

NONLOCALITY, INTENTION, AND OBSERVER EFFECTS IN HEALING STUDIES: LAYING A FOUNDATION FOR THE FUTURE

Stephan A. Schwartz,^{1#} and Larry Dossey, MD²

All research domains are based upon epistemological assumptions. Periodic reassessment of these assumptions is crucial because they influence how we interpret experimental outcomes. Perhaps nowhere is this reassessment needed more than in the study of prayer and intention experiments. For if positive results from this field of research are sustained, the reality of nonlocal consciousness must be confronted. This paper explores the current status of healing and intention research, citing a number of major studies and using the “Study of the Therapeutic Effects of Intercessory Prayer (STEP) in Cardiac Bypass Surgery Patients: A Multicenter Randomized Trial of Uncertainty and Certainty of Receiving Intercessory Prayer” as a case study of this line of research. The paper argues that the dose-dependent model typical of drug trials, and adopted for use in the STEP and other studies, is not the optimal model for intention-healing research, and critiques this approach in detail, citing apposite research from which we draw our recommendations and conclusions. The paper suggests that the usual assumptions concerning blindness and randomization that prevail in studies using the phar-

macological model must be reappraised. Experimental data suggest that a nonlocal relationship exists among the various individuals participating in a study, one which needs to be understood and taken seriously. We argue that it is important to account for and understand the role of both local and nonlocal observer effects, since both can significantly affect outcome. Research is presented from an array of disciplines to support why the authors feel these issues of linkage, belief, and intention are so important to a successful, accurate, and meaningful study outcome. Finally, the paper offers suggestions for new lines of research and new protocol designs that address these observer-effect issues, particularly the nonlocal aspects. The paper finally suggests that if these effects occur in intention studies, they must necessarily exist in all studies, although in pharmacological studies they are often overshadowed by the power of chemical and biological agents.

Key words: Intention, prayer, healing, observer effect, consciousness, placebo, nonlocal consciousness

(*Explore* 2010; 6:295-307. © 2010 Elsevier Inc. All rights reserved.)

INTRODUCTION

Epistemologically periodically reassessing what constitutes good research is crucial because this process gives us the ability to distinguish justified belief from opinion. Perhaps nowhere is this distinction of greater significance than in the study of prayer and intention experiments. For if the positive results from this field of research are sustained, the reality of nonlocal consciousness must be taken seriously. This paper explores the current status of healing and intention research, cites a number of major studies, and uses the “Study of the Therapeutic Effects of Intercessory Prayer (STEP) in Cardiac Bypass Surgery Patients: A Multicenter Randomized Trial of Uncertainty and Certainty of Receiving Intercessory Prayer” conducted by Herbert Benson et al¹ as a case study of this line of research. In April 2006, researchers from Harvard Medical School published this long-awaited study in the *American Heart Journal*.¹ The \$2.4 million study was funded in large part by the John Templeton Foundation, which promotes the study of the intersection of religion and science. Its publication grabbed headlines across America for two main rea-

sons: it originated from Harvard Medical School, and it had an unexpected result—patients who were prayed for, and knew they would be prayed for, fared the worst of the three intervention groups.

Because of its venue, its level of funding, and the media attention the study has engendered, we have selected this study as a case demonstrating issues common to much of this research field, and we use it to explore those issues. In the process, we also examine attitudes that prevail in the arguments of both proponents and skeptics of prayer and intention research. What we seek is a discussion on the basic assumptions implicit, but usually unacknowledged, in these studies, and a reappraisal of the design parameters upon which prayer and intention studies have been grounded. In our view, STEP is a noble failure; noble because it was done with integrity, on the basis of imperfect understanding, and because its failure has much to teach us.

STEP BACKGROUND

The STEP experiment involved 1,802 patients undergoing coronary artery bypass surgery at six US hospitals.¹ These 1,802 patients were then assigned to one of three subpopulations. Therapeutic intention in the form of prayer was provided by one Protestant and two Catholic groups, whose members were told to pray for a quick recovery with no complications. They were provided only with the first name and the initial of the last name

1 Senior Samueli Fellow for Brain, Mind and Healing of the Samueli Institute, columnist for *EXPLORE*, and editor of the SchwartzReport available at: www.schwartzreport.net

2 Executive Editor, *EXPLORE*

Corresponding Author. Address: P.O. Box 905 Langley, WA 98260
e-mail: saschwartz@earthlink.net

of the prayer participants—"John D." Prayers were initiated on the eve or the day of surgery and continued for two weeks thereafter.

The three groups consisted of the following (the group names are our designation):

- Group A: 604 patients who were told they might or might not be prayed for, and were; of this group, 52% had postsurgical complications
- Group B: 597 patients who were told they might or might not be prayed for, and were not; among this group, 51% had postsurgical complications
- Group C: 601 patients who were told they would be prayed for, and were; among this group, 59% had postsurgical complications

To many skeptics in both media and science, it was this last result that was the headline of the study, suggesting that prayers for the sick might actually be harmful.

How can these results be understood? To begin with, the differences between the two blind groups, those who were told they might or might not be recipients, one of which eventually was prayed for, whereas the other was not, are nonsignificant. *The only significant outcome in the study is between those who were blind and those who were not* ($P = .003$; $z = 2.8$). Yet an attempt to analyze this result is almost wholly absent in both the published report and much of the commentary about it.²⁻⁵

We are disturbed by the fact that not only skeptics, but the researchers themselves, turned a blind eye to this challenging result, and we are not alone. Duke University Medical Center cardiologist Mitchell W. Krucoff, and his research partners, Suzanne W. Crater and Kerry L. Lee, explain this carefully in their article accompanying the publication of the STEP study in the *American Heart Journal*.⁶ They say,

[T]he most striking element of the STEP report is in the interpretation of the study results showing significantly worsened outcomes in one of the experimental arms [T]he investigators take an almost casual approach toward any explanation, stating only that it 'may have been a chance finding.' It is rather unusual to attribute a statistically significant result in the primary end point of a prospective, multicenter randomized trial to 'chance.'

"In fact, such attribution is antithetical to the very definition of what error and statistical certainty imply: that the worse outcomes are almost certainly related to the therapy and not the play of chance. If the results had shown benefit rather than harm, would we have read the investigators' conclusion that this effect 'may have been a chance finding,' with absolutely no other comments, insight, or even speculation?"⁶

OBSERVER-EXPECTANCY EFFECTS, BOTH LOCAL AND NONLOCAL

The randomized, double-blind clinical trial is widely considered the gold standard of judging the efficacy of any therapy. If a study is adequately randomized and blinded, it is assumed that

the effects of belief, intention, and conviction of subjects and researchers are bypassed. Applying this logic to prayer experiments, it is assumed that what an experimenter privately thinks about the intercession is irrelevant. Yet experimental results suggest it is not that simple.

Rather, data suggest that intention, belief, attitude, and expectancy, on the part of everyone involved with a study, expressed both locally and nonlocally, can be determining variables. Chemist Douglas Dean and parapsychologist Karlis Osis showed that different experimenters carrying out the same experiment got different results.⁷ Psychologists Gertrude Schmeidler and Michaelen Maher made videos of well-known researchers conducting experiments and then played them for students with the volume turned so low as to be inaudible.⁸ The students were asked to describe the researchers, assigning them words like "friendly" or "cold." Estimates were then made as to how experiments conducted by these researchers would turn out. Those with "cold" type responses were estimated to have respondents who produced lower scores; the converse was true for researchers described as "friendly." The actual results of the experiments were then compiled. Those with "cold" type adjectives did in fact have informants who scored lower.⁸

Perhaps the starkest example, however, showing the observer latency effect of belief is an experiment series done by psychologist Richard Wiseman, a leading denier of nonlocal consciousness, and anthropologist Marilyn Schlitz, a researcher long associated with successful studies exploring whether an individual knows through some kind of linkage that they are being stared at, even by a person at a distance looking at their image on a closed-circuit television.⁹ The measurement for this effect being galvanic skin response. Schlitz had earlier worked with psychologist William Braud, and carried out a series of studies demonstrating this effect.¹⁰

Wiseman sought to replicate these studies and made three attempts, all unsuccessful. Schlitz then proposed that she and Wiseman do a new series, a kind of hyper-replication *using his same laboratory, the same protocol, the same participant pool*. Once again with Schlitz as the principal investigator, the study was successful. Once again, the participants being stared at showed significant physiological response that was absent when they were not being focused on.⁹ Wiseman then ran the same study again, without success, confirming his passionate negative expectation.

Hazelrigg et al¹¹ examined "personality moderators of experimenter expectancy effects" and focused on five, looking at them from the perspective of both researcher and participant. They reported, "Experimenters with stronger interpersonal control orientations, more positively evaluated interpersonal interaction styles, and greater ability to encode nonverbal messages are believed to be more likely to produce expectancy bias."¹¹ They also looked at subjects with greater need for social approval and greater nonverbal decoding ability, and hypothesized that such individuals would be more susceptible to bias.

They reported two "moderators" mattered: "the experimenter control orientation and subject need for social approval hypotheses. There was also evidence for a boomerang effect—subjects low in need for social approval gave ratings opposite to the experimenter's outcome expectancy. Finally, effects appeared

stronger when positive expectancies were communicated than when expectancies were negative.”^{11,12}

None of these factors are discussed in the STEP report. They are absent in most other similar studies as well, and will continue to be a confounding problem until they are addressed and understood. No intention study, whether it involves intercessory prayer or some other variety of therapeutic intent, should be conducted without careful consideration of observer effects as part of the protocol, and we believe it should be extended to all research exploring nonlocal consciousness with any protocol.

It would be helpful if the STEP study answered questions, such as, “Did the experimenters believe that intercessory prayer would work in the world, or were they expecting neutral outcomes?” “Could the negative beliefs of critics who knew about the STEP study during the several years it was in progress, and who may have wished to see it fail, have affected the outcome?” “What about the impact of the attitudes of religious individuals who believe in prayer but don’t want to see prayer studies done because of doctrinal objections?”

Questions such as these are awkward and make people uncomfortable. In our culture, probing such concerns is considered indelicate and intrusive. But this does not mean they are irrelevant. We suggest that an intention study cannot be properly designed if it does not take the intentions and beliefs of everyone involved with the study into consideration.

It strikes us as odd that observer effects were not considered in the STEP study, when Benson himself addressed observer effects in his previous work and has apparently long believed in their importance. In 1979, Benson and David McCallie coauthored a paper on a range of treatments for angina pectoris, including placebo.¹³ In this study, they refer to “Three recognized components of the placebo effect—the beliefs and expectations of the physician, the beliefs and expectations of the patient, and the physician-patient relationship.”¹³ Why would the beliefs and expectations of physicians and researchers not apply in the STEP study?

This Benson paper reports that treatments which enjoyed efficacy rates as high as 90% when a treatment was new and enthusiasm in the medical community was high, fell back to the typical 30% to 40% effectiveness when studies critical of the treatment began to emerge in the literature.¹³ The attitude of the clinician, locally mediated through subliminal body clues, tone of voice, or choice of words, was judged by Benson and McCallie to be important factors in this huge spectrum of response, to be clinically important.¹³ (We would add that a physician’s intentions can act nonlocally as well, bypassing the senses, to shape therapeutic responses.) In their paper, as an historical grace note they cite 19th-century French physician, Armand Trousseau, who observed sarcastically, “You should treat as many patients as possible with the new drugs while they still have the power to heal.”¹³

Because the evidence favoring belief and intention in affecting clinical outcomes is so strong, why aren’t belief and intention—“expectation,” as Benson and McCallie would have it—more carefully considered in intention studies? Psychologist William Braud has explored the influence of intention.¹⁴ He notes, “I think the reason that the intentions of other persons are not taken into consideration in most prayer studies is that the

investigators are not aware of the possible influence and alternative processes that might be involved, but instead, consider prayer outcomes only in terms of entreaties to, and actions of, the Divine” (W. Braud, personal communication, August 2006). This seems to us a very limited view. We see the “Observer Effect,” in its most generous interpretation, as one of the fundamental questions to be addressed in future work.

Without sacrificing any rigor in the process of randomization and blinding, what other factors need to be controlled for an intention or prayer study? Which factors operate locally, mediated via the senses? Which operate locally sourced sensory mediation? How do both local and/or nonlocal influences affect experimental outcomes? Do they operate concurrently or independently?

The classic “sheep/goat effect” is an example of the kind of variable we have in mind. First reported by physicist Robert McConnell and psychologist Gertrude Schmeidler (who coined the terms), this belief effect is now recognized as one of the most consistently determinative variables in the intention research literature.¹⁵ Sheep—those who accept that nonlocal phenomena exist in the context of the experiment *in which they are taking part*—generally achieve higher scores in controlled studies than goats, who are skeptics. But is the effect local or nonlocal, or both? The STEP study doesn’t address this kind of question, and neither do most other intention studies. They should.

THE QUESTION OF TIME

Nonlocality also opens another consideration important to understanding intention/prayer studies: the issue of time.

Consider the retroactive intercessory prayer study carried out by Israeli immunologist Leonard Leibovici.¹⁶ Highly skeptical of the claims of intention/prayer studies, Leibovici designed an experiment that only some kind of nonlocal linkage could explain. The very idea of such an effect challenges many assumptions. Yet retrocausality has become an area of intense research. The American Association for the Advancement of Science, in conjunction with the American Institute of Physics, held a conference on this topic, and a reader interested in pursuing retrocausality in the context within which it is discussed in this paper should read the published conference papers.^{17,18} They suggest that from a physics perspective, Leibovici’s research is conceptually plausible.

Leibovici’s protocol was a hospital-sited, “double blind, parallel group, randomized controlled trial of a *retroactive intervention* [emphasis added].”¹⁶ It was a study with a large enough *N* to have gravitas. In July 2000, Leibovici identified 3,393 adult patients each of whom had suffered from a bloodstream infection that was detected while they were in the Rabin Medical Center, in Israel, between 1990 and 1996—that is to say, *four to 10 years earlier*. All of these individuals were long out of the hospital. These 3,393 *former hospital patients* were randomized into two populations; 1,691 were assigned to the intervention treatment group and 1,702 to the control group. The treatment group was the focus of therapeutic intention in the form of prayer, which “was said for the well being and full recovery of the intervention group.”¹⁶

The study discovered that “length of stay in hospital and duration of fever were significantly shorter in the intervention

group than in the control group ($P = .01$ and $P = .04$, respectively).¹⁶ Leibovici concluded, "Remote, retroactive intercessory prayer said for a group is associated with a shorter stay in hospital and shorter duration of fever in patients with a bloodstream infection and should be considered for use in clinical practice."¹⁶

For this study to have worked, it seems that therapeutic intention from the "future" must have affected the "past" *when it was the present* to produce a biased outcome—not to have changed the past, but to have produced the original effect in the first instance. No local explanation can subsume what happened. (A possible alternative nonlocal explanation is based on decision augmentation theory [DAT], which we shall examine shortly.) Leibovici's study is an extreme example of an intention study because of its retrocausal essence, but all intention studies must consider that intention is not blocked by time. To understand intention/prayer studies, we must expand our horizons.

DOSAGE

The STEP study required prayer for only 14 days. Is a two-week intervention an adequate test of prayer? What about the duration of each prayer session? One positive prayer study required an hour of prayer¹⁹; one failed study required five minutes.²⁰ Is duration the determinant factor here? Many studies do not even consider this issue. What is the requisite dosage of therapeutic intention? Does this question even make sense given the nonlocal nature of the effect? We are aware of only one study, by Schwartz (coauthor of this paper) et al,²¹ that examined the relationship of time and effect, a study measuring changes across five, 10, and 15 minutes, and no significant differences were observed.

One might reasonably expect that long repetitive experience would lead to insincerity and boredom, and that freshness and sincerity are more likely to be found in those new to an endeavor. And yet this is another area where our actual knowledge is slight. In the chemical drug model, dosage and composition are crucial. This leads to a fundamental question: What do dosage and composition mean in an intention/prayer study? Do these concepts apply?

Experimental evidence suggests that reiterated acts of intention—which could be seen as a kind of dosage—produce a cumulative nonlocal field effect. Biologists Graham and Anita Watkins carried out a series of experiments in which they anesthetized mice from the same line, which were then put in one of two cradles, one designated "treated," the other "control."²² The task of the influencer/healer was to awaken the treated mouse through mental intention alone. There was no physical contact. The revival times of the "treated" mice were compared with those randomly assigned as controls. The results were statistically significant.²² Without planning initially for this effect, but having been consistent in their assignment pattern, they then wondered what would happen if no healer was involved. In subsequent sessions, those mice assigned to the "treated" cradle continued to awaken more quickly than the controls.²³

Another attempt to model this cumulative effect can be found in the concept of a field, which has some of the properties of a wave and some of a particle, which was independently devel-

oped in the 1920s by Russian biologist Alexander Gurwitsch, who also discovered ultraweak photon emission from living systems,²⁴ and Austrian biologist Paul Weiss. They called them morphogenetic fields, or biological fields. In the interests of historical accuracy, perhaps it would be best to say they called them biological fields.

Most recently, this line of research has been taken up and expanded by English biologist Rupert Sheldrake.²⁵ This work suggests that not only do individual acts of observation—observer awareness, one might call it—cause an observer effect, but that the effect becomes stronger as more iterations of awareness occur. Perhaps the best illustration of this can be seen in two contemporaneous studies, one designed by psychologist Gary Schwartz, then of Yale, the other by psychologist Alan Pickering of Hatfield Polytechnic in England.²⁶ Their protocols were different but essentially the same. In Schwartz' case the study involved different reactions non-Hebrew speakers and readers had to real words as compared to Hebrew letters randomly assembled to create nonsense words. In Pickering's study, the words and nonsense letter combinations used were in Farsi. Both studies were highly significant, and alternative explanations were systematically eliminated.²⁶ The oldest words, the ones that had been the subject of the most acts of intentioned awareness, produced stronger effects than did the new words, and they more than the nonsense words.

A third facet of this cumulative effect has shown up in nonlocal perception studies, particularly in experimental studies using a protocol known as remote viewing, in which individuals, under rigorously controlled conditions during an experimental session, are typically asked to describe persons, places, or objects that are not designated as targets until after the sensory and descriptive data has been recorded. Literally millions of these remote viewing sessions have been carried out, and they show that targets which have been the focus of reiterated acts of intentioned awareness, particularly in a state of heightened emotion (whether positive or negative does not seem to matter), say for instance a religious shrine, are easier than other targets, perhaps a rice paddy, which may be visually more arresting but harder to perceive in nonlocal awareness. Why? Because, we suggest, targets such as shrines have become numinous.²² The term numinous, coined in 1917 by the German Protestant philosopher and theologian Rudolf Otto (1869-1937), is based on the Latin word *numen*.²³ The word, *numen*, which dates to early 17th century Latin, represents a prescientific attempt to explain the sense of nonlocal awareness associated with totemic things and places by imputing this numinous empirical experience to a divine power or spirit over that thing or place. The particular quality that seems apposite to intention research was described by Carl Jung: "We should not be in the least surprised if the empirical manifestations of unconscious contents bear all the marks of something illimitable, something not determined by space time. This quality is numinous . . . numina are psychic entia . . ."²⁷

Research also suggests this numinous quality is not something inherent to the target, but instead, accumulated within the nonlocal information architecture linked to a physical target. Obviously then different viewers respond to the same target differently. An Irish lyre has a special meaning for an Irishman, that it

does not have for a Czech. Different individual viewers perceive the same target differently because it holds a different numinosity for each. Different groups and cultures similarly invest images with differing numinous significance. In terms of intention studies, consider the now-classic study done by cardiologist Randolph Byrd.²⁸ His study was conducted with Christian healers because of Byrd's personal beliefs. This leads one to ask, in intention/prayer studies what is the intention observer effect created by a researcher with strong religious beliefs? Also, what is the effect if the study protocol conflicts in some way with those beliefs?

The "field" concept, of course, is admittedly a hand-waving term whose meaning is imprecise. Even so, field effects appear to be lawful in the scientific sense, particularly in studies such as those reported by Watkins and Watkins.²² We believe this dimly understood cumulative intention effect is a significant variable that must be better understood if intention/prayer research is to advance.

BLINDNESS AND RANDOMIZATION

For over 30 years, research has suggested that both randomization and blindness do not perform the same functions in experiments involving nonlocal perception or perturbation, of which intention/prayer studies are a subcategory, as they are assumed to do in drug trials. The literature supporting this conclusion is now so large that we will simply mention three studies: two involving perception-remote viewing and Ganzfeld protocol studies-and perturbation-direct mental interactions with living systems (DMILS) studies.

As in Leibovici's study, a time factor is often involved, because accurate impressions are frequently obtained before a target is even selected, making these experiments truly triple blind.

In 1995, the United States Congress commissioned the American Institutes for Research, a Washington, DC-based, not-for-profit think tank with close government ties, and a long history of work in human performance, to assess the validity of remote viewing research that the US government had previously funded. That body of research was just a fraction of similar research that had been conducted up to that point. To make the assessment, American Institutes for Research selected statistician Jessica Utts of the University of California, Davis, and psychologist Ray Hyman of the University of Oregon, a fellow of the Committee for the Scientific Investigation of Claims of the Paranormal. Hyman was selected for his avowed skepticism, Utts because of her reputation as an academic statistician. Both had previously published in the field of nonlocal awareness and were notably sophisticated in the issues involved. Utts had previously addressed the question the US Congress was asking in a 1991 paper published in the journal *Statistical Science*.²⁹ In their joint report, Utts' concluded:

Using the standards applied to any other area of science . . . (this) functioning (Remote Viewing) has been well established. The statistical results of the studies examined are far beyond what is expected by chance. Arguments that these results could be due to methodological flaws in the experiments are soundly refuted. Effects of similar magnitude

have been replicated at a number of laboratories across the world. Such consistency cannot be readily explained by claims of flaws or fraud. "The magnitude of . . . functioning exhibited appears to be in the range between what social scientists call a small and medium effect. That means that it is reliable enough to be replicated in properly conducted experiments, with sufficient trials to achieve the long-run statistical results needed for replicability."³⁰

And Hyman, responding to Utts' statement, wrote:

I want to state that we agree on many . . . points. We both agree that the experiments (being assessed) were free of the methodological weaknesses that plagued the early . . . research. We also agree that the . . . experiments appear to be free of the more obvious and better known flaws that can invalidate the results of parapsychological investigations. We agree that the effect sizes reported . . . are too large and consistent to be dismissed as statistical flukes.³¹

A similar meta-analysis used a related but quite different Ganzfeld protocol, also used by laboratories and universities around the world. In a Ganzfeld experiment, the person providing the impressions is in a state of sensory deprivation and is exposed to white noise. The Ganzfeld meta-analysis was carried out by psychologist Daryl Bem, of Cornell University, and Charles Honorton, then at the University of Edinburgh.³² It reached conclusions similar to those of Utts in the Utts and Hyman meta-analysis.

A third protocol, DMILS, designed by psychologist William Braud and anthropologist Marilyn Schlitz, explored whether people could detect when they were the focus of another person's intentioned awareness.³³ This was achieved by placing one person in a room and measuring his or her electrodermal activity, which correlates with sympathetic autonomic activity, while a closed-circuit video feed of this individual was sent to another person in a room some distance away, beyond the reach of sensory communication. In the distant room, the second person either viewed the televised image of the individual or listened to white noise. The image was shown randomly for a few seconds. The results showed that when the target person's picture was being viewed on the monitor, his or her physiology reacted with a deviation in electrodermal activity.²¹ These findings have been replicated numerous times; the only notable failure being the Wiseman and Schlitz study⁹ when a self-defined skeptic served as one of the researchers. The DMILS protocol is of particular relevance to intention research because it is a very close approximation of the healing intention protocol. It raises the question, could one be aware when one was being prayed for? No one seems to have asked this important question.

These three protocols suggest that randomization and blindness, although they prevent conventional biases, are not the absolute barriers they are presumed to be. As far as intention/prayer studies are concerned, we propose that the prevailing perception of blindness be reexamined, and that the intentions of *all* the participants in the study be evaluated. The STEP study makes no such consideration, nor do most other intention/prayer experiments.

AGENT OF ACTION

One of the most pressing questions future intention research must consider is who is the agent of action? Is there only one? What would the effect be if all the participants were somehow linked—or there are no such linkages at all? Positive prior studies suggest that something nonlocal is happening, but exactly what? Are the results achieved because of a person's therapeutic intention? Or is the outcome determined by the beliefs of the person who is the overt focus of the intention? Or, even more fundamentally, does the person who selects the participating subjects produce a successful or unsuccessful outcome? Or do all these factors operate simultaneously? Our ignorance runs deep; we do not even know if the healing effect results from the healer's intention producing a perturbation in the recipient's body, or whether the healer nonlocally provides information to the recipient, who then uses that information to stimulate his or her own psychophysical self-regulation.

One compelling line of research known as DAT specifically addresses some of these questions. Decision augmentation theory proposes that researcher intention, not healer intention, can be the determining factor in any experiment's outcome. This hypothesis, initially called intuitive data sorting and, later DAT, was first developed by an interdisciplinary team headed by physicist Ed May, experimental psychologist Dean Radin, and statistician Jessica Utts.³⁴ Subsequently, DAT has been explored by other researchers, and its essential tenets have been confirmed.^{35,36} The theory proposes that the outcome of an experiment can be determined by the decisions made by the experimenters, *and that nonlocal perception on the part of the researcher—not nonlocal perturbation in the form of intercessory prayer or any other variety of therapeutic intent—is responsible for the outcome.* That is, if investigators could optimize (via nonlocal perception) their decisions while designing and carrying out an experiment, and take advantage of natural fluctuations in disease outcomes or differences in patients' inherent ability to heal, then by such favorable selections, placing these individuals in the intention group, a successful experimental result would be achieved. But it would not be due to healing intervention; rather, it would be due to the experimenters' "augmented" decisions. This hypothesis requires nonlocal perception on the part of the experimenters, and as such is as controversial as nonlocal perturbation, but it is plausible and more importantly, it provides a dramatically different interpretation of successful healing studies, so we feel researchers should take DAT into consideration when planning their experiments.

One possible approach would be to conduct healing studies with two groups. Group A might contain two patients, and group B, 15 patients. Each group would have one healer assigned to them. Neither recipients nor healers would know how many others were within each of the two groups. There would also be two similar-sized groups, C and D, to provide a (blindly) matched nonintentioned control condition. Assume that on average the hypothesized intentional healing effect operates with the same effectiveness on each patient, say e . Then the overall statistical outcome for the healing measurement of interest in group A would be approximately $e \times \sqrt{2}$, whereas in group B it would be $e \times \sqrt{15}$. That is, group B would achieve a greater level of statistical significance than group A. This is a simple conse-

quence of the greater statistical power provided by group B. If such a study produced a statistically significant outcome (beyond the results of the control groups C and D), it would provide evidence in favor of healing as a nonlocal perturbation, not as a result of "augmented" selection.

However, if the statistical outcomes of groups A and B were about the same (not the effect size e , but rather the resulting P values), then the assumption that intentional healing operates about the same on each patient would not be supported, and the observed effects would be more likely due to the investigators' augmented decisions. This is because under DAT, no healing is assumed to occur in these tests, and so the only way to obtain results that favor the experimental hypothesis is by taking advantage of natural "noisy" fluctuations and selecting individuals with a strong capacity for spontaneous healing, thus producing the positive outcome intended by the hypothesis. There are fewer opportunities to select strongly favorable fluctuations out of larger groups of 15 patients than from smaller groups of two patients.

There are two studies known to us that address the DAT issue, although this was not the authors' intention in either case. One of the largest therapeutic intention studies, the 2005 MANTRA II research conducted by Mitchell Krucoff at Duke, and researchers at eight other medical centers, involved a total of 748 patients.³⁷

Each of these individuals had been diagnosed with coronary artery disease and were to undergo percutaneous coronary intervention, or elective cardiac catheterization with possible percutaneous coronary intervention. All were enrolled between May 1999 and December 2002. They were randomized equally to each of the two noetic therapies or standard care, creating four treatment groups. "One group (189 patients) received both off-site intercessory prayer and music, imagery, and touch (MIT) therapy; a second group (182 patients) received off-site intercessory prayer only; a third group (185 patients) received MIT therapy only, while the fourth group (192 patients) received neither the intercessory prayer nor the MIT therapy."³⁵ The interventional heart procedures were all conducted according to each institution's standard practice, and the study called for a six-month period of follow-up.

Initially, this was a standard single-tier research project—one group of healers prays for one group of recipients. However, MANTRA II underwent a major protocol redesign part way through the study. Following the terror attacks of September 11, 2001, enrollment rates in the study fell sharply for approximately three months. During that time, the research team adopted a two-tiered prayer strategy. Twelve additional "second-tier" prayer groups were formed and added. "These groups were given a list of the primary tier prayer groups, and asked on notification *to pray for the prayers of the prayer groups.*"³⁵

Patients treated with two-tiered prayer had absolute six-month death and rehospitalization rates that were about 30% lower than control patients. This was statistically characterized as "a suggestive trend," and these results suggest that it is therapeutic intention and not DAT that at least sometimes is operative, and that researcher selection would not explain these results.

The MANTRA II researchers explicitly created this two-tier protocol to emulate an earlier study by Cha et al,³⁸ in which a

three-tier design had been employed to explore the effect of therapeutic intention/prayer on the success of in vitro fertilization. This in vitro study, which wrongly became notorious—not for a research flaw, but for the subsequent criminal conviction of the second author for matters unrelated to the study—may be the clearest guidance we have concerning the DAT hypothesis.

The study was a “prospective, double-blind, randomized clinical trial in which patients and providers were not informed about the intervention. Statisticians and investigators were masked until all the data had been collected and clinical outcomes were known.

“The setting was an IVF-ET program at Cha Hospital, Seoul, Korea. IP was carried out by prayer groups in the United States, Canada and Australia. The investigators were at a tertiary medical center in the United States. The patients were 219 women aged 26 to 46 years who were consecutively treated with IVF-ET over a four-month period. Randomization was performed after stratification of variables in two groups: distant IP versus no IP. The clinical pregnancy rates in the two groups were the main outcome measure. After clinical pregnancies were known, the data were unmasked to assess the effects of IP after assessment of multiple comparisons in a log-linear model. The IP group had a higher pregnancy rate as compared to the no-IP rate (50% vs. 26%, $P = .0013$). The IP group showed a higher implantation rate (16.3% vs. 8%, $P = .0005$). Observed effects were independent of clinical or laboratory providers and clinical variables.”³⁸

The statistical effect size of the study is what everyone focused on. But, in terms of the issues raised by DAT, the most important finding is this one: “The people praying . . . were separated into three groups. One group received pictures of the women and prayed for an increase in their pregnancy rate. Another group prayed to improve the effectiveness of the first group. A third group prayed for the two other groups.”³⁶

Once again it would seem that DAT is not the explanation, and that therapeutic intention is.

The DAT issue may be far from settled, but one thing seems very clear to us. In the future, therapeutic intention/prayer studies must accommodate themselves to DAT and design protocols accordingly.

CAN PRAYER HARM?

Biologist Carroll Nash of St. Joseph’s College, Philadelphia, carried out a therapeutic intention study involving bacterial colonies, cultured in common, and then split into three independent subpopulations.³⁹ His purpose was to replicate earlier studies by nun and biochemist Sister Justa Smith⁴⁰ and nursing pioneer Dolores Krieger,⁴¹ who along with Dora Kunz would later develop the nonsectarian approach to therapeutic intent known as Therapeutic Touch. Smith’s studies had shown significant differences between treated and controls measuring changes in hemoglobin and enzyme activity, which were the focus of the expressed intention. But Nash had a second question. He asked, “Could intention alone not merely affect the cell colonies, but could it do so both positively *and* negatively, when

compared to controls?” The results showed that it could, although positive intention produced a more significant result than negative intention. Nash’s experiments provide a clue that intention can do harm, and can be value weighted.

In their critique of the STEP study, Krucoff et al agree saying, “Leading researchers such as the STEP team should be underlining the imperative that . . . even well intentioned intercessory prayer . . . must be scrutinized for safety issues at an equal or even higher level than efficacy measures if medically important and useful knowledge in this arena is to truly step forward.”⁶

If one considers the STEP study, for example in this “can prayer harm” context, the relevance of the issue to good protocol design becomes clear. Let’s imagine what the results of the STEP experiment might have been under three conditions: (1) if prayer is effective, (2) if prayer is ineffective, or (3) if prayer is harmful:

1. *If prayer is effective*, groups A and C should have benefited equally from it, with C having the added benefit of the placebo response owing to the certainty of receiving prayer. Group C, then, should have had the best clinical outcome of the three groups. This was not the case; C had the worst outcome. So “effective prayer” is unable to explain the outcome of the STEP study.
2. *If prayer is ineffective*, it should not have exerted any effect on any of the three groups, but group C should have done better because of the certainty of receiving prayer, thus benefiting from the placebo effect. But group C did the worst of all the groups. So “ineffective prayer” is unable to explain the outcome of the experiment.
3. *If prayer harms*, both A and C should have demonstrated worse outcomes than B, which was spared prayer, in which case B would have done better than the other two groups. But B responded equally with A. Therefore, harmful or negative prayer cannot explain the results of the STEP study.

The STEP researchers essentially ignored the possibility that prayer might be harmful in their report, simply saying that the worst outcome in group C “may have been a chance finding.” They were taken to task for this in Krucoff et al, in the *American Heart Journal*.⁶ The criticism is appropriate in view of the anthropological evidence that negative beliefs and intentions can be lethal (curses, hexes, spells), as well as the controlled laboratory studies showing that negative intentions can retard or harm living, nonhuman systems.⁴²

What other possible explanations are there for STEP’s outcome?

Extraneous Prayer

Randomized, controlled studies in prayer in humans acknowledge that patients in both treatment and control groups may pray for themselves and that their loved ones may pray for them as well, but it is assumed that the effects of this extraneous prayer is equally distributed between the intervention and control groups and does not create statistical differences between the two. This assumption may or may not be true, and in any case does not eliminate the problems posed by extraneous prayer in controlled studies. The positive effects of extraneous prayer, if they exist, may diminish the effect size between the two groups,

therefore limiting one's ability to detect the effects of assigned prayer in the intervention group. As one of the coauthors of the STEP study said in a news release from Harvard Medical School, "One caveat [of STEP] is that with so many individuals receiving prayer from friends and family, as well as personal prayer, it may be impossible to disentangle the effects of study prayer from background prayer."⁴³

An analogy would be a pharmaceutical study in which the intervention group is treated with 10 mg of the drug being tested, and the control group with 9 mg. Even if the medication were effective, could the effect be detected?

No one knows how extraneous prayer could be eliminated in human prayer-and-healing studies. It may be impossible to do so, especially in American culture, where the great majority of individuals pray routinely when they are *well*. Trying to eliminate prayer in a control group may be unethical as well, for who has the right to extinguish personal prayer and prayer by loved ones during sickness? In contrast, extraneous prayer can be handily eliminated in nonhuman studies involving animals, plants, or microbes. They presumably do not pray for themselves, and neither do their fellow beings pray for them. In these studies, one often sees profoundly positive effects of healing intentions.⁴⁴

Randomization Differences

In May 2008, Ariel et al⁴⁵ examined the demographic differences between the three groups in the Harvard study and found that group C, which had the highest rate of postoperative complications, may have been predisposed to do worse. This group had a higher incidence of chronic obstructive pulmonary disease (emphysema and chronic bronchitis), a higher incidence of smoking history, a higher rate of three-vessel coronary bypass surgery, and a lower rate of beta-blocker use prior to surgery, which many experts consider to be cardio-protective during coronary bypass surgery, when compared with the other two groups. For a fair trial of prayer, the study should have established a level playing field between all three groups through proper randomization, such that no group was worse off than any other going into the study.

Psychological Factors

The overall design of the study may have created psychological dynamics in groups A and B that could have led to the results that were observed. Patients in A and B were told they might or might not be prayed for by the intercessors. Think for a moment what this means. Surveys show that around 80% or 90% of Americans pray regularly when they are well, and it can be assumed that even more pray when they are sick. Faced with the prospect of being denied prayer in the study, the subjects in A and B may therefore have aggressively solicited prayer from their loved ones to make up for the possible withholding of prayer in the experiment, and they may have redoubled their personal prayers for themselves. Thus a paradox may have resulted in which A and B received more prayer—not less—than C, even though this was not the intent of the study. If prayer is effective, this additional unforeseen, extraneous prayer may have lifted A and B above C in terms of clinical outcomes, accounting for the study's results.

Another possibility is that patients in group C, who knew that many outsiders were praying for them, felt stressed and pressured to do well. Moreover, "It might have made them uncertain, wondering, 'Am I so sick they had to call in their prayer team?'" said cardiologist Charles Bethea, MD, a member of the STEP research team.⁴⁶ "We found increased amounts of adrenalin, a sign of stress, in the blood of patients who knew strangers were praying for them," said STEP researcher Jeffrey A. Dusek, PhD, associate research director of Harvard's Mind/Body Medical Institute at Massachusetts General Hospital. "It's possible that we inadvertently raised the stress levels of these people."⁴⁷

For many believers—including believing researchers—the idea that prayer might harm is a horrifying consideration. Yet, as we have noted, it is completely consistent with both ethnohistorical traditions—negative prayer outcome is an iconic part of voodoo, and can be found in the Tibetan *Bön* faith—as well as the major scriptural texts of several religions, including Christianity.

The Bible is full of events in which people and things were harmed or killed when people invoked prayer for destructive ends. In the New Testament, Jesus cursed and killed a fig tree (Matthew 21:9; Mark 11:13-14, 20-22). The apostle Paul cursed a sorcerer and made him blind (Acts 12:11). In the Old Testament, the prophet Elisha cursed 42 children and caused them to be devoured by bears because they made fun of his baldness (II Kings 2:23-24).

Although not often acknowledged as such, veiled negative prayer is very much a part of our culture. To cite an obvious example: when you pray for victory in the current second Iraq War, are you explicitly praying for the defeat, destruction, and the killing of those who oppose us? Do you think others might be doing this, and if so, how prevalent do you think this is? A 1994 Gallup poll found that 5% of Americans explicitly admitted to praying that harm will come to others—and that's only the one in 20 who will own up to it.⁴⁸ Television and history tell us daily that death and destruction are the handmaidens of victory in war. Can there be any doubt that some prayers for victory hold an implicit negative intention toward the opponent? The truth is, although we don't want to admit it explicitly, we consider prayer as capable of harm as good.

The placebo literature also shows this. As long ago as 1955, physician Henry Beecher admonished researchers to pay attention to the negative aspects of intention expressed as a "nocebo" effect, saying, "Not only do placebos produce beneficial results, but like other therapeutic agents they have associated toxic effects. In a consideration of 35 different toxic effects of placebos that we had observed in one or more of our studies, there is a sizable incidence of (such) effects attributable to the placebo."⁴⁹ What is not known is what aspect of intention is local and what is nonlocal.

Experimental data, placebo evidence, and ethnohistorical and religious traditions all point in one direction. Intention can be expressed in both positive and negative ways. It is increasingly clear that this reality needs to be better understood and incorporated into study design. We also need to study the differences between positive and negative intention and how they manifest. The STEP study was silent on all this, as are all too many other research efforts.

HEALERS, RITUALS, AND PRAYERS

We know very little about what qualifies a person to successfully express therapeutic intention as a healer. Most investigators believe that the sincerity and genuineness of prayer must surely make a difference, but in most prayer experiments these factors are merely assumed without being rigorously assessed. In contrast, the skills of the cardiac surgeons in the STEP study were not assumed; the surgeons had met stringent objective requirements that qualified them for their role. Intention/prayer must incorporate these kinds of considerations into experiment design. One place to begin might be employing empathy rating scales like those used to rate the empathic capacity of therapists who work as caregivers and counselors.⁵⁰ Or, if children and parents are involved in an intention study, perhaps the Parent-Child Relationship Inventory.⁵¹ And there are sure to be other considerations that may affect outcome. The point here is that a number of useful measures have already been established and may be of use in intention/prayer research. Research teams should incorporate specialists in these areas.

Ethnohistory and anthropological research suggest that the role of form and ritual is important to understand. Yet few intention studies consider this. Left to themselves, people generally pray according to the dictates of their heart. In the STEP experiment, although intercessors were free to pray as they saw fit, an 11-word prescribed prayer was required of all of them. In other studies, the expression of therapeutic intention is more free form. What role does form of expression play in these studies?

There is also the issue of God. Some intercessors follow a nondirected or “Thy will be done” approach in prayer, whereas others are more comfortable with a more traditional, formally religious, directed form in which they pray for a specific outcome according to their religious belief. Some presume no involvement of a deity at all, as in Therapeutic Touch. What is the role of religious belief?

Experience and the role of intention-focusing disciplines, religious or secular, are also factors that have received inadequate study. In a study looking at changes in the molecular structure of water exposed to healing intention, Schwartz⁵² compared the performance of two subpopulations: one consisting of individuals who defined themselves as healing practitioners, and had some established approach to expressing their intention, and a second group who had never done such work or even considered it. Each sample was independently significant, but the experienced practitioners were much more effective (experienced, $P = .001$; naive, $P = .04$).⁵² The comparison showed “Those who trained in some kind of therapeutic technique, and characteristically involved themselves in such activities, produced more significant results than those who had not undergone such training or who did not characteristically involve themselves in such activities, although even with no training, or regular practice, it is possible . . . if the intent is strong.”⁵² This study looked at changes in the structure of water, but clinical studies support the same conclusion. Some of the most effective healing studies employed dedicated healers with decades of experience. To us this suggests expressing effective healing intention may be a skill set attained like any other. That is, one’s innate talent can be

more effectively expressed by mastering a technique to enhance it, and then practicing it.

One place to begin research into techniques, we think, is by examining the meditation literature—both ancient and modern. One ancient source of particular interest is the Patanjali Yoga Sutras, which date at least to the second century BCE.⁵³ The Sutras speak at length about moving into nonlocal awareness through meditation.

Braud, who has made a particular study of this, notes: “The sixth, seventh, and eight ‘limbs’ of ashtanga Yoga are *dharana* (concentration), *dhyana* (meditation), and *samadhi* (profound absorption), respectively.”⁵⁴

The Patanjali source refines this further: “The repeated continuation, or uninterrupted stream of that one point of focus is called absorption in meditation (*dhyana*), and is the seventh of the eight steps” (*tatra pratyaya ekatanata dhyanam*).⁵⁵ Braud continues, “When these three are practiced together, the composite process is called *samyama*. *Samyama* might be translated as *constraint; thorough, complete, or perfect restraint; or full control*; it might also be translated as *communion or mind poise*. *Samyama* conveys a sense of knowing through being or awareness through becoming what is to be known. Through mastery of *samyama* comes insight (*prajna*), and through its progressive application, in stages, come knowledge of the Self and of the various principles of reality (*tattvas*). With increasing yogic practice come a variety of mystical, unitive experiences, states, conditions, or fulfillments—the various *samadhis*—along with the attainments or powers (*siddhis*)” (W. Braud, private communication, October 2008).

Although couched in Eastern terms, the Sutras describe the same insights and processes concerning nonlocal functioning that have been elucidated by a modern peer-reviewed meditation literature too large to cite—including papers and a best-selling book, *The Relaxation Response*, by Benson.⁵⁶

Meditation is also potentially important because it produces placebo-like effects, as Benson et al⁵⁷ reported. In a small study, Buddhist meditators using several different meditative practices were able to raise their resting metabolism (VO_2 ; up by 61%) or lower it (down by 64%).⁴⁷ The reduction from rest was the largest ever reported when the paper was published in 1990. On the electroencephalogram measure, there was marked asymmetry in alpha and beta activity between the hemispheres, and increased beta activity.⁴⁷

Honorton carried out a study explicitly to explore this linkage of Patanjali and modern research involving nonlocal phenomena.⁵⁸ Radin, for several years now, has been conducting an online experiment involving nonlocal awareness expressed through several protocols. It is a study which now has a baseline of data numbering into the millions of trials. He reports that the strongest predictor of success with his protocols is whether or not the person participating is a meditator.⁵⁹ Therapeutic intent, expressed through intercessory prayer, is another manifestation of nonlocal consciousness and, not surprisingly, prayer and some kind of discipline to develop focused awareness is a part of almost every spiritual tradition.

It seems obvious to us that understanding the role of mind-altering disciplines such as meditation may have much to say to intention/prayer research. Like placebo research, meditation research tells us about the power of intention to produce psycho-

physical effects. Understanding this we think will help us comprehend how healing occurs. Is it something the intercessor does, or is it something stimulated by the healer but activated by the recipient, much like a placebo response?

The STEP study paid little heed to any of this and, once again, is representative of intention research as a whole. It drew no attention, for instance, to the fact that the study did not generate the expected placebo response among the participants who knew for certain they were the focus of prayer intention. This is an odd lacuna, given that Benson is one of the pioneers of both placebo and meditation research and, as long ago as 1975, entitled one of his papers, "The Placebo Effect—a Neglected Asset in the Care of Patients."⁶⁰

EVIDENCE IGNORED

To place the STEP study in context, one would expect that critics and analysts would cite and compare it with earlier prayer studies that reported positive outcomes. This has not happened. Study of the Therapeutic Effects of Intercessory Prayer has become such a marked feature of the healing intention debate that it often goes unchallenged and is assumed to be the final word. This seems an undeniable bias—a position counter to accepting science's fundamental commitment to go where sound data lead. Why is this area of inquiry so threatening, particularly positive studies of intention/prayer? We think it is because it requires extending our concept of consciousness to include the nonlocal; it gives us a model that is not exclusively physiological. How can this bias be seen as any different than the creationist's dismissal of all evolutionary science in the service of his bias? Why is this not a form of scientific superstition? In response to the critics' eagerness to declare the further study of intention expressed through intercessory prayer moribund, we say, look at the data. And look across the spectrum of science. Consider, for instance, the "Quantum Cooperation of Insects," reported by Austrian scientist Johann Summhammer, which suggests nonlocal linkage between insects, a provocative new area for further study.⁶¹ And the last several years have seen many papers involving quantum physics, largely in the context of Bell's theorem⁶² and string theory,⁶³ in which observer effects are fundamental.

Even within just the medical literature, the research is compelling to the objective observer. Wayne B. Jonas, former director of the National Institute of Health's National Center for Complementary and Alternative Medicine, and his colleague Cindy C. Crawford, recently surveyed the literature for studies involving prayer and directed intentions.⁶⁴ They discovered 80 randomized controlled trials in humans and 122 controlled laboratory studies involving cells, tissues, animals, plants, microbes, and inanimate devices such as random number generators. Using accepted Consolidated Standards of Reporting Trials criteria specifically designed to allow readers to understand and compare protocol design, procedure, analysis, and the interpretations advanced, to evaluate the quality of medical research, they found that the laboratory intention studies merited an "A" or "good" grade, and the human trials a "B" or "fair grade."

In addition to the Jonas and Crawford review,⁶⁴ many systematic and meta-analyses have been published, nearly all of which

are positive.⁶⁵ Most of the prayer-and-healing studies are abstracted, reviewed, and analyzed by psychiatrist Daniel Benor in his book *Healing Research*.⁶⁶

HOW TO DO A PRAYER STUDY

Four months before the Harvard study was published, mind-body researcher Jeanne Achterberg, a veteran explorer of indigenous healing methods and the role of imagery and visualization in healthcare, published an experiment incorporating many of the propositions we raise here.⁶⁷ The work of Achterberg and her team was ignored by the nation's media which, we believe, was a shame, because it is the kind of next-generation study needed if we are to more fully understand the effects of intention. That the study of Achterberg et al⁶⁷ with its positive findings was overlooked, whereas the ambiguous STEP study received international attention, we suggest, is not a coincidence but another expression of the bias we have discussed. Achterberg's work began with an attempt to understand the culture of the people with whom she would be working and to find a way to incorporate their worldview into a rigorous, meticulously designed, modern scientific protocol without compromising either, which is exactly the sort of approach we think will lead us to real understanding concerning intention/prayer. This led her to the island of Hawaii, where she spent two years observing the culture and healing methods of indigenous healers, many of whom took her into their confidence and shared their healing methods with her.

Achterberg was interested in exploring whether healers can exert a positive influence on a distant individual with whom they have no sensory contact, as healers universally claim. She and her colleagues at North Hawaii Community Hospital in Waimea recruited 11 indigenous healers to participate in a healing experiment.⁶¹ The healers were not casually interested in healing; they had pursued their healing tradition for an average of 23 years. Each of them was asked to select a person they knew, with whom they had previously worked professionally and with whom they felt an empathic, compassionate, bonded connection, to serve as the recipient of their healing intentions. Although the researchers summarily referred to the various healing endeavors as distant intention, the healers themselves described what they did in specific ways—prayer, sending energy, good intentions, or wishing for the highest good.

Not only was Achterberg cordial to the idea of remote healing as a result of her prior ethnological work, but she appreciated and respected both how the healers understood what they were being asked to do and why the sociocultural context of the experiment favored its success. The Big Island of Hawaii is often called "the healing island." There, prayer is "in the air"; its effectiveness is assumed. In essence, Achterberg had explicitly designed her study to deal with Benson's beliefs and expectations of the "physician" healer, the beliefs and expectations of the "patient," and the relationship of healer and recipient. We particularly single out the Achterberg study because although she was sensitive to the cultural aspects of his experiment, she made no concessions concerning rigor in her protocol. Each recipient in Achterberg's study was isolated from all forms of sensory contact with the healer and placed in a functional magnetic

resonance imaging (fMRI) scanner. The healers then sent their various forms of distant intention to their participants at random, two-minute intervals that could not have been anticipated by the recipient. When the fMRI brain scans of the participants were analyzed, significant differences in brain function were found between the experimental (send) and control (no-send) conditions. There was approximately one chance in 10,000 that these differences could be explained by chance ($P = .0001$). The brain areas that were activated during the healing, or send periods, were the anterior and middle cingulate, precuneus, and frontal regions.⁶¹ When the experiment was repeated, using participants with whom the healers felt no empathic bonding, no significant fMRI changes were found in the recipients during either the send or no-send conditions.⁶¹

This study suggests that compassionate, empathic healing intentions and prayer can exert measurable effects on a distant recipient, and Achterberg's study does not stand alone. Several earlier experiments demonstrated correlations in brain function between empathic individuals who are widely separated and who have no sensory contact with each other.⁶⁸⁻⁷¹

If there was one thing we could have wished included in Achterberg's study, it would be monitoring to ascertain whether, and in what time frame, therapeutic intention altered the course of an illness. Several other studies suggest that this will be a fruitful area for future study.

THE FUTURE

Therapeutic intention expressed through prayer is now and always has been a universal human activity. We wear different clothes. Speak different languages. Eat different foods, spiced by different condiments, consumed using different implements. We worship different Gods, with different rituals. But the overwhelming majority of us not only believe but operationalize some way of opening ourselves to a greater whole to express therapeutic intention. We pray. Individuals or minority cohorts may dissent, but it is hard to look across the millennia, seeing therapeutic intention expressed in any one of a thousand ways, and conclude that intention effects, such as those claimed for prayer, are only delusion. Yet, for the skeptics, none of this—neither carefully controlled research nor universal practice—seems to evoke the slightest curiosity. To us it seems long past time to ask skeptics to justify their positions by providing not polemics but careful methodological criticism to justify their assertions.

The positive outcomes of prayer research require a new view of consciousness. The conventional local view of the nature of human consciousness, in which the actions of consciousness are confined to the individual brain and body, must eventually yield to a more comprehensive, nonlocal view in which consciousness also acts beyond the brain in ways that transcend direct sensory contact between humans.^{72,73}

Just asking questions about prayer distresses many religious individuals, who fear that the sacred act of prayer may be swamped and profaned by being examined by what they see as a Godless science, which they consider practically demonic. This is a groundless fear. Therapeutic intent research may tell us how the process works, but in no way does it either prove or disprove

the existence of God. This remains as always an illumination of faith and gnosis.

Researcher William Harris and his colleagues,⁷⁴ in their 1999 study of prayer in heart patients, suggest that God cannot be either affirmed or denied by prayer research. They say, "We have not proven that God answers prayers or even that God exists All we have observed is that when individuals outside the hospital speak (or think) the first names of hospitalized patients with an attitude of prayer, the latter appear to have a 'better' CCU experience."⁷⁴

The inability to specify divine action in a prayer study is fortunate, because this discourages any specific religion from using prayer experiments to claim superiority over other faiths. Another way of inhibiting claims of superiority by specific religions is to openly study this issue by using intercessors from various religions in prayer experiments, thus replacing speculation and assertion with data. This is the custom followed in the high-profile MANTRA studies at Duke University Medical Center. In the pilot study, prayer groups around the world prayed for people undergoing urgent cardiac catheterization and angioplasty.⁷⁴ The prayed-for group had 50% to 100% fewer complications (bleeding, arrhythmias, death, etc) than the group not assigned prayer.⁷⁵ In other experiments, healers have been both secular and nonsecular.⁶⁷ Thus far, there is no compelling evidence from prayer studies that any particular faith enjoys an advantage over any other. Rather, prayer experiments seem to democratize and universalize prayer. They affirm religious tolerance, and that, we believe, may be one of their most valuable contributions.

One area of remote healing research that is particularly productive currently is hypothesis development. Although there is no consensus about how these nonlocal, consciousness-related phenomena occur, hypotheses abound and have been offered by a variety of scholars, including Nobelists, in physics, mathematics, and neurobiology.

Those who prefer theological explanations for prayer's workings need not worry. Physically based theories of how prayer may work are not incompatible with transcendental explanations, just as Darwinian explanations don't rule out operations of the Divine through evolutionary processes.

Is the STEP study an obituary for prayer research, as many claim? Following the premature publication of his obituary in the *New York Journal* on June 2, 1897, Mark Twain wrote, "The reports of my death are greatly exaggerated." So, too, with reports of the death of prayer research. In fact, in our view, we are just beginning to understand the right questions to ask.

Acknowledgments

The authors thank William Braud, PhD, Dean Radin, PhD, and Vernon Neppe, MD, PhD, for their critical review, comments, and suggestions concerning our paper.

REFERENCES

1. Benson H, Dusek JA, Sherwood JB, et al. Study of the Therapeutic Effects of Intercessory Prayer (STEP) in cardiac bypass patients: a multicenter randomized trial of uncertainty and certainty of receiving intercessory prayer. *Am Heart J.* 2006;151:934-942.

2. Koenig H. Quoted in: Freed PT. Prayer could hurt hearts. *The Harvard Crimson*. April 5, 2006. Available at: <http://www.thecrimson.com/article.aspx?ref=512467>. Accessed June 2, 2006.
3. Sloan R. Quoted in: Kalb C. Don't pray for me! please! *Newsweek*. April 10, 2006:15.
4. Giberson K. The great value of nothing. *Science & Theology News*. May 2006:6.
5. Casatelli C. Study casts doubt on medicinal use of prayer. *Science & Theology News*. May 2006:10-11.
6. Krucoff MW, Crater SW, Lee KL. From efficacy to safety concerns: A STEP forward or a step back for clinical research and intercessory prayer?: the Study of Therapeutic Effects of Intercessory Prayer (STEP). *Am Heart J*. 2006;151:762-764.
7. Osis K, Dean D. The effect of experimenter differences and subject's belief level upon ESP scores. *J Am Soc Psych Res*. 1964;58:158-185.
8. Schmeidler GR, Maher M. Judges' Responses to the Nonverbal Behavior of Psi-Conductive and Psi-Inhibitory Experimenters. *J Am Soc Psych Res*. 1981;75:241-257.
9. Wiseman R, Schlitz M. Experimenter effects and the remote detection of staring. *J Parapsychol*. 1997;61:197-208.
10. Braud W, Schlitz M. A methodology for the objective study of transpersonal imagery. *J Sci Explor*. 1989;3:43-63.
11. Hazelrigg P, Cooper H, Strathman A. Personality moderators of the experimenter expectancy effect: a reexamination of five hypotheses. *Pers Soc Psychol Bull*. 1991;17:569-579.
12. Cooper H, Hazelrigg P. Personality moderators of interpersonal expectancy effects: an integrative research review. *J Pers Soc Psychol*. 1988;55:937-949.
13. Benson H, McCallie D. Angina pectoris and the placebo effect. *New Engl J Med*. 1979;300:1424-1429.
14. Braud W. *Distant Mental Influence: Its Contributions to Science, Healing, and Human Interactions*. Charlottesville, Va: Hampton Roads Publishing; 2003.
15. Schmeidler G, McConnell R. *ESP and Personality Patterns*. New Haven, Conn: Yale; 1958.
16. Leibovici L. Effects of remote, retroactive intercessory prayer on outcomes in patients with bloodstream infection: randomised controlled trial. *BMJ*. 2001;323:1450-1451.
17. Sheehan DP, ed. *Frontiers of Time: Retrocausation-Experiment and Theory*. San Diego, Calif: American Institute of Physics; 2006.
18. Radin DI. Psychophysiological evidence of possible retrocausal effects in humans. In: Sheehan DP, ed. *Frontiers of Time: Retrocausation-Experiment and Theory*. San Diego, Calif: American Institute of Physics; 2006:193-213.
19. Sicher F, Targ E, Moore D, Smith HS. A randomized double-blind study of the effect of distant healing in a population with advanced AIDS-report of a small-scale study. *West J Med*. 1998;169:356-363.
20. Matthews WJ, Conti JM, Sireci SG. The effects of intercessory prayer, positive visualization, and expectancy on the well-being of kidney dialysis patients. *Altern Ther Health Med*. 2001;7:42-52.
21. Schwartz S, De Mattei R, Brame, E, Spottiswoode S. Infrared spectra alteration in water proximate to the palms of therapeutic practitioners. *Subtle Energies*. 1990;1:43-73.
22. Otto R. *The Idea of the Holy*. Harvey JW, trans. Oxford UK: Oxford University Press; 1958.
23. Belousov LV, Popp FA, eds. *Biophotonics*. Moscow, Russia: BioInform Services; 1995.
24. Watkins G, Watkins A. Possible PK influence on the resuscitation of anesthetized mice. *J Parapsychol*. 1971;35:257-272.
25. Sheldrake R. *A New Science of Life: The Hypothesis of Formative Causation*. London, England: Blond & Briggs; 1981.
26. Sheldrake R. *The Presence of the Past*. Rochester, Vt: Park Street Press; 1995:191-193.
27. Jung CG. *Dreams II*. Hull RFC, trans. Princeton, NJ: Princeton University Press; 1974.
28. Byrd R. Positive therapeutic effects of intercessory prayer in a coronary care unit population. *South Med J*. 1988;81:826-829.
29. Utts J. Replication and meta-analysis in parapsychology [with discussion]. *Stat Sci*. 1991;6:363-403.
30. Utts J. In: Mumford MD, Rose AM, Goslin DA, eds. *An Evaluation of Remote Viewing: Research and Applications*. Washington DC: The American Institutes for Research; 1995:sect 3-2.
31. Hyman R. In: Mumford MD, Rose AM, Goslin DA, eds. *An Evaluation of Remote Viewing: Research and Applications*. Washington DC: The American Institutes for Research; 1995:sect 3-2.
32. Bem DJ, Honorton C. Does psi exist? Replicable evidence for an anomalous process of information transfer. *Psychol Bull*. 1994;115:4-8.
33. Braud W and Schlitz M. Consciousness interactions with remote biological systems: anomalous intentionality effects. *Subtle Energies*. 1991; 2(1) pp. 1-46.
34. May EC, Radin DI, Hubbard GS, Humphrey BS, Utts JM. Psi experiments with random number generators: an informational model. In: Weiner DH, Radin DI, eds. *Research in Parapsychology 1985*. Metuchen, NJ: Scarecrow Press; 119-120.
35. May EC, Utts JM, Spottiswoode SJP. Decision augmentation theory: applications to the random number generator database. *J Sci Explor*. 1995;9:453-488.
36. May EC, Paulinyi T, Vassy Z. Anomalous anticipatory skin conductance response to acoustic stimuli: experimental results and speculation about a mechanism. *J Altern Complement Med*. 2005;11:695-702.
37. Krucoff MW, Crater SW, Gallup D, et al. Music, imagery, touch, and prayer as adjuncts to interventional cardiac care: the Monitoring and Actualisation of Noetic Trainings (MANTRA) II randomised study. *Lancet*. 2005;366(9481):211-217.
38. Cha KY, Wirth DP. Does prayer influence the success of in vitro fertilization-embryo transfer? Report of a masked, randomized trial. *J Reprod Med*. 2001;46:781-787.
39. Nash CB. Psychokinetic control of bacterial growth. In: Roll WG, Morris RL, White RA, eds. *Research in Parapsychology*. Metuchen, NJ: Scarecrow Press; 1982:61-64.
40. Smith MJ. Paranormal effects on enzyme activity. *Hum Dimens*. 1973;1:12-15.
41. Kreiger D. Healing by the laying on of hands as a facilitator of bio-energetic change: the response of in vivo human hemoglobin. *Psychoenergetic Sys*. 1974;1:121-129.
42. Dossey L. *Be Careful What You Pray For*. San Francisco, Calif: HarperSanFrancisco; 1997:165-192.
43. Jain M. Quoted in: Largest study of third-party prayer suggests such prayer not effective in reducing complications following heart surgery [news release]. Boston, Mass: Harvard Medical School Office of Public Affairs; March 31, 2006. Available at: http://web.med.harvard.edu/sites/RELEASES/html/3_31STEP.html. Accessed June 5, 2008.
44. Dossey L. *Healing Words: The Power of Prayer and the Practice of Medicine*. San Francisco, Calif: HarperSanFrancisco; 1993:189-195.
45. Ariel H, Dvorkin L, Steinman Y, et al. Intercessory prayer: a delicate celestial orchestration between spiritual and physical worlds [letter to the editor]. *J Altern Complement Med*. 2008;14:351-352.
46. Bethea C. Quoted in: Cromie WJ. Prayers don't help surgery patients. *Harvard University Gazette*. April 6, 2006. Available at: <http://www.hno.harvard.edu/gazette/2006/04.06/05-prayer.html>. Accessed June 5, 2008.
47. Dusek JA. Quoted in: Cromie WJ. Prayers don't help surgery patients. *Harvard University Gazette*. April 6, 2006. Available at: <http://www.hno.harvard.edu/gazette/2006/04.06/05-prayer.html>. Accessed June 5, 2008.

48. Gallup G. The power of prayer: how Americans talk to God. Gallup poll. *Life*. March 1994.
49. Beecher H. The powerful placebo. *J Am Med Assoc*. 1955;159:1602-1606.
50. La Monica E. Construct validity of an empathy instrument. *Res Nurs Health*. 1981;4:389-400.
51. Coffman JK, Guerin DW, Gottfried AW. Reliability and validity of the Parent-Child Relationship Inventory (PCRI): evidence from a longitudinal cross-informant investigation. *Psychol Assess*. 2006;18:209-214.
52. Schwartz S. *Opening to the Infinite*. Buda, Tex: Nemoseen; 2007.
53. The yoga-system of Patañjali; or, the ancient Hindu doctrine of concentration of mind: embracing the mnemonic rules, called Yoga-sūtras, of Patañjali and the comment, called Yoga-bhāshya, attributed to Veda-Vyāsa and the explanation, called Tattva-vaicārādī, of Vāchaspati-Miçra. Woods JH, trans. Delhi, India: Motilal Banarsidass; 1998.
54. Braud W. Patanjali Yoga and siddhis: their relevance to parapsychological theory and research. In: Rao KR, Paranpje AC, Dalal AK, eds. *Handbook of Indian Psychology*. New Delhi, India: Cambridge University Press (India)/Foundation Books; 2008:217-243.
55. Yoga Sutras of Patanjali 3.2. Available at: <http://hrih.net/patanjali/download/> Accessed: May 17, 2010.
56. Benson H, Klipper M. *Relaxation Response*. New York, NY: Avon Books; 2000.
57. Benson H, Malhotra MS, Goldman RF, Jacobs GD, Hopkins PJ. Three case reports of the metabolic and electroencephalographic changes during advanced Buddhist meditation techniques. *Behav Med*. 1990;16(2):90-95.
58. Honorton C. Psi, internal attention states and the Yoga Sutras of Patanjali. In: Shapin B, Coly L. *Concepts and Theories of Parapsychology*. New York, NY: Parapsychology Foundation; 1981:55-68.
59. Radin D. Psi games. Available at: <http://www.noetics.org/research/psi.cfm>. Accessed September 9, 2006.
60. Benson H, Epstein MD. The placebo effect—a neglected asset in the care of patients. *JAMA*. 1975;232:1225-1227.
61. Summhammer J. Quantum cooperation of insects. arXiv:quant-ph/0503136v1. Available at: <http://arxiv4.library.cornell.edu/abs/quant-ph/0503136v1>. Accessed May 14, 2010.
62. Bell JS. *Speakable and Unsayable in Quantum Mechanics*. 2nd ed. Cambridge, MA: Cambridge University Press; 2004.
63. Josephson B. String Theory, Universal Mind, and the Paranormal. arXiv:physics/0312012v3 [physics.gen-ph] 9 Dec 2003. Accessed December 2, 2008.
64. Jonas WB, Crawford C. *Healing, Intention and Energy Medicine*. New York, NY: Churchill; 2003:xv-xix.
65. Dossey L, Hufford DB. Are prayer experiments legitimate? Twenty criticisms. *Explore (NY)*. 2005;1:109-117.
66. Benor DJ. *Healing Research*. Vol 1. Southfield, Mich: Vision; 2002.
67. Achterberg J, Cooke K, Richards T, Standish LJ, Kozak L, Lake J. Evidence for correlations between distant intention and brain function in recipients: a functional magnetic resonance imaging analysis. *J Altern Complement Med*. 2005;11:965-971.
68. Wadkerman J, Seiter C, Keibel H, Walach H. Correlations between brain electrical activities of two spatially separated human subjects. *Neurosci Lett*. 2003;336:60-64.
69. Standish L, Kozak L, Johnson L, Johnson LC, Richards T. Electroencephalographic evidence of correlated event-related signals between the brains of spatially and sensory isolated human subjects. *J Altern Complement Med*. 2004;10:307-314.
70. Duane TD, Behrendt T. Extrasensory electroencephalographic induction between identical twins. *Science*. 1965;150:367.
71. Radin D. Event-related electroencephalographic correlations between isolated human subjects. *J Altern Complement Med*. 2004;10:315-323.
72. Dossey L. *Recovering the Soul*. San Francisco, Calif: HarperSanFrancisco; 1989:1-11.
73. Dossey L. *Reinventing Medicine*. San Francisco, Calif: HarperSanFrancisco; 1999.
74. Harris W, Gowda M, Kolb JW, et al. A randomized, controlled trial of the effects of remote, intercessory prayer on outcomes in patients admitted to the coronary care unit. *Arch Intern Med*. 1999;159:2273-2278.
75. Krucoff MW, Crater SW, Green CL, et al. Integrative noetic therapies as adjuncts to percutaneous intervention during unstable coronary syndromes: Monitoring and Actualization of Noetic Training (MANTRA) feasibility pilot. *Am Heart J*. 2001;142:760-767.