A STATISTICAL ARTIFACT IN WILLIAM BRAUD'S (1990) EXPERIMENT ON REMOTE MENTAL INFLUENCE OF HEMOLYSIS

By John Palmer

ABSTRACT: In 1990, William Braud reported an experiment in which 9 of 32 participants demonstrated remote mental influence on the hemolysis of red blood cells to a statistically significant degree, but not all in the same direction. Each participant completed 4 trials, 2 while attempting influence (experimental) and 2 without such attempts (control). Because the process of hemolysis follows a decelerating curve as a function of time, the experimenter could have unintentionally created this bidirectional result artifactually by consistently commencing the measurement process slightly earlier or later on pairs of trials he might have guessed were experimental than on pairs he might have guessed were control, even though he was blind as to the actual status of the trials and even if the guesses were no better than chance. The fact that 7 of the 9 "successful" efforts were in the predicted direction of hemolysis retardation (p = .09), plus evidence of a positive correlation between hemolysis retardation and the earth's geomagnetic field the day before testing, indicate a genuine directional effect in Braud's data, but only suggestively.

In preparing to conduct a conceptual replication of a generally well-designed experiment by William Braud (1990) that apparently demonstrated remote mental influence on the hemolysis of red blood cells, I studied the report in some detail. This examination uncovered a previously undetected statistical artifact. Our replication is reported elsewhere (Palmer, Simmonds, & Baumann, 2006).

Braud (1990) tested 32 volunteers in his study. Fourteen of the participants (Ps) donated their own blood to be used in the experiment, whereas the remaining 18 attempted to influence blood that was not their own (presumably supplied by the other 14). P was alone in a room separated from the room in which the hemolysis procedure would be performed by the experimenter (E). The procedure consisted of transferring blood to a test tube containing a concentration of .425% physiological saline. After the contents were mixed by shaking, the test tube was placed inside a spectrophotometer that measures the hemolysis. When red blood cells burst, the solution becomes more transparent. The spectrophotometer charts the progress of the hemolysis by passing a light beam through the test tube and recording the amount of light that is absorbed at specified time intervals. Sixty hemolysis measurements were recorded during each trial, i.e., 1 per s. These measurements can be graphed, demonstrating the time course of the hemolysis during the run.

Each session consisted of four 15-min trials. Two of these trials, as determined by a random process, were experimental trials, during which Ps were to concentrate on retarding the hemolysis taking place in the test room while having the opportunity to observe a photo of healthy blood cells if they so chose. During the control trials, Ps were asked not to think about the red blood cells, and if that was impossible, to concentrate on having the hemolysis occur at the normal rate. E was blind as to which two trials were the experimental ones. Prior to the first trial, Ps listened to a progressive relaxation and guided imagery tape over headphones.

During each of the four trials, E performed the hemolysis procedure on groups of either two or eight test tubes, resulting in 10 tubes being tested in the experimental and control conditions, respectively. This manipulation was introduced to allow a test of decision augmentation theory (May, Utts, & Spottiswoode, 1995), which maintains that apparent micro-PK effects (under which rubric the hemolysis task would fall) are in fact caused by ESP. For example, the experimenter responsible for randomizing the order of experimental and control trials might use precognition to assign as experimental those trials in which the hemolysis effect was going to be stronger anyway. The theory makes differential predictions as to the results in the two- and eight-tube cases, hence the manipulation.

The main analysis indicated no significant difference between performance in the experimental and control trials, nor did it make any significant difference whether Ps attempted to influence their own blood or someone else's blood. It also made no difference whether the scores were based on two or eight test tubes. However, there was highly significant variability among the scores of individual subjects. Of the 32 subjects, 9 achieved independently significant scores, whereas only 1.6 would be expected by chance, assuming an alpha criterion of .05, two-tailed. Of the nine significant sessions, seven were in the psi-hitting direction and two were in the psi-missing direction. The author concluded from the excessive number of significant sessions that PK had been demonstrated in the experiment.

The main control introduced in Braud's (1990) study was the random ordering of the experimental and control trials, an order to which E was blind. Although this control is effective with respect to directional findings, it is not effective with respect to variance or bidirectional effects of the type Braud found. To illustrate, assume that E in the Braud (1990) experiment could by some means slightly influence the rate of hemolysis on individual trials. Assume further that E consciously or subconsciously made a guess for each session which two trials were experimental, and that the results of this guessing were purely random (no ESP). Finally, assume that E then unintentionally and unconsciously performed the hemolysis procedure such that hemolysis scores would be significantly higher in the *expected* experimental trials than in the *expected* control trials. This is quite plausible, as the bias could cumulate over the 10 tubes tested in each

condition. There are six possible combinations of trials in the experimental and control conditions, as illustrated below. (Note that the order of the trials within each experimental or control pair doesn't matter.)

Exp.		Con.	
1	**2**	3	4
1	3	**2**	4
1	4	**2**	3
2	3	**1**	4
2	4	**1**	3
3	4	**1**	**2**

Assume that for a particular session E expected Trials 1 and 2 to be experimental. (These trials are in boldface in the illustration above.) It can be seen that two of the six sessions (first and last rows) line up (bi-directionally) with E's guesses. One would expect significant results in these cases. In the other four cases, E is right once and wrong once, so the effects should cancel leaving a net effect of near 0. (Note that the probabilities are the same regardless of which two trials are selected as experimental.) Thus, the model predicts that significant outcomes should appear for one third of the sessions (33%). In fact, Braud (1990) obtained significant results in 9 of 32 sessions, or 28%—very close to what the model predicts. The model also predicts that the number of positive and negative directional outcomes (psi-hitting or psi-missing) should be the same. In fact seven of the nine significant outcomes were in the hitting direction, compared to the chance expectancy of 4.5. Although the obtained ratio is encouraging, the departure from the null hypothesis of an even split is not quite significant, exact binomial $p = .090$, one-tailed. In conclusion, the significant result from Braud (1990) conforms satisfactorily to the artifact model and thus cannot be claimed as evidence for psi.

So how could E have produced higher hemolysis scores in some trials than in others? The most likely means would be to subtly vary the starting times of the measurement process. In our experiment, we found it impossible in practice to keep the starting times uniform to the degree required. We quickly discovered that the 60 hemolysis measurements per tube do not decrease linearly over time. As illustrated in Figure 1, they follow a decelerating curve. This means that the rate of hemolysis is much greater at the beginning of the process than at the end. Thus, it makes a big difference what stage of the process one measures on a given trial. If one starts early in the process, the rate of hemolysis over a 1-min period (reflected by the slope of the curve) will be greater than if one measures later in the process. If E started on the average at slightly different times in experimental and control trials, an artifact could be generated. Although Braud (1990) was aware of the problem and reported efforts to keep the hemolysis measurement procedure uniform, no data are reported on how

successful these efforts were in reducing the variability of start times. Based on our experience, keeping the starting times absolutely uniform is very difficult if not impossible to achieve in practice.

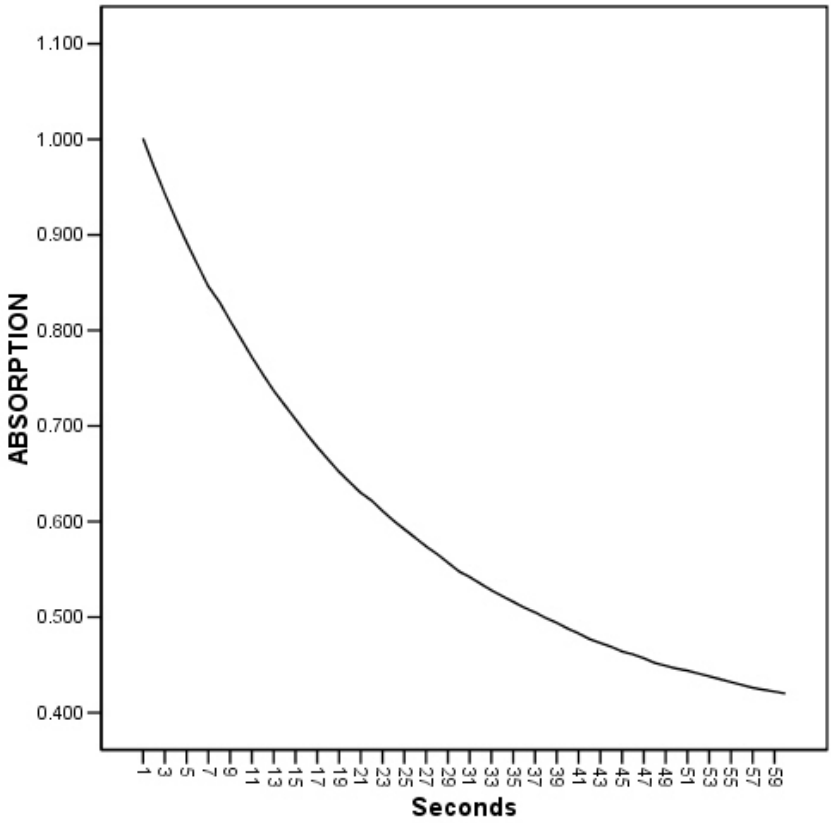

Figure 1. Decline in absorption of light over a 1-min interval in a hemolysis trial from Palmer et al. (2006).

We found in our data that the artifact is a quite strong one. We had 160 trials in our experiment, each involving eight cuvettes or hemolysis measures. For each trial we computed the correlation between the absorption score at the start time and the change in the average absorption score from the first to the last 5 s of the 1-min measurement period, the same change (hemolysis) measure Braud (1990) used. These 160 correlations ranged from +.051 to +.996, with a mean of +.703. We probably had more variability in our start scores than Braud did because our E had to overcome the additional hurdle of closing the door of a metal cage over the specimen before measurement could begin. However, she became quite proficient at this technique over the course of the study and some of the start-time

standard deviations were quite low. However, they would have to be nearly zero to erase the artifact. We found that the correlations described above correlated only a modest +.251 with the start-time *SD*s. Also when we restricted our sample to trials with *SD*s of .01 (representing a range of about .03 units on the absorption scale) or less for the start times (22.5% of the total trials), the mean correlation of .703 dropped only to .510. Fortunately, this artifact can be controlled for statistically (which we did), but Braud (1990) reported no such adjustments.

The one piece of evidence for psi in Braud's experiment comes from a separate paper that reports significantly ($p = .023$, one-tailed) greater activity in the earth's geomagnetic field (GMF) on the day preceding those hemolysis sessions showing a net decrease in hemolysis (psi-hitting) in experimental trials compared to psi-missing trials (Braud & Dennis, 1989). This finding refers to the direction of psi scoring and thus the artifact does not apply. Although this report combines the results of the formal experiment described above with those from an earlier pilot study, and the 1-day-before time was apparently selected post hoc from up to seven possibilities (including the day of the testing), the fact remains that a significant outcome was obtained that merits a replication attempt. In fact, we suggestively replicated Braud and Dennis's result in our own hemolysis experiment, using the Ap index (Palmer et al., 2006).

These GMF results, combined with the 7/2 split in favor of the predicted direction of the hemolysis effect among the high scoring participants, suggests that there might have been a real directional effect in Braud's (1990) data, but the support for this hypothesis is no more than suggestive. If the effect is real, the absence of a control for the effect of variation in the starting times of hemolysis measurement increases the likelihood that it was due to experimenter psi (see Palmer, 1997). The specific interpretation would be that E unconsciously used psi to select hemolysis starting times favorable to the hypothesis.

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Abstracts in Other Languages

Spanish

RESUMEN: En el 1990, William Braud reportó un experimento en el cual 9 de 32 participantes demostraron influencia mental remota sobre la hemólisis de células sanguíneas rojas con significación estadística, pero no todas en la misma dirección. Cada participante participó en 4 ensayos, 2 mientras intentaba una influencia (condición experimental), y 2 sin tal intento (control). Debido a que el proceso de hemólisis sigue una curva de deceleración en función del tiempo, el experimentador pudo haber creado este resultado bidireccional sin intención comenzando consistentemente el proceso de medición un poco antes o despues en pares de ensayos que él pudo haber adivinado eran condiciones experimentales en vez de en pares de ensayos que él había adivinado eran controles. Este pudo haber sido el case aún cuando él era ciego hacia las condiciones y aún si las adivinanzas no fueran mejores de lo esperado al azar. El hecho que 7 de los 9 esfuerzos "exitosos" fueron en la dirección esperada de retardación de hemólisis ($p = .09$), y que hubo evidencia de una correlación positiva entre retardación de hemólisis y el campo geomagnético de la Tierra el día antes de la prueba, indica un efecto direccional genuino en los datos de Braud, pero solo de forma sugestiva.

German

ZUSAMMENFASSUNG. William Braud veröffentlichte 1990 ein Experiment, in dem sich bei 9 von 32 Probanden ein mentaler Einfluss auf Distanz auf die Hämolyse roter Blutkörperchen statistisch nachweisen liess, allerdings nicht bei allen in der gleichen Richtung. Jeder Teilnehmer absolvierte 4 Versuchsdurchgänge (trials), 2 mit Beeinflussungsversuch (experimentelle Bedingung), 2 ohne Beeinflussung (Kontrollbedingung). Da sich der Hämolysevorgang in Abhängigkeit von der Zeit verlangsamt, hätte der Experimentator dieses bidirektionale Ergebnis unabsichtlich als Artefakt produzieren können, indem er konsistent den Ablesevorgang bei denjenigen Trialpaaren etwas früher oder später vorgenommen hätte, die er als zur Experimentalbedingung zugehörig einschätzte als bei denjenigen Paaren, die er unter die Kontrollbedingung rechnete, obwohl er in Bezug auf den tatsächlichen Stand der Trialdurchgänge blind war und sogar

wenn er beim Raten nicht besser als Zufall abschnitt. Die Tatsache, dass 7 von 9 „erfolgreiche" Beeinflussungen in der vorhergesagten Hämolyseverlangsamung lagen (p = .09), zusammen mit einem Hinweis auf eine positive Korrelation zwischen der Hämolyseverlangsamung und dem Erdmagnetfeld einen Tag vor dem Test, spricht für einen, wenn auch nur andeutungsweise, echten Richtungseffekt in Brauds Daten.

French

RESUME: En 1990, William Braud présenta une expérience dans laquelle 9 des 32 participants démontrèrent une influence mentale à distance sur l'hémolyse de cellules sanguines rouges jusqu'à un degré statistiquement significatif, mais selon des directions différentes. Chaque participant a complété 4 essais: 2 en essayant d'influencer (essai expérimental) et 2 sans rien faire (essai contrôle). Etant donné que le processus de l'hémolyse suit une courbe qui diminue en fonction du temps, l'expérimentateur pourrait avoir crée sans le vouloir ce résultat artificiellement, en commençant la mesure du processus un peu avant ou après les paires d'essais, devinant ainsi où étaient les paires expérimentales et les paires contrôles, même s'il était aveugle quant au statut actuel de l'essai, et même s'il ne devinait pas mieux que ce qui est attendu du hasard. Le fait que 7 des 9 essais ayant "réussi" furent dans la direction prédite du retardement de l'hémolyse (p = .09), en plus de la preuve d'une corrélation positive entre le retardement de l'hémolyse et le champ magnétique terrestre le jour avant le test, indique un véritable effet dans les données de Braud même s'il est d'une faible teneur.