Dr. Daniel Amen Brain and QEED Study

May 16-17, 2018

Foreword by Paul L Cox

Today June 22, 2022. I have just read the below Abstract by Dr. Daniel Amen. The study below originally took place May 16-17, 2018. We had present one who was working on her doctorate degree and one who was working on her master's degree. Present for the study were the supervisors for the two students. After the study we found that the proper academic certification for the study was not obtained so the study would not qualify to be recognized in the academic world.

On September 10-11, 2021, I was in New Jersey and a man wanted to meet me. I found out that he was friends with Dr. Andrew Newberg (mentioned several times in the Abstract below). It was hoped that I would connect with him but the timing was not good). I had contacted Dr. Daniel Amen to get his input and that is when I was sent the Abstract.

The Abstract might be of interest to those who are interested in an academic analysis of brain and QEED information tied to prayer, tongues, discernment and prophecy.

Cerebral Blood Flow and QEEG during Four Spiritual Disciplines

Dr. Amen

A neuroscientific study exploring brain function before and during spiritual practices

Abstract

There is increasing interest in neurological activity or changes while participating in religious and spiritual practices especially since the insurgence of reliable neuroimaging devices. The following study uses single photon emission computed tomography (SPECT) and quantitative electroencephalography (QEEG) to measure brain activity in volunteers who participated in spiritual activities. SPECT (n=5) compared conversational prayer (praying for someone else) to glossolalia; while QEEG (n=9) compared conversational prayer, glossolalia, prophecy, and discernment. Participants collectively have over 20 years' experience in these daily spiritual disciplines. SPECT showed overall decreased activity during glossolalia in 3 subjects (consistent with our hypothesis), with increased activity in the pleasure centers (basal ganglia) in one subject and increased activity in the anterior cingulate gyrus in another. QEEG showed inconsistent patterns of activation, with frontal and temporal lobe activation being the most consistent findings across the prayer groups. Conversational prayer and glossolalia had the most consistent activation patterns.

Key Words: SPECT QEEG Spiritual discipline prayer discernment glossolalia prophecy

Literature Review

Introduction

For the past three decades, neuroimaging has been increasing in its use to distinguish illnesses, define best practices and more recently, to match treatment with the values of the client. Neuroimaging uses developing technology in an effort to identify and treat biological as well as psychological disorders (Amen, Stubblefield, Carmicheal, & Thisted, 1996; Lansing, Amen, Hanks, & Rudy, 2005; Willeumier, Taylor, & Amen, 2011; Santra & Kumar, 2014). For these purposes, neuroimaging techniques include computed tomography (CT), magnetic resonance imaging (MRI), functional magnetic resonance imaging (fMRI; Paniagua Bravo, Albillos Merino, Ibáñez Sanz, & Alba de Cáceres,, 2011), positron emission tomography (PET; Hoffmann, 2013), electroencephalogram (EEG), quantitative electroencephalogram (qEEG; Petchkovsky, 2017), magnetoencephalography (MEG) and single-photon emission computed tomography (SPECT; Raji, Willeumier, Taylor, Tarzwell, Newberg, Henderson, & Amen, 2015). Functional maps of neural brain activity, electrical activity, and blood flow allow for: predictive and preventative care (Lake, 2008; Petchkovsky, 2017; Petchkovsky, Robertson-Gillam, Kropotov, & Petchkovsky, 2013), developing research in the field of neuroimaging promoting best practices in neurotherapy (Kaiser, 2005), and also value of client diversity within the religious/spiritual community (Worthington, Griffin, Toussaint, Nonterah, Utsey, & Garthe, 2016).

Uses of Neuroimaging

Understanding functional brain circuitry allows practitioners to treat ethically, efficiently, and effectively, regardless of the discipline (Kaiser, 2005; Lake, 2008; Raji et al., 2015). For example, professional athletes use neurofeedback as often as ADHD subjects (Arns, De Ridder, Strehl, Breteler, & Coenen, 2009; Dupee & Werthner, 2011). Criminals are suitable subjects for neuroimaging study, as are dementia patients (Amen, Hanks, Prunella, & Green, 2007; Baskin, Edersheim, & Price, 2007; Kemp, Holmes, Hoffmann, Bolt, Holmes, Rowden, & Fleming, 2003).

Imaging is used to distinguish between biologic and psychiatric illnesses (Lake, 2008; Santra & Kumar, 2014). This type of advanced imaging allows study and research in areas of interest for best practices in medical and mental health care (Amen, Trujillo, Newberg, Willeumier, Tarzwell, Wu, & Chaitin, 2011; Kaiser, 2005). Therefore, accessing neuroimaging

for the benefit of future treatment is expected to continue for both researchers and clinical practitioners.

Neurological Research on Religious/Spiritual practices

A more recent area of interest for imaging includes religious/spiritual practices (Newberg, Alavi, Baime, Pourdehnad, Santanna, & d'Aquili, 2001; Newberg, Pourdehnad, Alavi, & d'Aquili, 2003; Newberg, Wintering, Morgan, & Waldman, 2006; Newberg, Wintering, Waldman, Amen, Khalsa, & Alavi, 2010; Khalsa, Amen, Hanks, Money, & Newberg, 2009; Beauregard & Paquette, 2006; Kozasa, Sato, Lacerda, Barreiros, Radvany, Russell, & Amaro, 2012). By understanding the way the brain changes with specific activity, practitioners are knowledgeable in offering therapies appropriate to individuals seeking religious/spiritually (R/S) accommodative treatment (Azari, Nickel, Wunderlich, Niedeggen, Hefter, Tellmann, Herzog, Stoerig, Birnbacher, & Seitz, 2001). The use of R/S accommodative therapies has increased over the past decade, as has the research on the effectiveness for this type of treatment (Smith, Bartz, & Richards, 2007; Worthington, 2013).

Need for Continued Research on R/S Practices

The American Psychiatric Association (2013) points to the need for continued research by labeling "Spiritual and Religious Problems" in the *Diagnostic and Statistical Manual -Fifth Edition*. Worthington's (2013) review of current research and his call for empirically supported Christian-accommodative treatment describes evidence-based treatment (EBT) as research that provides opportunity for a clinician/researcher to consider not only randomized clinical trials, but also many other forms of evidence that support a treatment (American Psychological Association, 2005). This type of EBT can include developing research such as the use of neuro-

imagining with religious/spiritual practices, matching the beliefs and values of clients in an effort to provide empirical support for best plan of care.

Spiritually oriented practices are valuable tools in addressing client diversity (Richards & Bergin, 1997; Smith & Richards, 2005). Evolving neuroimaging research provides a clinical foundation to aide individuals in treatment while being sensitive to their R/S practices (Smith et al., 2007). Smith et al. (2007) recommends R/S accommodative therapies become part of assessment and informed consent since they demonstrated effectiveness across a meta-analysis of 31 outcome studies. For professionals seeking the best treatment in Christian accommodative therapies, the research to determine effective treatment is limited, particularly in the area of neuroimaging and religious/spiritual practices. Worthington, Kurusu, McCullough, & Sanders, (1996) examined a meta-analysis of religious and spiritual accommodative treatments and provide research that demonstrates patients engaged in R/S psychotherapies show similar or greater improvement than those in alternate secular psychotherapies in psychological outcome and better on spiritual outcomes.

Neuroimaging Research on Meditation

Recent research utilizing neuroimaging tools examines R/S practices with an interest in measuring and identifying neurological changes that could benefit both individuals and the professionals who treat patients (Azari et al., 2001; Beauregard & Paquette, 2006; Kjaer, Bertelsen, Piccini, Brooks, Alving, & Lou, 2002; Lazar, Bush, Gollub, Fricchione, Khalsa, & Benson, 2000; Lou, Kjaer, Friberg, Wildschiodtz, Holm, & Nowak, 1999; Newberg et al., 2001; Newberg et al., 2003; Peres, Moreira-Almeida, Caixeta, Leao, & Newberg, 2012; Wang, Rao, Korczykowski, Wintering, Pluta, Khalsa, & Newberg, 2011). Benefits have been evident particularly in the area of meditation (Barnby, Bailey, Chambers, & Ritzgerald, 2015; Newberg

et al., 2010), but research is limited in other spiritual practices. Newberg (2014) recommends future research utilize measures of physiological change to develop a more thorough analysis of what occurs with particular R/S practices.

Neuroimaging Research on R/S practices

In an effort to outline neural activity during meditation, Newberg et al. (2001) performed a pilot study using SPECT scanning and subjective reporting to link a R/S experience with neuroscientific data. Andrew Newberg and colleagues continue the research linking neural regions and systems to religious/spiritual practices (Newberg, 2014; Newberg et al., 2003, 2006, 2010; Newberg & Iversen, 2003).

Beauregard and Paquette (2006) followed this work with a study of 15 Carmelite nuns who participated in fMRI and qEEG studies to determine activity in the brain during both emotional and spiritual experiences. This experiment was followed up with interviews to allow subjective experiences to be expressed, allowing researchers to compare the objective data to the subjective reports (Beauregard & O'Leary, 2007). Beauregard and O'Leary (2007) reported the findings as supportive of separate from an emotional experience and a "complex and multidimensional" (p. 274) experience within the brain, involving different regions and functions simultaneously.

New Imaging Research on R/S Practice of Glossolalia

Building on the neuroimaging research of those engaged in studying R/S practice (Lynn, Paris, Frye, & Schell, 2010; Newberg et al., 2006; Persinger, 1984), this research study continues the effort to assess the brain regions and function during the Christian spiritual practice of "speaking in tongues" (*glossolalia*) and the neurological impact this practice has on individuals who engage in this R/S practice on a regular basis. Using SPECT to measure regional cerebral

blood flow (rCBF), which is closely correlated to brain activity, researchers studied the blood flow and metabolic activity during silent practices of glossolalia. Further, research subjects participated in four qEEG studies: an initial baseline study followed by three different spiritual practices (discernment, prophecy and glossolalia). After the neuroimaging assessments, subjects for this research project participated in self-reporting using Sethi and Seligman's (1993) religiousness measure, Hood's (1975) Mysticism Scale, and a subjective report of the experience via videotaped personal interview questioning.

For this study, the term glossolalia is defined by the research of Newberg, Wintering, Morgan, and Waldman (2006). Although their research focused on the definition of speaking in tongues as "a highly active and emotional state of vocalization, where there is a loss of intentional control and dramatic utterances or quiet/silent sounds and syllables of an unknown language" (Newberg et al., 2006, p. 69), this research uses an alternate definition that allows subjects to be quiet and have calm, pleasant emotions (Grady & Loewenthal, 1997).

Meditation verses Prayer

Speaking in tongues is considered a complex and unique prayer experience different from meditation studies (Newberg et al., 2001). Mindfulness meditation and spiritual practices differ in that the prayer (speaking in tongues) is reported to be a focus on and experience with God (McMinn & McRay, 1997) versus a mindful meditation focusing on self or senses (Ivanovski & Malhi, 2007). Hölzel, Lazar, Gard, Schuman-Olivier, Vago, & Ott (2011b) list brain attention regulation, body awareness, self-perspective, and emotion regulation as effected systems trained by mindfulness. Beauregard and O'Leary (2007) report that R/S practices simultaneously affect multiple regions and functions including perception, cognition, emotion, body representation and self-consciousness, visual and motor imagery and spiritual perception.

While both practices are helpful and may have overlapping neurological impact (Barnby et al., 2015), speaking in tongues is considered a R/S practice, whereas mindful meditation may not be expressly a R/S practice. Prayer is a normal and expected behavior in a R/S community and may be spoken aloud and consist of the repetition of a certain phrase (Anastasi & Newberg, 2008) or be more of a conversational style aloud or in silence (Whittington & Scher, 2010).

Because R/S practices show evidence of benefit for both the professional and the practicing individual, regardless of specific affiliations to organizations (Kim & Seidlitz, 2002), the neuroimaging research will add explanation for continued use. For the client, people who practice R/S disciplines report less psychological distress and improved physical resiliency and mood (Cohen, Jiminez, & Mittal, 2010; Jain, Shapiro, Swanick, Roesch, Mills, Bell, & Schwartz, (2007); Lynn et al., 2010; Wachholtz & Pargament, 2005). In addition, frequency of prayer has research suggesting similar positive physical and emotional effects (Laird, Snyder, Rapoff, & Green, 2004; Maltby, Lewis, & Day, 2008). For the professional, religiously accommodated therapies (including prayer, forgiveness, Christian meditation, confession, and worship) demonstrate both psychological and neurophysiological benefits (Newberg et al., 2017) with added benefit of increased resilience in times of crises (Worthington, Griffin, Toussaint, Nonterah, Utsey, & Garthe, 2016).

Methods

Subject Selection

For purposes of this study, nine individuals volunteered to participate in a two-day research experience to practice the R/S habits of conversational prayer, glossolalia, discernment, and prophecy. Subjects were recruited through their committed involvement with Aslan's Place

Ministries. Subjects were asked to participate in both a SPECT scan and also a qEEG study before and during these spiritual practices.

Written informed consent was obtained for their participation. Each volunteer completed a thorough intake packet giving history of physical, psychological, spiritual and neurological information. Inclusion criteria allowed for healthy individuals (ages ranging from 54 to 75 years of age) exhibiting no current pathological symptomology. Subjects underwent a structured clinical interviews and evaluations with a psychologist to exclude any psychotic/delusional disorders as well as current alcohol or drug related disorders. Subjects included did report physical symptoms of high blood pressure, Cholesterol, Type II diabetes, cancer, autoimmune disorder and psychological issues with ADD, anxiety, depression, sleep concerns, and past alcohol and drug issues.

All nine participants report 20 years (+) of spiritual practices with prayer, discernment, prophecy and spiritual community participation. Of the nine subjects, five (3 male, 2 female) were chosen to participate in two SPECT scans and six qEEG reports. These five individuals were chosen based on availability for the study. The other four volunteers (all female) were used for additional studies with both SPECT and qEEG testing. Each subject completed Sethi and Seligman's (1993) Religiousness Measure and Hood's (1975) Mysticism Scale before each SPECT scan and also after. In addition, all volunteers participated in a post procedure interview.

Prayer States

For use in this research study, subjects are asked to participate in a Christian R/S practice of prayer. Although Ladd and Spilka (2002) describe prayer as both complex and multifaceted, others define types of prayer that include what is utilized in this research as "receptive" (Laird, et al., 2004). Using the research terms of Ladd and Spilka, participants completed an exercise in

"upward prayer" where adoration, contemplation, resting, meditating, thankfulness and unceasing interaction occurred. Subjects used this receptive prayer that was focused as upward while setting a baseline for the initial SPECT and also the first qEEG. During this first experience, subjects were asked to focus on a conversational prayer, while remaining silent.

For the second SPECT scan and one of the qEEGs, subjects were asked to practice glossolalia prayer (Newberg et al., 2006), which is also defined as "silent," "receptive," and "upward" in the definitions of Laird, et al., 2004 and also Ladd and Spilka (2002). The additional two qEEGs involved internal prayers that were labeled "discernment" and "prophetic." These labels, used in a Christian faith community, may still be defined as "receptive" because subjects are attempting to be open to receiving any information in their conversation with God, as they report doing on a regular basis, while being scanned with SPECT and qEEG testing for neurological activity during the practice of these different types of prayers.

Spiritual Measures

Beauregard (2007) states that although the quantitative aspect of neuroimaging is essential to understanding the science behind religious practices such as meditation and prayer, the actual subjective experience that each subject has is also important to better evaluate the data. Newberg (2014) also addressed the methodological challenges of quantifying something as subjective as a religious experience and suggests the importance of assessing the subjective experience as well. To address Beauregard's and Newberg's concerns this study incorporated Hood's Mysticism Scale (Hood, 1995) and Religiousness Measure scale (Hood, 1999), as well as post procedure interviews. The Mysticism scale was used to assess the subjective experience of the spiritual experience, while the Religiousness scale was used to assess how influenced each

individual is by their religious beliefs and how involved they were in religious practices. Finally, post procedure interviews were performed to allow each individual to explain their experience.

Since its conception in 1975, Hood's Mysticism Scale has greatly facilitated research associated with mystical experiences, most specifically those of a religious kind. The scale has been through a deluge of factor-analytic studies for which a respectable internal consistency and construct validity has been found (Hood, 1975; Caird, 1988; Reinert & Stifler, 1993). Sethi and Seligman (Hood, 1999) designed the Religiousness Measure to measure three levels of religiousness; religious influence in daily life, religious involvement, and religious hope. The Religiousness Measure does not have the vigor the Hood's questionnaire does in that there has been no formal attempt to establish reliability band validity. However, it was believed that the subjective measure of each participant's religious involvement and influence was pertinent to gathering a deeper understanding of the overall subjective experience of the individuals while actively involved in speaking in tongues, prophesizing and discerning.

The Hoods Mystical scale revealed that all participants have experienced times that were timeless, spaceless, holy, divine, and sacred, leaving them feeling in awe. They also all endorsed items that they believed to have an experience in which deeper or new aspects of reality were revealed to them. All but one of the nine expressed that they had had experiences that they could not put into words, had times that they were left with feeling a sense of wonder, and again, times for which they were not able to put into words the experience.

The Religiousness Measure revealed all nine subjects believe in God, heaven and miracles. They all have hope in the future believing the future will be better for self and their children. They all endorsed that religion is extremely important to them and all but one reported spending time praying and reading the Bible daily. Additionally all but one stated that they

attend religious activities at least once a week. All stated their decisions are influenced by their religious beliefs.

Subjective Interviewing

Personal interviews were conducted to further expound on each subjects' individual experience while actively involved in speaking in tongues, prophesizing and discerning. Eight of the nine participants were interviewed after their procedures. The ninth participant had to leave before her interview could be done. The questions asked for the post procedure interview used a five point Likert Scale (1-5) rating their ability in the certain discipline (speaking in tongues, discernment, prophesy). Subjects were asked to talk about their own experience and any sense involved. The first questioned explored was: "During your experience were you aware of any of your senses affected?"

Subjects all reported some sense being affected including: visual, tactile, auditory, taste, as well as, an overall sensation or "feeling". The following are statements made about the senses experienced;

Visual: One described, "I saw my [Heavenly] father"….. "we were playing". Another stated seeing, "A giant Zodiac". One described, "there was energy coming down". While another said they saw "dancing water." One reported seeing "tongues of men" while another saw the "Lion of Judah." One reported, "I see in colors." One stated they were "walking on the beach with the Lord"….. "he put his arm around me"…."we went to a higher place."

Tactile: The different type of tactile sensations were reported, "My thighs were heating up"; "a stirring a quickening"; "Trembling inside my body"; "A lot of spiritual energy was flowing through me"; "an internal presence"; "I felt a lot of pressure"; "I felt things going off in my head"; "feeling something behind me"; "feeling tremendous electrical arching across the

cortex"; "feeling pressure"; "feeling information from the Lord coming down in my mind"; and "I feel electromagnetic energy".

Auditory: One participant reported he heard "everyone must go up higher" but did not elaborate. Another stated, "I heard several things" but did not elaborate.

Taste: One participant stated she "tasted water".

Sensation: Many reported just having a sensation and would describe the sensation. One stated there was a sense of a "huge emphasis of wisdom". She went onto say that she felt "everyone in the room was connected". Another stated they "felt the Kingdom of Heaven". One stated she was "aware of an anointing" and "of the Kingdom of Heaven". There was a report of the "feeling different spiritual beings" and "something is happening here that I have never felt in a medical office before". There was an elaboration of "the spiritual activity during our time together has been very complex". Finally, one reported "I could feel I was with God".

Each subject was asked to discuss the SPECT or QEEG experience and their expectations for any results: "Have you ever had a SPECT or QEEG?"; "What was the experience of a SPECT or QEEG like for you?"; "What do expect to see in the results?" Each participant was given the opportunity to elaborate on any and all of the questions. None of the subjects had ever had SPECT or QEEG. There was a general description of going through the QEEG and SPECT as confining in that they could not move or partake in the spiritual exercise in the way they typically did. However, there was elaboration by some as to the experience. One stated "I felt like it was an upgraded experience". He stated it was completely different in that he had to have an "internal awareness". Another stated, "I was aware of things I never felt before". Another said, "this has been amazing". When asked what they anticipated to be found from this study, the general consensus was that science and religion would be found to be two parts of a whole.

The summation of the subjective data is that all nine participants describe experiences that can be equated to mystical in nature for which they accredit God and/or heavenly beings, yet they are not able to clearly describe in words the totality of their experience. All participants believe the experience to be real, but of another dimension which again they accredit to encounters with God and heavenly beings. Finally, although their mystical description is a sense of out of body experience, they are able to describe physical sensations.

SPECT Acquisition and Analysis

We used SPECT to measure regional cerebral blood flow (rCBF). Each subject received an age/weight-appropriate dose of Tc99m HMPAO intravenously. Subjects were injected in normal lighting while they did conversational prayer or glossolalia. The radiopharmaceutical was injected three minutes after starting the activity. Subjects were then scanned 30 minutes later using a high-resolution Picker Prism 3000 triple-headed gamma camera with fan beam collimators, acquiring data in 128x128 matrices, yielding 120 images per scan with each image separated by 3 degrees spanning 360 degrees.

SPECT data was processed and attenuation correction performed using general linear (Chang) methods. All images were reconstructed and resliced using an oblique reformatting program, according to anterior-posterior commissure line so final images were similarly aligned for analysis. The second study was performed a day later.

The images were displayed using a standardized color scale. The transaxial images were then used to produce three dimensional "surface" images and three-dimensional "active" images using a standard Picker surface projection technique. For the surface images a thresh old of 55%

was used, looking at brain activity above this level; these images give a three-dimensional "surface" view of cortical activity. For the active images. average activity of the brain was set at a thresh old of 55% and contrasted with the most active areas of the brain, set at 85%. These images give a three-dimensional "active" view of brain activity, showing the most active areas of the brain. Qualitative visual inspection was used in the analysis of the two-dimensional and three-dimensional surface images.

qEEG Acquisition and Analysis

qEEG is the measurement of electrical patterns at the surface of the scalp, which reflect cortical electrical activity. All of our measurements were obtained with the subjects' eyes open and closed, using the International 10/20 system of electrode placement and manual and automatic artifact removal. Comparison to an age-matched QEEG normative database was used for the 3-dimenional source analyses. The data was displayed in standard QEEG format.

Imaging Results

SPECT showed overall decreased activity during glossolalia in 3 subjects (consistent with our hypothesis), with increased activity in the pleasure centers (basal ganglia) in one subject and increased activity in the anterior cingulate gyrus in another. QEEG showed inconsistent patterns of activation, with frontal and temporal lobe activation being the most consistent findings across the prayer groups. Conversational prayer and glossolalia had the most consistent activation patterns.

Table of Results

Results	SPECT 2	QEO	QCP	QT	QD	QP	QEG
Paul	Overall a hit heal their ↑Acg	High Central Beta (Mild)	↑Delta ↑Frontal theta ↑↑ Antal beta & high beta	Not made Δ from go base	↑ Delta front * High Central R high Beta	↑ Delta Frontal * High LTR Central Bedat High Beta	High Delta/Theta Frontal High Central Beta
Jana √	Frontal Lobe Deactivation ↑ L Thalamus	↑ L Beta Frontal & high Beta ↓ L Delta / Theta	↑L Frontal Beta Mild ↑ Overall Beta	↑L Frontal Beta Mild ↑ Overall Beta	Mostly Healthy	Mostly Healthy	Mostly Normal
Rob √	Marked deactivation overall	Mild Frontal ↓ Alpha	↑ Left Post PL High Beta	↑ Right Delta Frontal	↑ Frontal Delta	↑ Frontal Delta & Theta	↑ Post Alpha & Beta
Larry	↑↑↑↑ L & R BG Lower PFC Pole	Sleepy	Activation Right Temperal Lobe	Marked Activation R-P-T Lobes ↑ ↑ High Beta	Marked Activation R-P-T Lobes ↑ ↑ Beta & HB	Not much change from EO Baseline	↑ Right PL & TL
Anne √	Mild ↑ AC R & L ↓ LTL	Normal	↑↑ L & R Lat TLS ↑↑↑ L & R Post High Beta	↑ L & R Lat TLS ↑↑ L & R Post High Beta	Not much change	↑↑ L & R Lat TLS ↑↑↑ L & R Post high Beta	NL

Discussion

Limitations

The small number of subjects limits the conclusions.

Conclusion

Since R/S practices show evidence of effective treatment interventions, neuroscientific study exploring brain structures before and after spiritual practices (such as speaking in tongues) assess regions of interest and how the brain structures may change (Newberg et al., 2001) during spiritual experiences. Research in this area may provide empirical support for possible application in both psychological and physical disorders (Newberg, 2014). Since research demonstrates improved care through the use of imaging (Amen, Jourdain, Taylor, Pigott, & Willeumier, 2013), future research will continue to build empirical support for effective treatment in an effort to continue providing the medical and psychological communities best practices while supporting the values of R/S clients through neuroimaging techniques.

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Potential Journals

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