

## Experimental

# REMOTE INFLUENCE OF HUMAN PHYSIOLOGY BY A RITUAL HEALING TECHNIQUE

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Two experiments tested the hypothesis that remote calming effects of a traditional healing ritual can be objectively measured using indicators of electrodermal activity, heart rate and blood volume. A total of 14 sessions were conducted in the initial study and 16 sessions were conducted in the replication. In both experiments, the authors exchanged roles as experimenter, healer and patient. Healers were instructed to try to calm the remote patient using a set of traditional ritual magic strategies, or to exert no influence (as a control).

The patient created a doll in his or her likeness and provided mementos, pictures and an autobiographical sketch. The healer used these materials to form a sympathetic connection with the patient who was located in another building in an isolated room. During the experiments, there were no other connections between the healer and the patient.

Each session consisted of a randomized counterbalanced sequence of five calming and five control epochs of one minute each. No performance feedback was provided to the healer or patient during the session. The combined results of both experiments showed significant effects for changes in blood volume ( $p = .00002$ ), heart rate ( $p = .001$ ) and electrodermal activity ( $p = .013$ ), suggesting that traditional magic healing rituals caused significant relaxation of the vascular system and arousal of electrodermal activity. These rituals appear to be helpful in focusing mental intention in laboratory investigations of direct mental interactions with living systems.

**KEYWORDS:** Physiology, healing, ritual practices

## INTRODUCTION

**T**he phrase “Direct Mental Interactions with Living Systems” (DMILS) was introduced by William Braud to describe the effects of mental intention on the physiology of *remote* biological systems shielded from conventional informational and energetic influences.<sup>3-5</sup> In Braud’s experiments, the distant systems have included, for example, another person’s electrodermal activity and blood pressure, the spatial orientation of fish, and the locomotor activity of small mammals. Meta-analysis of these experiments shows that the effect is relatively robust (effect size  $r = .33$ ).<sup>4</sup>

Braud and Schlitz view their experiments as laboratory analogies of mental healing.<sup>4</sup> We take this to refer primarily to so-called low-aim epochs, that is periods in which a “healer” creates and maintains an intention to calm a remote patient, and to thereby decrease the activity of the patient’s autonomic nervous system. In such periods, one can view the healer’s task as exerting a bias in the direction of a healthy, relaxed physiological state similar to local intervention techniques like Therapeutic Touch.<sup>6-8</sup>

In trying to develop a systematic, positive application of DMILS, it would be wise to consider traditions that have long used similar remote intervention techniques, but have been repressed in most modern, “sophisticated” cultures. While the techniques used to study DMILS have been developed according to conventional scientific procedures and concepts, the DMILS experiment itself is actually a modern version of the same principles that underlie certain traditional magical healing rituals.

Anthropologist James Frazer first proposed a distinction between two categories of magic: sympathetic magic and contact magic.<sup>9</sup> A similar principle underlying both types may be called a principle of connectedness.<sup>10</sup> The type of connectedness that is operative in sympathetic magic might be compared to the idea of using a focusing device to represent a remote target person. This idea is encountered in many forms, ranging from DMILS experimentation to psychometric claims of psychics, and even to prayer in the direction of a crucifix on the wall.<sup>4</sup>

## COMMON FEATURES

A common feature of these studies is the use of feedback to assist the healer<sup>11</sup> in focusing on the patient. Studies have employed a real-time video image of the patient,<sup>12-14</sup> or the patient's real-time physiological state,<sup>5</sup> or both.<sup>15</sup> While it is not known if such feedback is necessary, it is often assumed that feedback assists the healer's focus, and so some form of feedback is usually employed.

Another common feature is that while the healer and patient are both important factors in these studies, more explicit attention is usually given to the patient. That is, the experimental protocols usually allot a fair amount of time and effort to attaching the patient's electrodes, making sure their physiology is being recorded properly, ensuring that they are relaxed but not overly relaxed so as to fall asleep, and that they are comfortable with the idea of being remotely influenced. The patient's physiology comprises the primary data of the experiment, and the patient is often a volunteer or a recruit for the experiment.

**B**y contrast, the attention given to the healer tends to be less satisfying, because other than the anecdotal suggestions of practicing psychic healers, there is little empirical evidence suggesting what a healer should actually do. Typically, depending on the nature of the study, the healer is asked to imagine the patient in a calm or activating setting, to imagine that their physiological feedback changes in accordance with (randomly assigned) instructions, or to just gaze at the video image of the patient. That is, the presence of feedback is assumed to be enough. Healers also tend to be a member of the laboratory staff, or one of the experimenters so they are less likely to receive any special attention.<sup>12,16</sup>

But this raises a curious paradox. Presumably, the healer and patient both play important roles in these experiments; the patient is usually passive and the healer is usually active. And yet, there is more experimental emphasis placed on the passive side of the healer-patient interaction than on the active side, and the active side is the only side that actually *does* anything in the usual protocol.

Therefore, for this experiment we decided to focus on the role of the healer. Instead of providing the usual forms of real-time feedback, which may actually

distract the healer from the optimal mental state because it creates an abstract representation of the patient as opposed to the richness of the actual patient, the present study investigated a simple but traditionally powerful focusing aid based on ideas from traditional sympathetic magic. We explored a scheme in which the healer focused on the patient by gazing at a doll made in the likeness of the patient, by the patient. Along with the doll were mementos, pictures and an autobiographical sketch of the patient.

## THE IMPORTANCE OF CONNECTION AND FOCUS IN HEALING RITUALS

**B**ecause the healer was asked to establish a connection to the patient through the use of a doll and other artifacts offered by the patient, it is useful to briefly discuss the concept of sympathetic magic and the act of focusing in traditional healing rituals.

As described by Frazer,<sup>7</sup> sympathetic magic is based upon two ideas:

First, that like produces like, or that an effect resembles its cause; and, second, that things which have once been in contact with each other continue to act on each other at a distance after the physical contact has been severed.<sup>7(p.11)</sup>

One of the better known practices of sympathetic magic is voodoo (voodoo in the vernacular), typically practiced in Haiti. This practice has acquired a generally negative connotation because of its use of ritual animal sacrifice, its association with zombies, and its use of spells to supposedly control people at a distance. There are two essential aspects of voodoo. The first is the assumption (as in Frazer's description of sympathetic magic) that there exists a sympathetic *connection* between the practitioner and his "patient," and second (a more implicit feature of sympathetic magic), the importance of *focus* of the practitioner on objects believed to be an extension of the person, such as a representative extension of the patient they wish to manipulate.<sup>17</sup>

These two important elements of connection and focus are evidenced in many indigenous healing practice.<sup>18,19</sup> According to Frazer,<sup>7</sup> Native American healing rituals use the same idea of connection and focus;

Native American practices include drawing the figure of a person in sand, ashes, or clay . . . and then pricking it with a sharp stick or doing any other injury, they [the Native American Practitioners] inflict a corresponding injury, on the person represented.<sup>7(p.13)</sup>

The anthropologist Levi-Strauss noted that the shaman establishes a connection with the patient's conscious mind first and then manipulates the patient's belief system by a variety of ritual activities.<sup>18</sup> These activities act as focusing procedures for the shaman.

Another example of this type of connection and focus is a long standing healing tradition among some of the Andean indigenous people involving the use of a guinea pig. The practitioner rubs a guinea pig over the body of the patient, directing the illness to move from the person into the guinea pig. The animal is then cut open, the 'disease' pulled from its body and then shown to the patient to complete the healing ritual.<sup>20</sup> The connection is made by the practitioner to the patient and the guinea pig is used as a ritual focusing object.

According to Nancy Mum, a cultural anthropologist, ritualistic objects and symbolism are important to the experience of healing because,<sup>21</sup>

Symbolic objects can embody or represent power, in this case, the power to heal. Another key characteristic of symbolic objects is their capacity to link subjective experience, *i.e.*, cognition, emotion and sensual perception with a culturally available [objective] scheme of shared meaning.<sup>21(p.608)</sup>

**F**urthermore, the use of objects (or symbolism) as mediating devices for healing also appear in more modern cultural beliefs. Superstitions such as wearing copper bracelets to ward off arthritis, and wearing amulets around one's neck to protect against illness are practiced to this day in modern societies.<sup>22</sup>

## MENTAL FOCUS AND REMOTE INTENTION

This experiment brings together the use of ritual objects and the connection of a healer and patient in a modern experimental test of sympathetic magic. While sympathetic magic is considered a hopelessly primitive idea by contem-

porary science, both connection and focus are key elements employed in some of the most convincing psi research to date, that of remote intention.<sup>23</sup>

For example, earlier parapsychological research in remote intention presented strong evidence that a person can influence another by intending to activate or calm their physiology.<sup>4</sup> Essentially, the healers mentally directed their desires to manipulate the patient. The connection made between the two was an internal one. Although video feedback (the focus) was successfully used to provide the healer with real-time progress,<sup>5,12-14</sup> the picture was of a relatively unexciting image of the patient. The focus in this case may not have been sufficiently engaging to maintain the connection.

**I**t is conceivable that the use of an external focus (*i.e.*, the doll) may provide the healer with a closer analog to a real patient. In this experiment, the doll presented the healer with a kinesthetic outlet for focusing their intentions. The doll, crafted in the image of the patient, may provide a more complete symbolic resemblance than say, a video image as used in earlier experiments. This method of externalizing the healer's focus may help to further strengthen the impressive results of earlier remote influence experiments.

## THE VALUE OF TRADITIONAL RITUALS IN AN EXPERIMENTAL CONTEXT

The present study was conceived to test the idea that magic rituals, in this case an adapted voodoo healing technique, might be used to induce physiologically measurable relaxation effects within a controlled setting. If these effects were similar to those observed in a more conventional DMILS studies, then incorporating these techniques could make the experimental requirements less costly (by eliminating the necessity of real-time feedback infrastructure and hardware) and the task less scientifically sterile and abstract. These would be significant advantages when it comes to developing future DMILS-based healing applications.

The universal (albeit repressed) prevalence and persistence of magic, deeply embedded within many aspects of modern culture, suggests that magical thinking is fundamental to how human beings think. Thus, healers in DMILS

studies may find valuable psychological resonance by using magical techniques. In addition, magic may make the very concept and the “rituals” of DMILS experiments more intuitively plausible for subjects without scientific backgrounds.

## METHOD

### PARTICIPANTS

The first, third and fourth authors were the subjects in the initial experiment. For two reasons, we felt it was important not to bring in any participants from outside the lab for this study. First, there is a delicate matter of personal trust in this sort of experiment which was established in this case by working only with colleagues. The goal, after all, was to attempt to directly affect another person’s physiology. Second, by switching roles (healer, patient, experimenter) we hoped to provide a more motivating personal context as well as enhance our ability to learn about DMILS by actively doing, rather than by passively observing.

### FACILITIES

**T**he healer and patient were situated in two adjacent buildings. The rooms were on different floors and were separated by about 100 meters with several walls in between (Figure 1). There were no telephones, cables, computer networks, or any other connections between the rooms. Therefore, contrary to the usual DMILS set-up, no direct feedback to the healer was provided, or in this case, required. The healer’s chamber was a quiet, acoustically and electromagnetically shielded room with black fabric walls and ceiling, and a mirror on one wall. A darkened room creates an atmosphere which inhibits analytical thought, and stimulates the feeling of being sealed away from the outside “profane” world.<sup>24</sup>

Ritual objects were placed on black cloth on a small table in the center of the chamber, on which a golden candle burned. The candle was the main source of illumination. A laptop computer was also placed on the table, which was

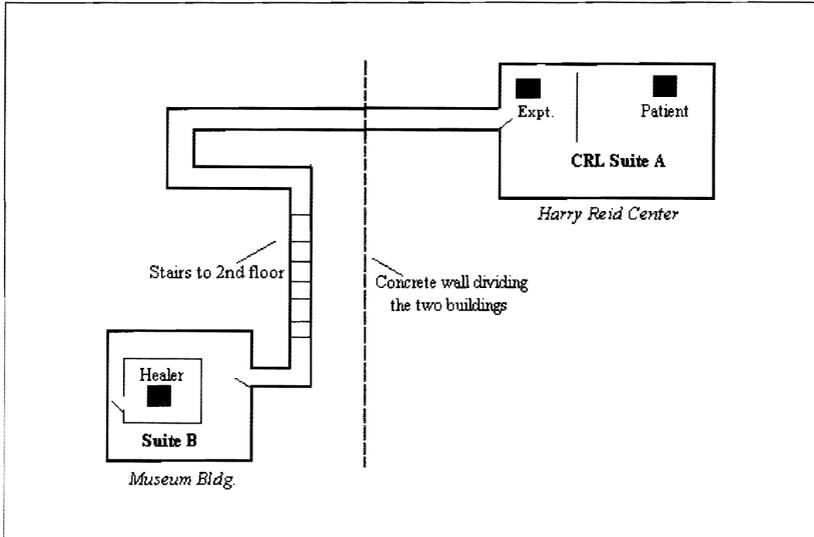


Figure 1. Layout of the experimental rooms.

used to present instructions to the healer (described later). In all, we created what looked like an suitable environment for a ritual to take place.

## PHYSIOLOGICAL MEASURES

Healing rituals are reported by their practitioners to influence a wide variety of bodily and psychological functions. Most of these would be expected to register as changes in autonomic nervous system parameters typically used in DMILS experimentation. We measured heart rate (HR), electrodermal activity (EDA), and blood volume pulse (BVP) in the finger.

EDA was measured by affixing two silver-silver chloride electrodes to the middle finger and forefinger of patient's left hand, using a self-adhesive collar on each electrode. Conductive paste was used to improve electrical contact with the skin. HR and BVP were measured by affixing a photoplethysmo-

graph electrode on the ring-finger of the left hand. The electrode leads were connected to a computer-based physiological monitoring system<sup>25</sup> that was set to sample physiology at 10 samples per second and return one mean value per measure per second over the duration of a session. A baseline period of 5 minutes was used to allow hydration of the paste into the skin and to allow for the patient's physiology to become stable before the experiment was to begin. The digitized physiological output was recorded on hard disk for later analysis.

## RITUAL OBJECTS

**T**he choice of items used in healing rituals depends on tradition and on what is at hand in a particular cultural setting. In general, specific forms of magic seem to be related to their historical contexts. For example, spells, rituals, and ritual items that may have been effective in evoking anomalies in 18th century Haiti might not be effective in the US (or even Haiti) today. In the US, for modern ritual practitioners, the children's modeling clay known as Play-doh is readily at hand, and so for this experiment, each participant molded a figure of him/herself out of Play-doh. Inside each figurine, the participant put personal belongings, messages, nail clips, hairs, and whatever else a participant felt to be a "living part" of him/herself. In traditional voodoo rituals the representational figure is typically not molded by the person who is represented, but, given the idea of "extension" we presumed that we would gain a possible extra effect when the patient shaped the figure with his/her own hands.

Other props used by the healer were photographs of the patient, his or her watch, and other personal belongings. Each participant wrote a one page autobiography which supplied the healer with additional material for identification with the patient. The autobiography also listed a number of situations that the patient would experience as particularly relaxing (e.g., "sunset at the coast of an ocean") and some indications of sensitive bodily areas (e.g., shoulders), where the patient was specially receptive to relaxing influences.

## EXPERIMENTAL PROCEDURE

### THE EXPERIMENTER

**T**he experimenter (E) ensured that the computer system clocks were synchronized on the laptop computer used by the healer (described below) and the computer used to collect the patient's physiological data. Once this was done, E gave the laptop to the healer and reminded him or her to begin the laptop's instruction program in about five minutes. The healer then left the lab and went directly to the ritual chamber. At this point, E then hooked up the patient's physiology electrodes, and started the data collection program. After that, E simply sat behind a screen and waited for the end of the session.

### THE HEALER

The healer used the first five minutes before the first experimental epoch to prepare for the session, reading the patient's autobiography, and by trying to make a remote mental connection to the patient. During the remote relaxation epochs (the influence periods), the healer was free to use any strategy he or she felt would calm the patient's physiological state. This meant directing calming thoughts towards the ritual doll and photographs, making massaging gestures over parts that were pointed out beforehand by patient as being especially sensitive to stress, visualizing the patient in situations that s/he had pointed out as being calming, and using Therapeutic Touch-like techniques on the doll while visualizing the patient.

Each session was assigned a random schedule of 10 influence/control epochs. This schedule consisted of one of four counterbalancing schemes of five I, Influence and five C, Control (no influence) epochs. The scheme used on each successive session was randomly chosen by a pseudorandom number generator (whose seed number was re-set to the computer's current system clock each time the counterbalancing scheme was used). The four sequences were: ICCIICCI, CIICCIIC, ICICICIC and CICICICI.

Each influence or control epoch lasted for one minute, with 11 seconds between epochs during which the healer could prepare for one of three possible changes of instruction. The program cued instructions through an audio signal to attract the healers attention. These instructions were “Influence,” “Control,” or “Prepare for change of instruction,” and were displayed on the laptop computer screen on the table in the healer’s chamber.<sup>26</sup> The program on the laptop also indicated when the session was over, whereupon the healer left the chamber and came down to the lab where the patient and experimenter were waiting. He or she then knocked on the laboratory door to alert the two that the session was over.

One session thus took 10 x 71 seconds, plus about five minutes preparation time at the beginning of the session, for approximately 17 minutes. A series of three sessions were usually done in a row, in which each participant took each of the three roles in the experiment.

## THE PATIENT

**T**he patient’s role was to sit quietly and wait for the session to end. At the beginning of a session, the patient was asked to make a “silent wish” to connect to the healer.<sup>4</sup> From the moment data collection started to the moment when the healer’s knock on the door of the lab announced the end of a session, the patient simply gazed at a color screen saver on a computer monitor. This was a random display which reminded him/her to maintain unstructured thoughts and neither strive to become especially calm nor aroused. In other words, the patient tried to remain in as neutral a condition as possible and to make no deliberate attempt to reinforce or block any real or imagined influences. To help prevent the patient from becoming too relaxed, he or she was seated in a normal office chair and the room lights were kept on during the whole session.

## HYPOTHESIS

The hypothesis was that the patient would be more relaxed during the mental influence epochs than during control epochs, presumably due to the voodoo

healing techniques used by the healer. This would imply, comparing influence to control, that HR would be negative, EDA would be negative, and BVP would be positive (*i.e.*, more blood in the periphery reflecting vascular relaxation). It was not expected that these effects would appear instantaneously, because it would presumably take time to mentally “shift gears” when switching between the influence and rest conditions. Thus, we expected any remote effects to “build up” over the course of the epoch, peaking sometime before the 60 second end point.

## ANALYSIS

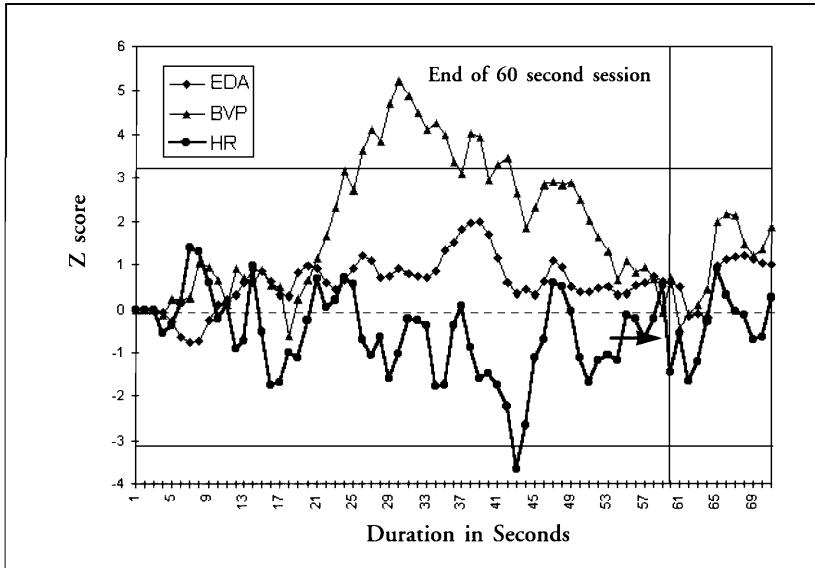
**B**ecause tonic (baseline) levels of physiology slowly change within and between participants over different epochs and different sessions, we were not interested in the absolute levels of the physiological measures, but in the *change in levels* given the baseline physiology per epoch. Thus, the data were analyzed as superposed epochs of Influence and Control periods. For each 60 second epoch, first the mean for each epoch was determined, then mean-difference values per second per epoch were determined, and finally the overall per second mean and standard deviations for all Influence epochs and all Control epochs were determined.

From these means and standard deviations, *z* scores of the difference between the influence and control conditions were formed for each second of the epoch as  $z = (\bar{I} - \bar{C})/sd$ , where *sd* was the combined standard deviation of the Influence and Control epoch means per second, and  $\bar{I}$  and  $\bar{C}$  were the per-second epoch means. To form a conservative measure of significance, we decided [post-hoc] to apply Bonferroni corrections to take into account the 60 significance tests (one per second of the epoch). This means a probability of .05/60 or .00083 (equivalent to a *z* score of 3.14) would be considered “significant” for any individual second during the superposed epoch.

## RESULTS

The results, shown in Figure 2, suggest that the remote influence was successful for the vascular system, with BVP increasing significantly and HR

decreasing significantly, but it took 25 to 30 seconds for the effect to “build up,” and the main relaxing effect lasted at most only 20 seconds. EDA, by contrast, suggested a very mild state of arousal over most of the epoch.



*Figure 2. Z scores for the difference between the Influence and Control conditions for EDA, HR and BVP. Z scores above 3.14 and below -3.14 are significant at  $p = .05$ , after correction for multiple analyses.*

## DISCUSSION

**R**esults of the experiment showed that the vascular system produced a relaxation response as expected, but EDA responded slightly in the direction more commonly associated with arousal. This apparently paradoxical result—relaxed arousal—was puzzling, but the bottom line was that controlled use of a magical technique caused remote physiology to respond in ways that are unexpected according to the null hypothesis. This raises an interesting question: How should we think about the use of magic in the laboratory?

In its search for acceptance by the scientific community, parapsychology as a discipline has tended to shy away from associating neutral, white-coated psi in the laboratory with traditional magic. However, studying such relationships does not automatically imply a regression to a pre-rational mode of thinking. Instead, we might find that there is much to learn from concepts and techniques that have developed over millennia.

**W**hile it is easy to emphasize the differences between science and magic, there are also some striking similarities. Both science and magic involve certain arcane rituals reserved for an elite of specially selected, trained and initiated experts. Both postulate systematic hierarchies of forces and “entities” that actively determine all phenomena that ultimately arise from “behind” or “below” the world of common sense observations. Both have developed internally consistent knowledge structures. Adherents both claim that the systems “work” if properly applied. Of course, the technological level of modern science demonstrably works, while the effectiveness of magical techniques are not so clear.

In contrast, an examination of the metaphysical assumptions underlying magic and science reveals that the former world is permeated with meaning and deep, living interconnections among other things, whereas the latter is permeated with meaninglessness and isolation. It is any wonder then why magical thinking still lies close beneath the veneer of the sophisticated modern mind? Magic is much closer to the world of common experience and science presents an alien world of invisible, dead particles, waves, and fields.

With this in mind, DMILS experiments may be viewed as a sort of bridge between the scientific and the magical. It provides a scientifically valid ceremony, a sequence of rituals that is justified according to rules and criteria of science, and it furnishes participants and experimenters with a meaningful context in which psi can manifest in a logical, statistical and nonthreatening product of a well-defined, pristine recipe. And yet, the result of this process points to an existence that is not (yet) well accommodated by science. One cannot help but wonder, as the foundations of science shift with each new discovery, whether this paradox will continue to move us away from primitive magical thinking to an even more materialistic, mechanistic view of the world, or towards a more comprehensive perspective that also includes some principles of the so-called perennial wisdom.

## AN EXPERIMENTAL TEST OF REMOTE HEALING RITUALS: REPLICATION

This study was designed to closely replicate the earlier experiment. The only differences were the involvement of two new participants<sup>28</sup> in place of Wezelman and Stevens, the use of a J & J Instruments I-410 physiological monitoring system instead of a J & J Instruments I-330 system used in the original study, the use of a richly detailed poster instead of a computer screen saver for the patient to stare at, and the introduction of a straight back chair as opposed to a comfortable (reclining) chair used in the original experiment. The I-410 model of J & J's physiological system is an updated and more user-friendly physiological system.

**A**s in the initial study, before the experiment began the participants created a small doll in their image. Along with the doll, they included other small objects, pictures, jewelry, an autobiography and personally meaningful tokens into a kit intended to "represent" them to the healer. In addition, they provided a list of situations or actions that made them feel nurtured, calm and comfortable. This personal information was used by the healer to make the sympathetic connection to the patient and to guide their healing intention. Three participants each acted as experimenters, healers and patients. The specific role was decided by the group before each session, and the three participants took each role approximately the same number of times.

### DATA ANALYSIS

Data was analyzed as before, using superposed epochs of Influence (I) and Control (C) periods. For each 60 second period, first the mean for each epoch was determined, then mean-difference values per second were determined, and finally the overall mean and standard error for each Influence and Control sample, per second were determined. Then, because we were interested in seeing how physiology *changed* from the beginning of each epoch, subsequent analyses looked at the difference between the first sample and subsequent samples of the epoch means.

Z scores of the difference between the Influence and Control conditions were formed for each second of the epoch as  $z = (I - C)/sd$ , where  $sd$  was the

standard error of the difference between the Influence and Control values, per second, and  $I$  and  $C$  were the per second means.

## PREDICTIONS

The main advantage of the replication study is that we could make specific predictions based upon the results of the first experiment. We formed a model of the expected physiological changes in this experiment by combining EDA, BVP and HR per second according to the equation,  $z = (z_{EDA} + z_{BVP} - z_{HR}) / \sqrt{3}$ . This model (shown in Figure 3) indicates that we expected, in general, to observe a rise in EDA and BVP and a drop in HR, as we had originally observed.

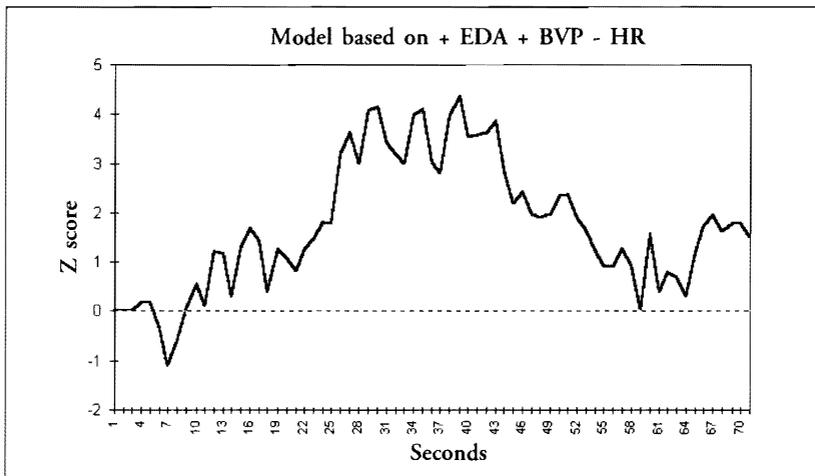


Figure 3. Combined physiological prediction based on actual physiological results of the initial experiment.

## RESULTS

The first author completed 6 sessions as the patient, RH, completed 6 sessions as patient (with one of those 6 only comprising 4 I and 4 C periods due to a prior scheduling commitment), and KG completed only 4 sessions (one of those sessions consisted of only 4 Influence/Control periods due to

a scheduling conflict). This resulted in a total of  $(60) + (60 - 2) + (40 - 2) = 156$  periods, of which 78 were Influence and 78 Control.

As in the original experiment, the superposed epoch analysis (shown in Figure 4) resulted in significant positive EDA (peak  $z$  score = 3.53, adjusted  $p = .0004$ , one tailed), significant positive BVP (peak  $z$  score = 2.887, adjusted  $p = 10^{-2}$ ), and a significant negative HR (peak  $z$  score = -3.429, adjusted  $p = .001$ ). Figure 5 shows the combined physiological results following the model shown in Figure 3.

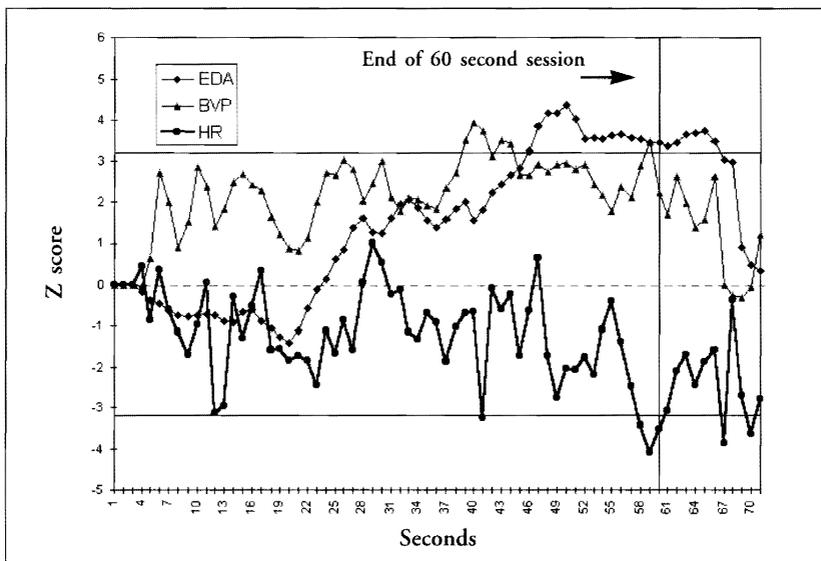


Figure 4. Z scores of the difference between Influence and Control periods for EDA, BVP and HR.

## COMBINED RESULTS

Figure 6 shows the combined physiological data from the initial and replication studies. This graph suggests that for both studies, the remote influence period was successful for the vascular system. BVP eventually increased significantly and HR decreased significantly. EDA also achieved a significant difference, but in an unexpected *positive* direction.

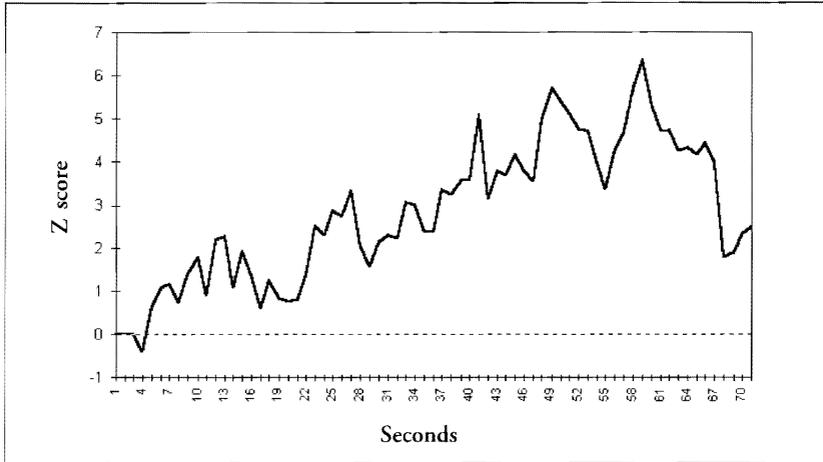


Figure 5. Model of results combining the physiological measures according to the prediction + EDA + BVP - HR (as in Figure 3).

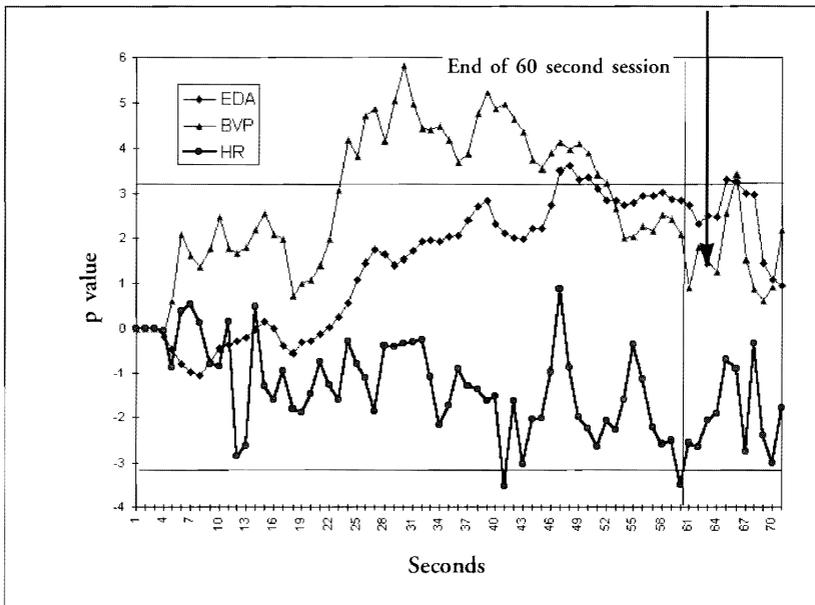


Figure 6. Z scores for the difference in Influence and Control conditions for EDA, HR and BVP in the initial and replication studies combined (N= 132).

Table I shows the minimum p-values achieved for differences between the Influence and Control conditions for EDA, BVP and HR in the individual experiments and for the combined results.

Experiment	Electrodermal (EDA)	Blood Volume (BVP)	HeartRate (HR)
Initial (N = 54)	.977	.0000006	.007
Replication (N = 78)	.0004	.002	.001
Combined (N = 132)	.009	.0000002	.013

## PREDICTIVE MODEL COMPARISON

Figure 7 compares the model of combined physiological measures from the original experiment to the results of the replication. By inspection we see that the two models resulted in very similar physiological trends for the first 45 seconds of the epoch. The results went opposite to our original one-tailed

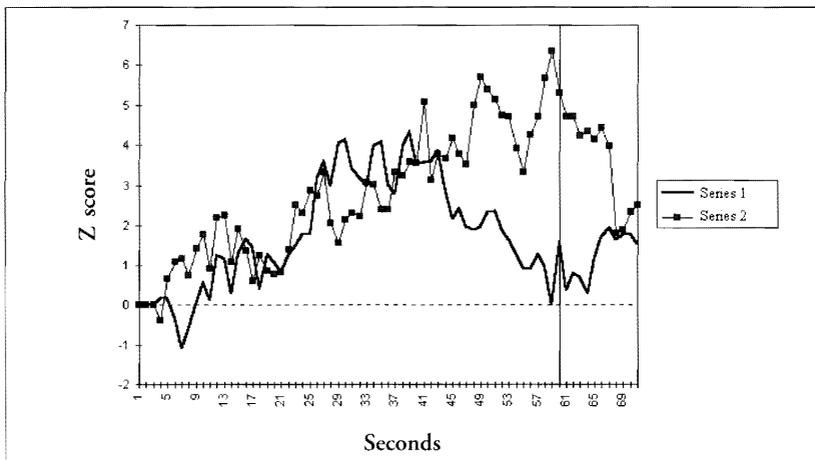


Figure 7. Physiological predictions of the original (series 1) and replicated result (series 2).

prediction; for the combined data, we reversed the prediction based on the observed results in the first study.

## DISCUSSION

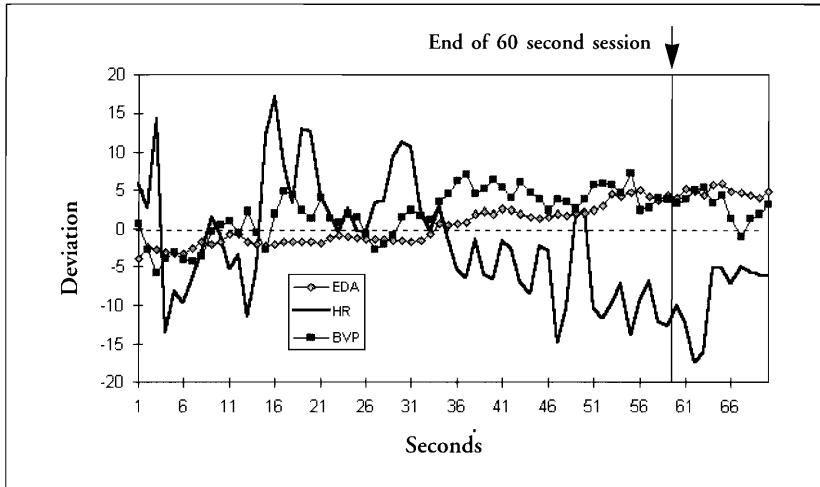
**T**he experiment significantly repeated the results observed in the initial experiment. Both experiments showed significant trends, positive for EDA and BVP and a negative trend for HR. But the EDA results in both cases were puzzling. While the trends in HR and BVP both indicated a relaxation response, which makes sense given that the healer was attempting to remotely “nurture” the patient, a rise in EDA indicates that some aspects of the autonomic nervous system were becoming aroused.<sup>31,32</sup>

In an attempt to understand the surprising EDA result, we examined the techniques used by the participants to nurture the dolls. It was noted that we all rubbed the shoulders of the dolls to effectively give the patient a “remote massage” and we stroked the hair and/or face of the dolls.

We therefore speculated that perhaps the physiological measures in both experiments resembled the state of the body during an actual hands-on massage, which may be a combination of vascular relaxation and autonomic arousal. While such a paradoxical condition may seem unlikely it turns out that previous research on the effects of human touch on horses and other animals shows the very same effect. For example, when an owner pets a horse, its EDA increases and its HR decreases.<sup>33</sup>

## REMOTE VERSUS LOCAL NURTURING

To test whether we might have been observing a “remote massage” effect, the first author (JR) asked the fifth author (RH) to participate in an experiment where we wished to see what would happen when JR directly massaged RH’s shoulders and stroked his hair. In this experiment, EDA, BVP and HR were monitored by the J & J I-410 system, and RH’s physiology was first recorded for 60 seconds (followed by an additional 11 seconds for a total of 71 seconds) as in the replication experiment. This acted as a control period. This was



*Figure 9. Difference between hands-on massage and control period. This ordinate is the raw difference in physiology measures, thus HR is in beats per minute and EDA & BVP are in arbitrary units ranging from 1 to 100.*

followed by another 71-second epoch during which JR massaged RH just as she had previously massaged RH's *doll* in the experiment. The difference between physiological measures in the the control and massage periods is shown in Figure 8.

**F**igure 9 shows the combination of physiological measures modeled as in Figure 7. This shows the same general trend as those seen in the original study and in the replication. In the massage experiment, over the 60 second epoch EDA increased about 10% over the control EDA, HR decreased almost 25% and BVP increased around 5%. That is, the body showed a simultaneous relaxation (of the vascular system) and arousal (of electrodermal activity).

Comparison between the remote nurturing (Figure 5) data and the massage data (Figure 9) suggest that the local actions and thoughts of the healer were mimicked in the remote patient *as though the healer and patient were actually next to each other*. The implications for designing future studies of remote interactions are clear: Test the strategies of the healers locally before testing

them remotely. They may cause the same physiological responses in local patients as in remote patients. This result also supports the primitive belief that a non-local sympathetic connection acts as though it were local.<sup>21</sup>

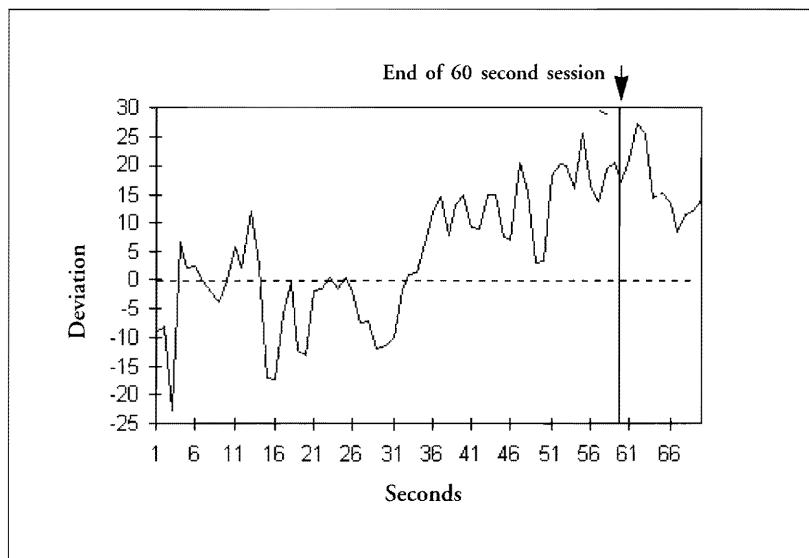


Figure 9. Hands-on massage data based on the predictive model algorithm.

## CONCLUSION

This experiment successfully replicated an earlier study exploring remote influence on human physiology using magical healing rituals. In addition, a post-hoc experiment confirmed that the same physiological reactions produced in a remote nurturing condition also appeared in a hands-on local-nurturing condition.

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26. The presentation of the instructions displayed on the laptop were time-stamped so the time and assignment of each epoch could later be time-synchronizd with the recorded physiological data.
27. Physiology is highly auto-correlated, of course, so combining  $z$  scores with the Stouffer  $z$  method gives an over inflated estimate of the overall effect.
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29. A rise in BVP means blood flows to the fingertips, indicating a possible relaxation response.
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