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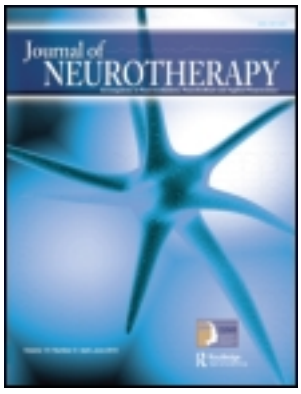

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Neurofeedback and QEEG: The Space-Race …

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EDITORIAL

NEUROFEEDBACK AND QEEG: THE SPACE-RACE . . .

In the 1960s the United States and the then-called USSR were engaged in a ''space-race'' battling each other for supremacy in space exploration and both wanting to achieve ''to be the first'' milestones. In these years John Kennedy was committed to putting a man on the moon. On July 20 in 1969 the United States became the first country to put a man on the moon with the Apollo 11 flight, and we all now recall the names of Neil Armstrong and Edwin ''Buzz'' Aldrin as the first men on the moon. What we often forget is that in the background much research and development was undertaken to achieve these milestones. Furthermore, the whole space-race resulted in a lot of spin-offs, including discoveries related to our field. In other words, the field of neurofeedback and QEEG might not have existed without the space-race.

In the period of 1961 to 1974, a Space Biology Laboratory was established at UCLA, with Ross Adey as the director. Among other things, this unit investigated the effects of weightlessness on brain function to determine whether prolonged space flight would be possible for the human body. Their first results were published in *Science* and were based on the physiological data from a macaque monkey that was the first primate put in space from U.S. soil and remained in space for 9 days while physiological data were recorded including EEG. This project was also labeled Biosatellite III (Adey, Cockett, Mack, Meehan, & Pace, 1969). The group of Ross Adey also pioneered quantitative electroencephalography, or QEEG as we know this technique today. They were the first to use digital computers (IBM 7040-7094) in the analysis of EEG data, produced brain maps, and developed the first normative library of brain maps consisting of 200 healthy subjects (French, Adey, & Walter, 1966). In those days the spectral analysis for 50 subjects took about 1,400 hr using an IBM 7094 (Schadé & Smith, 1970). Figure 1 shows photos from this period taken at UCLA and surroundings. Here is shown the first equipment that was developed to measure EEG in outer space and during driving, the development of which they also featured in their 1963 article (Adey, Winters, Kado, & DeLucchi, 1963). The right bottom picture also displays the IBM-7094 computer they used to analyze their QEEG data. This group also developed the technology for biotelemetry—featured in this photo—that allowed EEG recordings from astronauts Lovell and Borman during the Gemini VII spaceflight. The field of QEEG as we know it today can therefore be seen as a spin-off from the space-race.

In Volume 14, Issue 4, of the *Journal of Neurotherapy* we read how the clinical application of neurofeedback in epilepsy was really a serendipitous finding, after Barry Sterman investigated the effects of monomethyl hydrazine in cats, which was a high-thrust propellant used as rocket fuel (Sterman, LoPresti, & Fairchild, 2010). This research took place in the same period of this space-race and really ignited further research into neurofeedback, more specifically SMR neurofeedback.

In the same manner, we all remember the first men on the moon to be Armstrong and Aldrin. Likewise, for our field Ross Adey and Barry Sterman can be considered our ''first men on the moon.'' On April 16, 2010, President Obama set out his plans for a mission to Mars. We can wonder and hope that this endeavor will result in similar spin-offs to what

FIGURE 1. A photo from 1963 demonstrating the telemetric equipment developed by the Space Biology Laboratory headed by Ross Adey et al. to measure EEG in space. Ross Adey—who pioneered QEEG—is the person on the right in the top left picture. Also note the IBM-7094 computer on the bottom right picture, which was the first computer used to crunch QEEG data (Courtesy of the Computer History Museum).

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we have seen after John Kennedy promised the United States would put a man on the moon. We can also wonder who and what sorts of wonders this new generation of neurofeedback researchers and clinicians will find in this new ''space-race.'' Who might be our new ''men in the moon?'' As discussed in Volume 14, Issue 2, will we witness a ''Neurofeedback 2.0'' focused on further integration of neuromodulation techniques (Arns & De Ridder, 2011), a revival of classical conditioning techniques, an integration of quantum neuro-physics?

At this moment, we don't know, we can only imagine. However, we do know that time has come for two new senior editors for the *Journal of Neurotherapy* to further develop, foster, and nourish such new developments and aid in this new ''mission to Mars'' for our field. Therefore, we want to hereby hand over the editorship to the wonderfully competent hands and minds of Adam Clarke and Efthymios Angelakis, who will be the new senior editors of the *Journal of Neurotherapy* starting with Volume 16. We are thrilled to have such talented and committed scholars and practitioners to carry the journal into the future.

For now, we want to sincerely thank the many authors who submitted their manuscripts to this journal, and we especially want to thank our editorial board, associate editors, and reviewers who have really made a great team over the last couple of years and made the pages in front of you possible. And we want to remind our readers to encourage submissions and research, for at the end of the day, the journal is only as good as you the members allow it to be.

Yours Sincerely,
Martijn Arns and Randall R. Lyle
Senior Editors

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