
Tom Shay Post-Conviction Testing

fMRI Testing Report

Steven J. Laken, Ph.D.
June 28, 2010

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Background Information

Mr. Morrison Bonpasse, Bonpasse Exoneration Services, P.O. Box 390, Newcastle, ME 04553-0390 contacted Cephus and requested that Cephus perform a Functional Magnetic Resonance Imaging (fMRI) deception testing on his client, Mr. Thomas Shay having a date of birth of November 3, 1971.

Mr. Shay alleges the following:

1. He did not take part in bomb building, and
2. He did not purchase items to make a bomb from RadioShack.

On May 24, 2010, Mr. Shay was given a fMRI test using a control series of tasks and questions to determine if Mr. Shay would be a suitable candidate for fMRI testing. Immediately following the first two tests, Cephus performed two additional fMRI scans to determine the veracity of Mr. Shay's statements to the questions above. Mr. Shay has been diagnosed with pseudologia phantastica and Klinefelter's syndrome. The purpose of the first test is to determine if his brain reacts to lying as described in Cephus' publications. If his brain reacted appropriately to this task, then Cephus would analyze the second and third fMRI test regarding the questions above. Mr. Shay also received a high-resolution MRI to examine his brain for anomalies. fMRI scanning occurred at Shields MRI, 30 Cocichuate Road, Framingham, MA. Steven J. Laken, Ph.D., President and C.E.O. of Cephus Corporation performed the fMRI analysis at 74 Northeastern Ave. Unit 21B, Nashua, NH on June 3, 2010.

fMRI deception technology is peer reviewed [1-40], the brain is the source of lying [1-40], and the error rates are documented [14, 17, 34-45].

Testing Procedure

Testing Protocol

Testing was performed using Cephus' fMRI Testing Protocol version 1.10.

Question Development

Dr. Steven Laken and Mr. Bonpasse developed the questions. The questions were reviewed with Mr. Shay on the day of the scan.

Day of Testing

On the day of testing, Dr. Laken explained the fMRI testing procedure to Mr. Shay, and had Mr. Shay do the following:

- Sign a consent form.
- Provide a urine sample for drug screening.
- Fill out an Annette Handedness questionnaire.
- Complete an MRI safety form.

Dr. Laken did not interview Mr. Shay for psychological screening as this had been previously performed by other health care providers.

For the purposes of determining if Mr. Shay's brain responds similarly to our published data, we had Mr. Shay pretend to steal a ring or a watch from a drawer. He placed that in his locker and was instructed to answer as if he did not take either object and to not tell anyone what object he took. Mr. Shay was then told he would have to convince us he did not take an object to 'pass' the test. If he could not convince us, then we would not draw a conclusion for the specific incident scans.

Question Presentation

Each fMRI scan consists of two epochs where Mr. Shay was visually instructed to 'Lie' or to tell the 'Truth' to the Specific Incident Questions (SIQ). He was told to always respond truthfully to the neutral and control questions. The question order, but not the questions themselves, was randomized by a computer when administered in the fMRI; therefore, the questions presented, but not the type of questions (e.g. neutral), differed between Lie and Truth epochs.

For the control fMRI test, Mr. Shay was instructed to answer to the 'Ring' or the 'Watch' questions as if he did not take either object. The neutral and control questions were identical to the neutral and control questions in the specific incident testing.

Practice Outside of the Scanner

Mr. Shay practiced answering the questions in Appendix 1 on a laptop computer outside of the scanner while being observed by Dr. Laken. When Dr. Laken felt that Mr. Shay showed sufficient compliance with the instructions, responded to questions appropriately, and understood what he was to do in the scanner, Dr. Laken had Mr. Shay change into magnetic-resonance compatible clothing.

May 24, 2010 fMRI and MRI

On May 24, 2010, Mr. Shay received three fMRI scans using Cephos' standard imaging protocol [39], and fMRI Testing Protocol, version 1.1. In addition, Mr. Shay received a high-resolution structural MRI scan so a radiologist could determine if there were any anomalies of the head or neck.

Dr. Laken and an MRI technologist escorted Mr. Shay into the MRI environment. They made Mr. Shay comfortable in the MRI and placed a display that would relay the random questions to Mr. Shay over Mr. Shay's head. They then aligned Mr. Shay's head in the MRI scanner and performed the fMRI testing procedures as established at the Medical University of South Carolina, the University of Texas Southwestern at Dallas, and Cephos Corporation [14, 34-40, 43, 44, 46]. The random questions prevented Mr. Shay from anticipating any question. Mr. Shay's response to each question was recorded.

fMRI Data Analysis

Dr. Laken analyzed the functional MRI data using Statistical Parametric Mapping software (SPM 2, Wellcome Department of Cognitive Neurology, London, UK – using Matlab version 2006a). Individual activated t-maps were generated by defining the following contrasts: Lie-Truth, Truth-Lie, Lie-Neutral and Truth-Neutral. To provide statistical analysis of truth or falsehood, the number of significantly activated voxels ($p \leq 0.05$, uncorrected) for Lie-Neutral and Truth-Neutral was determined in three regions of interest (roughly the right orbitofrontal/inferior frontal, the right middle frontal, and the right anterior cingulate) that were previously defined [37]. A greater number of significantly activated voxels for the Lie-Neutral contrast versus the Truth-Neutral contrast indicated that Mr. Shay was being deceptive about the Lie questions. Conversely, a greater number of significantly activated voxels for the Truth-Neutral contrast versus the Lie-Neutral contrast indicated that Mr. Shay was being deceptive about the Truth questions. An equal number of significant voxels for the two contrasts yielded an indeterminate indication.

Results

Candidate for fMRI Testing

I, Dr. Steven Laken, met with Mr. Shay on May 24, 2010; between the approximate hours of 7:30 to 9:00 p.m. Prior to testing I reviewed Cephos' fMRI Consent Form with Mr. Shay. In addition, Mr. Shay provided a urine sample that was screened for drugs. The results of the screening was negative.

Based on the urine tests, I believe that Mr. Shay is a good candidate for fMRI pending a positive result for the mock ring and watch scenario testing.

Structural Scan

A radiologist reviewed the high-resolution structural brain scan taken on May 24, 2010. The scan did not show any obvious abnormalities. Based on this information, I believe that Mr. Shay's fMRI scans are amenable to fMRI analysis.

May 24, 2010 fMRI Scans

Mr. Shay tolerated the fMRI procedure well and I did not feel there was any reason to not use these scans.

June 3, 2010 fMRI Data Analysis

On June 3, 2010, I reviewed and processed the first, control fMRI scan for the ring or watch taken on May 24, 2010. The 300+ scans [34-40] were analyzed using automated scripts and the fMRI Testing Protocol, version 1.1. Mr. Shay answered an appropriate number of questions, responded correctly, and had no excess movement. There were no imaging artifacts. The number of activated voxels for each condition was generated and a conclusion drawn.

On the first scan, Cephos' *a priori* cut-off concluded that Mr. Shay had taken the watch (see [Appendix 2](#)). In fact, Mr. Shay had taken the ring and he is not a good candidate for conclusions to be drawn on the specific incident questions. Therefore there will be no conclusions drawn for the second and third fMRI tests.



Conclusions

In my professional opinion, I, Dr. Steven Laken, refrain from making any conclusions that Mr. Shay is, or is not, telling the truth in regards to the specific incident questions because the results of the control fMRI test was inconclusive.

A handwritten signature in black ink, appearing to read 'S. Laken', positioned above a horizontal line.

Steven J. Laken, Ph.D.
President and C.E.O.

Appendix 1 – Questions Administered

May 24, 2010 – Control Ring or Watch Stolen

Neutral

Do you like to swim-
Do you like to read-
Are you awake-
Are you asleep-
Are you under age 50-
Are you over age 18-
Do you like the beach-
Do you live in the United States-
Do you live in the United States-
Do you live in Massachusetts-
Do you like chocolate-
Do you like to watch TV-
Do you have a dog-
Do you have a cat-
Is it 2004-
Do you like movies-
Do you speak English-
Is it October-
Are you at Shields MRI-
Are you in a MRI-
Are you laying down-

Ring or Watch Questions

Did you take the ring from the drawer-
Did you take the watch from the drawer-
Is the ring in your locker-
Is the watch in your locker-
Did you take the watch-
Did you take the ring-
Did you steal the ring-
Did you steal the watch-

Was the watch stolen-
Was the ring stolen-
Did you hide the watch-
Did you hide the ring-
Did you steal a watch-
Did you steal a ring-
Is the ring with your possessions-
Is the watch with your possessions-
Is there a stolen ring in your locker-
Is there a stolen watch in your locker-
Did you take a ring that is not yours-
Did you take a watch that is not yours-
Did you put the ring in your locker-
Did you put the watch in your locker-
Did you hide the ring in your locker-
Did you hide the watch in your locker-
Did you remove a ring from the drawer-
Did you remove a watch from the drawer-
Did you steal a ring from the drawer-
Did you steal a watch from the drawer-
Did you place the ring in your locker-
Did you place the watch in your locker-
Did you keep the ring in the drawer-
Did you keep the watch in the drawer-
Did you leave the ring in the drawer-
Did you leave the watch in the drawer-
Did the watch stay in the drawer-
Did the ring stay in the drawer-
Was the ring moved from the drawer-
Was the watch moved from the drawer-
Is the ring in the drawer-
Is the watch in the drawer-

Control

Do you ever gossip-
Have you ever done something illegal-
Have you ever done something illegal-



Have you ever done something immoral-
Have you used illegal drugs-
Have you ever deceived a loved one-
Have you ever made someone angry-
Have you ever made someone angry-
Have you ever committed a crime-
Have you ever cheated on a test-
Have you ever told a white lie-
Do you obey every traffic law-
Have you always told the truth-
Have you ever cheated on your taxes-
Do you curse-
Have you ever faked an illness-
Are you a law-abiding citizen-
Have you ever forged a signature-
Have you ever kept the truth from someone-
Have you ever been arrested-
Do you speed-
Have you ever littered-



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Are you a law-abiding citizen-
Have you ever forged a signature-
Have you ever kept the truth from someone-
Have you ever been arrested-
Do you speed-
Have you ever littered-

May 24, 2010 – Did you have knowledge of a bomb?

Neutral

Do you like to swim-
Do you like to read-
Are you awake-
Are you asleep-
Are you under age 50-
Are you over age 18-
Do you like the beach-
Do you live in the United States-
Do you live in the United States-
Do you live in Massachusetts-
Do you like chocolate-
Do you like to watch TV-
Do you have a dog-
Do you have a cat-
Is it 2004-
Do you like movies-
Do you speak English-
Is it October-
Are you at Shields MRI-
Are you in a MRI-
Are you laying down-

Control

Do you ever gossip-
Have you ever done something illegal-
Have you ever done something illegal-
Have you ever done something immoral-
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Have you ever deceived a loved one-
Have you ever made someone angry-
Have you ever made someone angry-
Have you ever committed a crime-

Have you ever cheated on a test-
Have you ever told a white lie-
Do you obey every traffic law-
Have you always told the truth-
Have you ever cheated on your taxes-
Do you curse-
Have you ever faked an illness-
Are you a law-abiding citizen-
Have you ever forged a signature-
Have you ever kept the truth from someone-
Have you ever been arrested-
Do you speed-
Have you ever littered-

Specific Incident Questions

Before October 28, 1991, did you have knowledge of a bomb at your father's home-
Did you purchase parts for the building of a bomb-
Did you plan the planting of a bomb-
Did you ever participate in bomb building-
Have you ever helped build a bomb-
Did you have knowledge of bomb debris at Quincy quarries-
Have you ever played any role in disposing of bomb making materials-
Did you intend to hurt your father with a bomb-
Did you ever buy bomb building material-
Did Trenkler ever direct you in how to build a bomb-
Did you work with Trenkler on bomb building-
Did you purchase bomb making items at a Radio Shack-
Did you first learn about the October 28 bomb at your mother's-
Did you go to your father's home on October 29th-

May 24, 2010 – Did you purchase parts for a bomb from a Radio Shack?

Neutral

Do you like to swim-
Do you like to read-
Are you awake-
Are you asleep-
Are you under age 50-
Are you over age 18-
Do you like the beach-
Do you live in the United States-
Do you live in the United States-
Do you live in Massachusetts-
Do you like chocolate-
Do you like to watch TV-
Do you have a dog-
Do you have a cat-
Is it 2004-
Do you like movies-
Do you speak English-
Is it October-
Are you at Shields MRI-
Are you in a MRI-
Are you laying down-

Control

Do you ever gossip-
Have you ever done something illegal-
Have you ever done something illegal-
Have you ever done something immoral-
Have you used illegal drugs-
Have you ever deceived a loved one-
Have you ever made someone angry-
Have you ever made someone angry-
Have you ever committed a crime-

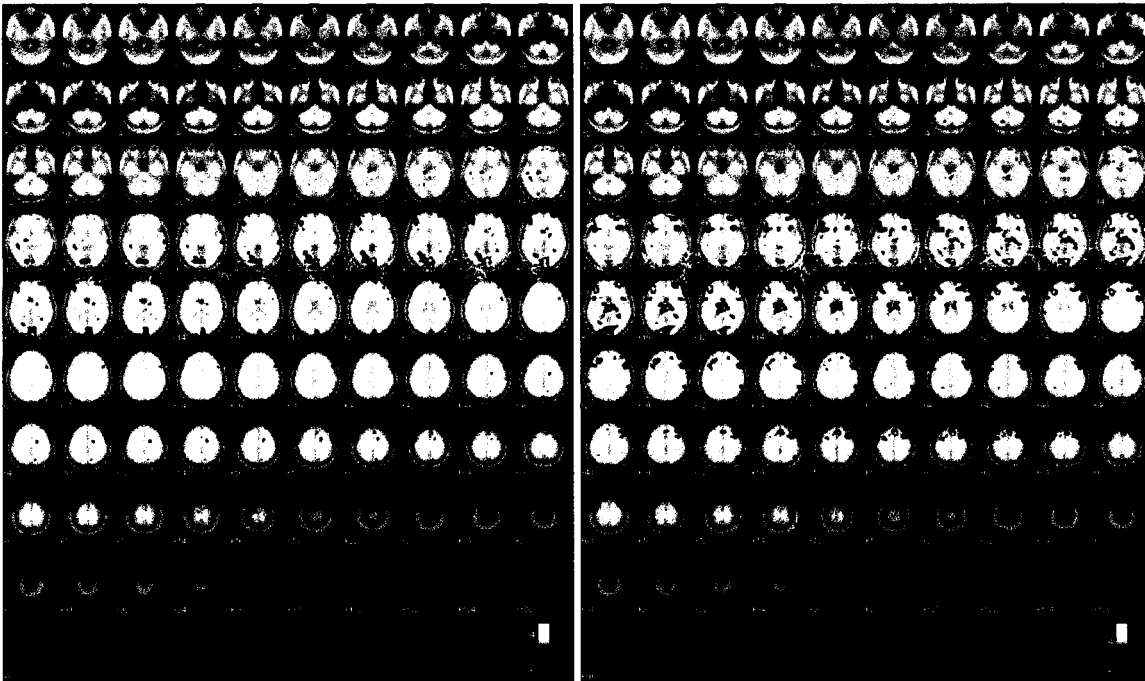
Have you ever cheated on a test-
Have you ever told a white lie-
Do you obey every traffic law-
Have you always told the truth-
Have you ever cheated on your taxes-
Do you curse-
Have you ever faked an illness-
Are you a law-abiding citizen-
Have you ever forged a signature-
Have you ever kept the truth from someone-
Have you ever been arrested-
Do you speed-
Have you ever littered-

Specific Incident Questions

Did Alfred Trenkler direct you to purchase bomb making items-
Did you ever purchase bomb making items on October 18, 1991-
Did you purchase items at Radio Shack to make a bomb-
Had you ever visited the 197 Massachusetts Ave store before October 18, 1991-
Were you aware of the Radio Shack receipt before Paul Kelly showed it to you-
Did you give Trenkler any items you purchased-
Did you lie to Karen Marinella in her interview-
Did you purchase six items at Radio Shack on October 18, 1991-
Did you give your father's phone number to the Radio Shack clerk on October 18, 1991-
Is October 18, 1991 your mother's birthday-
Did you ever purchase bomb making items-
Did you purchase bomb making items on October 18, 1991-
Did you purchase items at Radio Shack on October 18, 1991-

Appendix 2 – Brain Images

Scan 1: Not Taking the Ring (Left) and Not Taking the Watch (Right)



This figure depicts brain regions preferentially activated when Mr. Shay reported to not taking the ring (Ring) and to not taking the watch (Watch). The image on the left represents regions preferentially activated in {Denying Taking the Ring over Denying Taking the Watch}. The image on the right represents regions preferentially activated in {Denying Taking the Watch over Denying Taking the Ring}. Regions activated are shown in red to orange. Activation shown are equivalent to a minimum statistical threshold of $p \leq 0.05$. The computer concluded that Mr. Shay was lying when Denying Taking the Watch. The pictures are displayed in Neurological convention (the left side of the image is the person's left).

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