placebo control group, but at this same time there are increases in Conscious Depression and Dejected & Depressed. Anyone who has worked with the Q-The Experience technology has seen a lethargy come over many people in the minutes and hours after their first experience, and this significant increase in Conscious Depression and Dejected & Depressed is a quantified scientific description of the after-effects of the Q-Treatment, relative to a Placebo Control footbath.

Even more intriguing is the dichotomy between the significant **reduction** in Energy and the significant **increase** in Strong & Robust that is seen in the Post Treatment group relative to the Post Placebo group. The Energy reduction is significant (p<.025) and is almost 15% of one standard deviation on the Energy scale of the CMS. The increase of Strong & Robust is also significant (p<.025) and represents a difference of almost 5% of the total scale range of the Strong & Robust scale of the BIMI. This statistically significant difference shows with some subtlety the qualities of the Q-Treatment effects relative to Placebo controls. Q-Treatment Ss can simultaneously feel **less Energy**, but at the same time can feel **more Strong & Robust**. The difference may be potential well-being vs. energy to actualize that potential. And, of course, these are the effects at the 20-minute point following the footbath. Fortunately the design of the research study allows us to look at treatment effects beyond the 20-minute mark after the footbath. There is also data available from 2 days after the footbath Treatment. To follow the course of the development of the Q-Treatment effects, we next consider the Day 2 effects.

Two-Day Delayed Mood Effects of the Q-Treatment.

One of the most interesting types of Mood effects are those that show the effects of the Q-Treatment, relative to the Placebo, at the 2 day point after the first Treatment. Here we see

statistically significant reductions in the Pre-Mood Scales on Day 2 of a wide range of negative emotions including: Total Anxiety Unconscious Anxiety, Total Depression, Conscious Depression, Unconscious Depression, Total Hostility, Unconscious Hostility from scales on the BIES. In addition, confirming the statistically significant reduction in BIES measures of Depression, there is also a statistically significant reduction in Dejected & Depressed on the BIMI. The means of deriving these statistical comparisons are as follows. We use one sample *t*-statistics for the mean. We begin by computing the Mean Change (Day 2 - Day 1) in the Placebo group first for all 21 of the Mood Scale dimensions. This represents whatever changes will occur naturally over the three days that include: Day 1 at the laboratory, One day off, and Day 2 at the laboratory. Using these average change measures from the Placebo group allows us to remove from the Treatment group's data any effects that are due solely to the passage of time and familiarity with the laboratory and the laboratory procedures. So in this analysis the means of the Placebo groups changes (Day 2 - Day 1) on each of the 21 Mood Scale dimensions are calculated and then subtracted from each of the (Day 2 - Day 1) change scores of each member of the Q-Treatment group. Again, on each of the 21 Mood Scale dimensions the Treatment group Ss' scores are adjusted by subtracting the mean change score of the Placebo group on that Mood Scale dimension. This removes the effects of familiarity with the laboratory and procedures and leaves only the 2-day remnant effect of the Treatment given on Day 1 for each of the 21 Mood Scale Dimensions. Performing this procedure on the Pre-footbath Mood Scale measures allows us to see effects of the Q-Treatment that do not show up until 2 days after the Q-Treatment footbath. These results are given in Table 3.

Table 3
Two-Day Delayed Mood Effects of the Q-Treatment (Using "Pre-Treatment Data)

Mood	*t*-score	Degrees of Freedom	Probability Level	Mood Score Difference
Total Anxiety	-2.83049	14	*p*<.01	-1.267
Unconscious Anxiety	-3.572173	14	*p*<.0025	-1.467
Total Depression	-4.302032	14	*p*<.0005	-4.333
Conscious Depression	-1.771168	14	*p*<.05	-0.867
Unconscious Depression	-4.571969	14	*p*<.00025	-3.467
Total Hostility	-3.734196	14	*p*<.0025	-2.000
Conscious Hostility	-3.223963	14	*p*<.005	-0.667
Unconscious Hostility	-3.0165	14	*p*<.005	-1.333
Dejected & Depressed	-4.706633	14	*p*<.00025	-3.200

This is an amazing array of Very Highly Statistically Significant effects, seven of them are stronger than 5 chances out of 1,000 and three of them are stronger than 5 chances out of 10,000 against being due to random chance. These very strong statistical results tell a story of powerful and beneficial effects of one 35 minute Q-Treatment on moods and emotions that is developing and strengthening 2 days after the treatment.

As remarkable as these results are, an even more remarkable set of results is obtained when we do this same type of comparison on the "Post" Mood Scale data. These analyses subtract out the effects of the Placebo-first group from the Treatment-first group's effects, however this time, when using the "Post" data, we are subtracting out data in which the Placebo-first group has actually had the Q-treatment on the second day. So what we are subtracting out is the effect of changes from the first to second days (Day 2 - Day 1), where the Placebo-first group data now includes the Q-treatment on Day 2. The impressive arrays of highly significant results that follow in the text and Table 4 attest to the fact that the effects of the Q-Treatment after 2 days are even more powerful (and more beneficial) than the effects on the day of the Q-Treatment! Table 4 gives the details for the comparisons that involve (Day 2 - Day 1) "Post" footbath Mood Scale Data.

Table 4
Two-Day Delayed "Post-Q footbath" Mood Effects of Q-Treatment

Compared to Immediately "Post Q-footbath" Data

Mood	t-score	Degrees of Freedom	Probability Level	Mood Score Difference
Total Anxiety	-4.385613	14	$p<.0005$	-1.600
Conscious Anxiety	-2.898275	14	$p<.01$	-0.400
Unconscious Anxiety	-3.096618	14	$p<.005$	-1.200
Total Depression	-4.2633	14	$p<.0005$	-4.067
Conscious Depression	-4.686835	14	$p<.00025$	-1.400
Unconscious Depression	-3.613502	14	$p<.0025$	-2.667
Total Hostility	-2.245549	14	$p<.0025$	-0.933
Conscious Hostility	-8.699177	14	$p<.0000005$	-0.800
Unhappy	-5.16624	14	$p<.0001$	-3.400
Dizzy	+2.563635	14	$p<.025$	+1.800
Taut & Apprehensive	+2.494438	14	$p<.025$	+1.267
Dejected & Depressed	-4.681031	14	$p<.00025$	-1.667

This is an amazing array of Very and even Extremely Highly Statistically Significant effects, one of which is stronger than 5 chances out of 10 million, and given that this Extremely Highly Statistically Significant effect involves Conscious Hostility, there is a very strong set of indicators that the Q-The Experience process produces, two days after just one 35 minute treatment, strong and beneficial changes in moods and emotions, that if broadly applied across the population, could well lead to beneficial changes in the way people feel and perhaps in the ways they relate to each other. Imagine the effects in the middle East if all the major players had such significant reductions in Conscious Hostility!

The reductions in Anxiety, Depression and Unhappiness are also powerful and potentially beneficial to almost every area of human endeavor. These very strong statistical results tell a story of powerful and beneficial effects of one 35 minute Q-Treatment on moods and emotions, which effects are developing and strengthening 2 days after the treatment. Combined with these results, there is also a significant increase in Dizzy and Taut & Apprehensive. With such powerful and beneficial changes set loose in the person's psyche, there could well be a sense of Dizziness in the changes, and the natural tendency to resist rapid change may be the explanation for the significant increase in Taut & Apprehensive.

Other Results. Two of the 30 Ss experienced panic attacks on their second day at the laboratory. Both Ss were female and both had been in the Q-Treatment group on Day 1, so they could possibly have been experiencing some of the mood and emotional changes which have been documented above. These progressively developing mood and emotional changes seem to have involved the emergence into consciousness of memories that had been repressed. Both of the panic attacks occurred in the experimental chambers early on during the second session. In both instances the women had their EEG electrode headboxes plugged in, and they were either ready for EEG recording to begin or they were already having EEG baseline recordings. The first case involved a woman who had a full blown panic attack with heart pounding and racing, hyperventilation, sweating, and chills. In appearance this woman was thin, nervous, and tense, and during that day's (Day 2) electrode application process, she had spoken of bad memories that were beginning to surface. She said she thought she had buried these memories and mentioned that the process of thinking about how to answer some of the questions on the personality tests had caused her to think about unpleasant past events. At one point while electrodes were being attached to another of the research Ss, this woman suddenly asked if there was anything in the electrode wires that could explode. The Research Director immediately explained that, "No, there is nothing in the electrode wires that could explode." And he went on to explain that inside the colorful plastic coatings of the electrode wires was a woven sheath of very fine, supple, hair-like wires that were designed to both conduct the very tiny brain waves easily, and also to be flexible and resistant to being broken when bent or moved. The

Research Director then went on to ask the woman directly, "Is there was something inside of YOU that could explode?" At this point the woman shifted nervously in her chair and spoke of her belief that some things should not be thought about. She mentioned wanting to keep a lid on her thoughts and feelings.

No further comments were made on this topic and when all three of the Ss were ready to go to their experimental chambers, they first took a bathroom break and then went into their respective chambers to fill out the first set of Mood Scales for the day. After the Mood Scales were completed, and before the EEG recording had started, and with the lights on and the door still open this first woman had her panic attack. The technician responded to her call on the intercom and notified the Research Director who went into the woman's chamber and counseled her and calmed her down. The Research Director offered to sit with her in the chamber for the two EEG baselines that are done with eyes closed, in the dark and with the door closed (EC and WN), but after a little counseling and reassurance, the woman said that she would be able to handle going through the procedures in the normal manner by herself. The rest of the session was uneventful and there were no further panic attacks.

The second case involved a woman who was also on her second session who had her panic attack during the day's first WN baseline. Her panic attack had all the same symptoms, but was not as severe, and she was able to control herself by partially getting up out of her chair (without dislodging her electrode wires) and opening the chamber door so that light could come in. With this modification she was able to continue and did not even call for help, though she did report the panic attack at the end of the WN baseline, first to the technician and then to the Research Director. She described how some aspect of her thought processes during the WN baseline had evoked some prior memories that then triggered the panic attack.

Again both of these panic attacks were women on their second day at the laboratory, so there would not have been any reason to fear the laboratory or the procedures, all of which would have been familiar at that time. A more likely reason for the panic attacks would be that the women had been given the Q-Treatment on their first day and it was now two days later and the Q-Treatment could have been causing repressed memories to surface. This suggests that there may well be some personality types who should only use the Q-Treatment under qualified supervision so that the emergence into consciousness of repressed thoughts and emotions will be the subject of suitable counseling. In this way these vulnerable people will be able to successfully process their way through these thoughts and emotions to achieve a better self-understanding and an improved degree of mental and emotional stability and harmony.

We could also note, parenthetically, that since this type of processing is a significant component of the Biocybernaut Institute Neurofeedback training programs, that, it would be a good match to combine the Q-The Experience process with the Biocybernaut Institute Neurofeedback training programs. And it is now the intention of Biocybernaut Institute, based on the positive and beneficial findings from this research study, to make the Q-The Experience process a part of all Biocybernaut Institute Neurofeedback training programs. The time required each day for electrode application is about the same time (35 minutes) as is required for the Q-Treatment with a footbath, so there is an easy and natural blending of the two processes readily available. The Biocybernaut trainings are on 7 consecutive days so the Q-Treatment footbath could be given on days 1, 3, 5, and 7.

EEG Alpha Results.

One of the compelling reasons to use EEG measures in evaluating products is that EEG measures are very sensitive to individual variations in experience. However this very sensitivity leads to one of the primary challenges of using EEG measures, and that is the large individual differences which contribute to large error variance terms that are associated with any comparisons across Ss. These large error variances make it less likely that the comparisons will achieve statistical significance.

One of the challenges of doing EEG research is that of discovering, crafting, and applying statistical analysis methods that reduce the large contribution of individual differences in the magnitude and the standard deviations of EEG scores to the error variance terms. Analysis methods that are performed largely within individuals and thus are relatively independent of the large magnitude variations between individuals can be very helpful in reducing the error variance terms and thus in achieving statistical significance and the consequent understandings of the meaning in the EEG data.

The first analysis typically performed (which does not reduce the large contribution of individual differences to the error variance) is a test to see if there is a Main Effect of the Treatment across all the Conditions, which here is across the 2 days. Recall that there were 3 EEG baseline conditions before the Treatment footbath or the Placebo footbath EO, EC, WN) and the same 3 EEG baseline conditions, in reverse order, were given after the Treatment or Placebo footbath (WN, EC, EO). Within each of these EEG conditions we studied the Minimum (Min), Maximum (Max), and Average (Avg) integrated amplitude scores that were calculated over 15 second sub-epoch periods, and this was done for Broad Band EEG Alpha activity at 8 different cortical sites (O_1, O_2, C_3, C_4, T_3, T_4, F_3, F_4) There are also 3 EEG baselines after the footbath. The Average (Avg) score was calculated over the entire set of 15 second sub-epochs in the EO, EC, and WN conditions. Both EO and

EC had 16 of the 15-second sub-epochs and were thus 4 minutes long and the WN had 32 of the 15-second sub-epochs and was thus 8 minutes long. The Avg scores were calculated over the entire baseline of either 4 minutes (EO and EC) or 8 minutes (WN).

This set of analyses makes for 72 Pre-measures and 72 Post-measures: (3 EEG conditions [EO, EC, WN] times 3 statistical measures [Min, Max, Avg] times 8 cortical sites [O_1, O_2, C_3, C_4, T_3, T_4, F_3, F_4], and 3x3x8 = 72.

Pre-test EEG Alpha Comparisons between Placebo and Treatment Ss.

Using *t*-tests for two groups, the 72 EEG Pre-measures were studied to discover if there were any differences between Treatment and Placebo groups. **None** of the 72 EEG Pre-measures were significant between the Treatment and Placebo groups. This could mean either that the two groups, which had been derived through random assignment, were well matched or that there were differences between the two groups that were masked by the large error variances associated with EEG measures.

Post-test EEG Alpha Comparisons between Placebo and Treatment Ss.

Again using *t*-tests for two groups, the 72 EEG Post-measures were studied to discover if there were any differences between Treatment and Placebo groups. None of the 72 EEG Post-measures were significant between the Treatment and Placebo groups. This Non-Significant result is more surprising than the lack of significant results in the EEG Pre-measures. This means that through the lens of Broad Band EEG Alpha, the 15 Treatment Ss and the 15 Placebo Ss did not differ AFTER the footbaths. This surprising result suggests the existence of some very large error variances, which are not untypical in EEG data.

To look further into this unexpected result, the next step was to separate days and look at the Treatment vs. Placebo difference within each day separately. All of the Pre-measures on Day 1 have the benefit of being before any Treatment or Placebo intervention, so we would expect, if the Treatment and Placebo groups were well matched on their EEG measures by the randomization procedure, then there would also be no significant difference between the Treatment and Placebo groups before (Pre) the Day 1 footbath. Recall this was the situation when data were aggregated across both days.

However, when looking only within Day 1 EEG Pre-measures there were many significant differences between the Treatment and Placebo groups. Four of the 18 Frontal contrasts

were significant, as were 12 of the 18 Temporal contrasts, and 6 of the 18 Central contrasts, using 1 tailed t-tests. If we restrict the analysis to 2-tailed t-tests, then there were fewer significant contrasts, and all of those involved the T_4 electrode site. Curiously, all of the significant contrasts showed that on Day 1 before anyone had any kind of treatment, the Placebo Ss had higher T_4 alpha than did the Ss who were going to (later that day) receive the Q-Treatment. All of the 1-tailed contrasts that are not tabled below also showed the Placebo Group had higher alpha to begin with at all sites except the Occipital sites. See Table 5.

Table 5
Day 1 Pre-Treatment EEG Contrasts between Treatment and Placebo Groups

EEG Measure	t-score	Degrees of Freedom	Probability Level	EEG Difference * Placebo vs. Treatment
Pre EO Average T_4	-2.17202	28	$p<.05$	650.6 vs. 483.1
Pre EC Minimum T_4	-2.65155	28	$p<.025$	639.4 vs. 396.7
Pre EC Average T_4	-2.351	28	$p<.05$	849.2 vs. 587.3
Pre WN Average T_4	-2.45958	28	$p<.05$	869.3 vs. 612.7

Note: All tabled effects are 2-tailed significance levels.

* EEG scores are on a scale of integrated amplitude where a steady 50 μvolts = 1,500 points, and thus a sustained 1 μvolt = 30 points.

Interestingly none of the 18 Occipital contrasts were significant at either the 1-tailed or the 2-tailed statistical levels. This means that the Occipital EEG alpha scores were much better matched between the groups than the three other pairs of sites (Central, Temporal, and Frontal). This fact should make it easier to detect statistical significance at Occipital sites if the Q-Treatment produces EEG changes there. This says that the Treatment and Placebo groups were well matched by the randomization procedures ONLY on the Occipital brain wave measures, and they were NOT well matched on the Central, Temporal, and Frontal measures. This is one of the unfortunate and all-too-common consequences of small sample size: only 15 Ss in each of the two groups. If we had had larger groups, say 30-60 Ss in each group, the randomization would be much more likely to produce well matched Treatment and Placebo groups.

Also interesting is that 15 of the 22 EEG mismatches were on the Right hemisphere. It would be instructive to see what personality types contributed to this mismatch between the Treatment and Placebo groups, and that data is available in the Biocybernaut Institute data archive for all 30 Ss, and is awaiting both scoring and analysis in future studies.

The Treatment and Placebo groups on Day 1 also differed after treatment, and again the differences were exclusively on Central, Temporal, and Frontal sites. This emphasizes the importance of removing the individual differences in the Pre-EEG measures from any and all assessments of the Post EEG measures.

One useful way to cut through the statistical noise caused by large error variances in EEG scores is to look at data within Ss rather than between or across Ss.

Change scores of individual Ss are a good start in this direction, although large individual differences in magnitude of change scores will still exist. If one person's alpha increases by doubling from 1,000 to 2,000, the change is 1,000, and if another person's alpha increases by doubling from 200 to 400 the change is 200. They have both doubled, but there is a five-fold difference in the change scores, which inflates the variance even in paired t-tests.

Paired t-tests using the pairing of each S's Pre and Post EEG scores for Day 1, showed interesting differences between the Treatment and Placebo groups. Contrasts of Eyes Closed (EC) Alpha scores showed no significant Occipital Alpha contrasts in the Placebo Group. However, the Treatment Group did show significant increases, Pre to Post, in the Maximum Occipital scores (O_1 Max and O_2 Max). The Average O_2 (O_2 Avg) also increased significantly from before to after the Treatment (Post – Pre > 0). These results are given in Table 6 below.

Table 6

Day 1 Paired-*t* Contrasts Between Pre & Post EC EEG Scores, Separately in Both Groups

Placebo Group

EEG Measure (EC Pre vs. Post)	*t*-score	Degrees of Freedom	Probability Level	EEG Score Difference

~ ~ ~ ~ **No Significant Effects** ~ ~ ~ ~

Treatment Group

EEG Measure (EC Pre vs. Post)	*t*-score	Degrees of Freedom	Probability Level	EEG Score Difference
Maximum O_1	2.790166	14	*p*<.01	273.9
Maximum O_2	3.287968	14	*p*<.005	246.9
Average O_2	2.360492	14	*p*<.025	226.5

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Note: All tabled effects are 2-tailed significance levels.

What we did next was to apply one of the same analysis methods as was used to good effect in the mood scale analysis where we calculated the average change in the Placebo group on EACH mood scale measure and then subtracted that number from each Treatment S's score and then we did a single *t*-test for the mean. This was a VERY powerful analysis method for the mood scale data. To apply this same method to the EEG data we calculated the average change in the Placebo group on EACH EEG measure and then subtracted that number from each Treatment S's score on that EEG measure, and then we did a single *t*-test for the mean. With the assumption that effects of the Q-Treatment would make Ss more alert in the eyes open condition, the EO (eyes open) alpha scores would be expected to be lower in the Treatment group. Beneficial effects of the Q-Treatment would also be expected to yield higher alpha scores in the EC condition (eyes closed). The analysis used the one sample *t*-statistic for the mean. On each of the EEG measures we computed the Mean Change (Day 2 - Day 1) in the Placebo-first group and subtracted this value from the individual scores of each S in the Treatment first group on each of their corresponding EEG scores, knowing that this removes effects of familiarity with the laboratory and procedures

and leaves only the 2-day remnant effect of the Treatment given on Day 1, for each of the EEG measures.

The results of this analysis for the Eyes Open (EO) condition are given in Table 7 and the results for the Eyes Closed (EC) condition are given in Table 8.

Table 7
Eyes Open EEG Data

(Day 2 - Day 1) One Sample *t*-Tests of the Mean for Treatment Ss with Average Changes (Day 2 - Day 1) for Placebo Ss Subtracted Out to Leave Remnant Effects Only of the Treatment

EEG Measure	*t*-score	Degrees of Freedom	Probability Level
Minimum O_1	-7.5400872	14	*p*<.0000025
Maximum O_1	-2.15233	14	*p*<.025
Average O_1	-2.99094	14	*p*<.005
Minimum C_3	-5.7157	14	*p*<.00005
Maximum C_3	-3.34209	14	*p*<.0025
Average C_3	-3.92607	14	*p*<.001
Minimum C_4	-2.08097	14	*p*<.05
Maximum C_4	-2.1099	14	*p*<.05
Average C_4	-3.51576	14	*p*<.0025
Minimum T_3	-4.35483	14	*p*<.0005
Maximum T_3	-2.88011	14	*p*<.01
Average T_3	-4.38249	14	*p*<.0005
Minimum T_4	-3.85046	14	*p*<.001
Average T_4	-2.92432	14	*p*<.01
Minimum F_3	-7.24801	14	*p*<.0000025
Maximum F_3	-2.94263	14	*p*<.01
Average F_3	-4.29812	14	*p*<.0005
Minimum F_4	-2.3048	14	*p*<.025
Maximum F_4	-3.72506	14	*p*<.0025
Average F_4	-4.74369	14	*p*<.00025

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All of the above data are consistent in showing a pattern of greater alertness in the Eyes Open Treatment Ss who have lower Eyes Open EEG scores than the Placebo Ss. All but one of the 8 cortical sites show this effect (O_2 does not) and the effects are often Extremely Highly Statistically Significant.

Table 8
Eyes Closed EEG Data

(Day 2 - Day 1) One Sample *t*-Tests of the Mean for Treatment Ss with Average Changes (Day 2 - Day 1) for Placebo Ss Subtracted Out to Leave Remnant Effects Only of the Treatment

EEG Measure	*t*-score	Degrees of Freedom	Probability Level
Minumum O_1	3.035763	14	*p*<.005
Maximum O_2	2.622722	14	*p*<.015
Minimum C_3	3.602164	14	*p*<.0025
Maximum C_3	-2.2509	14	*p*<.025
Minimum C_4	3.403144	14	*p*<.0025
Minimum T_4	8.049039	14	*p*<.000001
Minimum F_3	1.832224	14	*p*<.05
Minimum F_4	1.810032	14	*p*<.05

The Eyes Closed data show higher EEG alpha scores in the Q-Treatment Ss at 7 of the 8 cortical sites. T_3 is the only site that does not show this effect of the Q-Treatment. Interestingly the C_3 site shows a paradoxical effect in that the Q-Treatment produces larger Minimum scores in Treatment Ss for C_3 alpha ($t = 3.602164$, *df* = 14, *p* < .0025), but then there is, paradoxically, a significantly LOWER Maximum score for C_3 alpha in the Treatment Ss ($t = -2.2509$, *df* = 14, *p* < .025). It is well within reason that this paradoxical result could have occurred by chance since 1 out of 20 comparisons could be significant at the *p*<.05 level by random chance and 1 out of 40 comparisons could be significant at the *p*<.025 level by random chance, and we did here 72 comparisons and got one paradoxical result at the *p*<.025 level. If the paradoxical result is real and reproducible it could be of some importance because broad band alpha at the C_3 site is strongly and negatively correlated with Paranoia. A different sign for changes in the Minimum and Maximum

measures of C_3 alpha may be important for future work relating the Q-Treatment to interventions with Paranoia. Different signs for changes in the Minimum and Maximum measures of C_3 alpha would be more likely to be real (rather than random) if there were differences in the variance or standard deviation measures of C_3 alpha. And, in fact, we do have a Very Highly Statistically Significant Difference in the Standard Deviation measures of C_3 alpha ($t = -4.90134$, $df = 14$, $p < .00025$) where the Q-Treatment Ss have significantly smaller Standard Deviations of their C_3 alpha change scores: (Day 2 - Day 1) changes.

Percent Change Scores.

The purest way to look at the EEG changes associated with the Q-Treatment may be to look at the Day 1 Percent Change scores [from Before to After the footbath] for the comparison between Treatment and Placebo groups. By using the Percent Change scores, we remove more of the effects of the pre-treatment differences between the Treatment and the Placebo groups and we also remove more of the effects of the individual differences between Ss within each of the two groups. We do this exclusively with the Day 1 scores because by Day 2, both groups have had the Q-Treatment. However in the Day 1 comparisons, only the Treatment Group has had the benefit of the Q-Treatment. We would assume that there would be larger alpha increases in the Treatment group for the eyes closed [EC] resting baseline condition since alpha is more prevalent in eyes closed conditions and any effects of the Q-Treatment would be most likely to be seen in an eyes closed condition without any task requirements. Therefore we use the 1-tailed t-test for positive t's that indicate larger alpha percent change scores for the Q-Treatment group relative to the control group. Table 9 shows these results.

Table 9
Day 1 (Pre-to-Post) *Percent Changes* In The Treatment vs. Placebo Group

EEG Measure Percent Change in (EC2 - EC1)	*t*-score	Degrees of Freedom	Probability Level	EEG Score Dif-* ference: Treatment vs. Placebo group
O_1 Maximum	1.765758	28	***p***<.05	+28.90 vs. +8.02
O_1 Average	1.846486	28	***p***<.05	+17.61 vs. +2.38
O_2 Maximum	1.841679	28	***p***<.05	+27.47 vs. +8.53
O_2 Average	2.357363	28	***p***<.025	+27.90 vs. +1.67
C_4 Minimum	1.800367	28	***p***<.05	+12.15 vs. -6.14
T_4 Minimum	2.613139	28	***p***<.01	+21.29 vs. -7.46
T_4 Average	1.725397	28	***p***<.05	+18.38 vs. +8.53

* **Note.** EEG scores are on a scale of integrated amplitude where a steady 50 μvolts = 1,500 points, and thus a sustained 1 μvolt = 30 points. This way we can see that the largest changes seen in the Treatment Group (from before to after the Q-Treatment) are nearly 1 μvolt. The differences between the changes in the Treatment and Placebo groups also approach 1 μvolt, as in the contrast between Treatment and Placebo for the O_2 Average scores (+27.90 vs. +1.67 => Difference = 26.23 = 0.87 μvolt) and the T_4 Minimum scores (+21.29 vs. -7.46 => Difference = 28.75 = 0.96 μvolt).

Both of the Occipital sites provide statistically significant differences between the Q-Treatment group and the Placebo Control group. Both the 15 second Maximum scores and the overall Average scores at the Occipital sites show the effects of the Q-Treatment in increasing these alpha EEG scores. Two other cortical sites (both in the right hemisphere) also show increased alpha as a result of the Q-Treatment. Right Temporal, T_4, shows higher alpha Minima and Averages in the Percent Changes of alpha scores for the Treatment Group compared to the Placebo Control Group. In addition Right Central, C_4, shows higher alpha Minima in the Q-Treatment Group than in the Placebo Control Group.

Occipital alpha increases are known from previous research studies to be related to reductions of Anxiety (Hardt, J.V. and Kamiya, J. Anxiety change through EEG alpha feedback: Seen only in high anxiety subjects. *Science*, Vol. *201*, pp. 79-81, 1978) and also to reductions of Anger, Hostility, and Depression (Hardt, J.V., Prescriptive Brain Maps of Human Mood States, *Proceedings of the Society for the Study of Neuronal Regulation*, 2nd Annual Meeting, Las Vegas, NV, May 1-4, Vol. 2, p. 15, 1994; Hardt, J.V. Accelerating

Personality Change with Predictive Brain Mapping and Training, *Proceedings, FutureHealth's Key West Conference, EEG '95*, Key West, FL, Feb. 2-7, 1995). Thus these bilateral Occipital, Right Central, and Right Temporal Alpha increases are entirely consistent with the findings described above that have showed beneficial changes in Moods and emotions as a result of the Q-Treatment, mood changes that involve reductions of Anxiety, Hostility, and Depression.

In summary, the Q-Treatment significantly increases Eyes Closed EEG Alpha activity at selected cortical sites, especially Occipital sites, and the Q-Treatment also reduces negative emotions including Anxiety, Depression, Unhappiness, and Hostility. These beneficial changes in moods become stronger over time out to the limit of time measured in this study, which was 2 days after the Q-Treatment. There are also some beneficial short term effects of the Q-Treatment, such as increases of Friendly, Clear Thinking, Energy, and Strong & Robust. These are seen during the Q-Treatment to be higher in the Treatment Ss than in the Placebo Ss, but these beneficial changes do not persist after the footbath at either the 20 minute Post or the 2-day Post assessment periods. Indeed the Energy scores of the Q-Treatment Ss are lower than Placebo Ss at the 20-minute post assessment period. It may well be that additional treatments, beyond the one Q-Treatment given would lead to longer term increases of the positive moods such as Friendly, Clear Thinking, Energy, and Strong & Robust. Careful attention has been given to identifying the Ss in this research study, so they could be re-contacted and further, more long-term studies could be conducted with these same Ss, on whom so much data has already been carefully collected.

The long-term (2-days post-treatment) reductions in negative moods including Anxiety, Depression, Unhappiness, and Hostility are firmly established by the results of this study, and the benefits of such improvements in moods and emotions are immediately apparent. Further studies could begin to assess whether there are also long term improvements in positive emotions that would develop with a longer program of Q-Treatments.

Appendix A
Anecdotal Reports

Three interesting results occurred with the provision of Q-treatments outside the scope of this study. In the first instance a man, GM, in his mid-40s had given a high-powered white shirt business presentation to several people, one of whom had a Q-The Experience device. After the presentation, GM was invited up to a hotel room for a footbath. He took off his suit coat and shoes and socks and began the footbath. At the 20 minute point he blurted out, "I feel like I've lost all my testosterone!" Then it was explained to him that success energy and aggressive masculine energy are not the same. It was explained to him that the stress could be taken out of his energy and he would be both more effective and less drained of energy. At the conclusion of his footbath he put on his socks and shoes and bid everyone good night and left. The next day he called with some surprising news. Unbeknownst to everyone except GM, he had a substantial hemispherical lump on his back, that was perhaps 3/4 inch in diameter. He had consulted with his Doctor about this lump, and was told it was an infection. The Doctor offered to surgically open the infected lump so the infection could be drained and it could heal. GM had declined the surgical procedure, the lancing of his infected lump. However on the morning following his Q-Treatment he was first alarmed, then surprised, and then delighted that the lump had opened by itself and the infection had drained out during the night, and it was well on its way to healing. GM attributed this surprising result to his one Q-Treatment footbath.

In the second instance a woman (SH) in her mid 50's had severely injured her back while lifting and playing with her grandson. Her back had been previously injured in an auto accident and the play with the grandson had aggravated this old injury. SH was in severe pain for over a week and had uncharacteristic outbursts of anger caused by her constant pain and triggered by events that she could normally handle with ease. She came for one 35 minute session of the footbath treatment and she was was 100% pain free on the following day. She was so completely free of pain that she played actively with her grandson again, and re-injured her back while lifting and playing with her grandson. However the injury was not as severe as previously and began to heal on its own. SH attributed her remarkable and rapid recovery to her one Q-Treatment footbath.

In the third instance a man in his mid 70s (RO) had participated in the formal study described above. For several reasons RO was able to have 5-6 additional footbath treatments over the next 2 months. RO had been quite concerned about his systolic blood pressure, which was running in the mid-150s. Following the 5-6 additional treatments his systolic blood pressure had dropped dramatically and was now in the high 120s. He was

very pleased with this result and he attributed this wonderful result to his Q-treatment footbath treatments.