

HOW SHOULD ALTERNATIVE THERAPIES BE EVALUATED?

AN EXAMINATION OF FUNDAMENTALS

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If there is any primary rule of science, it is . . . acceptance of the obligation to acknowledge and describe all of reality, all that exists, everything that is the case. . . . it must accept within its jurisdiction even that which it cannot understand or explain, that for which no theory exists, that which cannot be measured, predicted, controlled, or ordered. . . . It includes all levels or stages of knowledge, including the inchoate, . . . knowledge of low reliability, . . . and subjective experience.

Abraham Maslow¹

One of the most important and controversial issues confronting the entire field of alternative medicine is how alternative therapies should be evaluated. This question is being debated in the Office of Alternative Medicine, medical schools, and research institutions throughout the country.

THE CONVENTIONAL VIEW

The position taken by most researchers in orthodox medicine, and shared by many within the field of alternative medicine, is that:

Alternative therapies should be tested in the same way that drugs and surgical procedures are currently evaluated. The gold standard has been, and should remain, the double-blind, controlled clinical trial. Double-blind testing is tedious and expensive, to be sure, but it is the most foolproof criterion that exists.

In defense of this perspective, adherents point to the impressive achievements of the double-blind method. It is as valuable as ever, in large measure because delusion remains alive and well in both orthodox and alternative medicine. Well-meaning investigators continue to fool themselves, and safeguards are crucial.

Central to the faith in double-blind methodology are several time-honored tenets of empirical science in general. In the debate about how best to test alternative therapies, these assumptions are seldom articulated. We shall focus on three of them.

Initial conditions

"Double-blinders" believe that if an investigator duplicates

the initial conditions of an experiment done elsewhere by another investigator and applies precisely the same methodology, the same result should, in principle, be obtainable.

Determinism

Although rigid determinism has given way to a statistical, probabilistic outlook at the subatomic level, in the macroscopic domain occupied by human bodies, the laws of nature remain thoroughly deterministic. The laws of nature governing health and illness are immutable; they apply equally everywhere and at all times. Nature's laws have no down time and they do not play favorites. It does not matter where or when a therapy is evaluated or who the evaluator may be. If coronary artery bypass surgery works in London, it should be effective in Los Angeles as well; if a homeopathic remedy is effective in Paris, it should work in Pittsburgh—on Monday or Saturday, day or night, whether administered by Smith or Jones. The constancy and universality of physical law, acting in linear, deterministic fashion, makes replication possible regardless of time, place, or person. Determinism is the friend of the health practitioner because it makes regularity and predictability possible in clinical medicine.

Consciousness

Healing is a physical process taking place in a physical universe. Introducing immaterial factors such as "consciousness," "mind," or "the spiritual" into medicine is to become bogged down in a metaphysical swamp. The various expressions of consciousness—what we loosely call volition, will, thought, choice—are the result of poorly understood physiological processes taking place in human brains and bodies. Mental activity is never primary; it is the result of physical processes and does not initiate them. Mind-body medicine should more accurately be called brain-body medicine, because mental events are shaped by physical events, not vice versa.

The effects of what we call consciousness are entirely local—that is, they are confined to the brains and bodies that produced them. Nonlocal effects of the mind, or mental action-at-a-distance, is impossible in principle. Because the beliefs of experimenters are entirely local in their effects, and because they do not influence the operation of natural laws, they cannot shape the outcome of properly designed experiments. Nature cannot

be pushed around by preference or manipulated by belief.

There are no goals or purposes in the operations of human beings. The body is pushed from behind and below by the forces of natural law; it is never pulled from in front, as if it were striving toward some future destiny. "The cornerstone of scientific method is . . . the systematic denial that 'true' knowledge can be got at by interpreting phenomena in terms of final causes—that is to say, of 'purpose.'"²

Disease, therefore, means nothing. It does not symbolize, represent, or stand for anything occurring "in consciousness." Health and illness are only a consequence of the play of matter against the backdrop of impersonal, blind, physical law.

THE VIEW OF (MOST) ALTERNATIVE THERAPISTS

In contrast, the following position has been advanced by many—perhaps the majority—in the alternative therapy community:

While the double-blind method of evaluation may be applicable to certain alternative therapies, it is inappropriate for perhaps the majority of them. Many alternative interventions are unlike drugs and surgical procedures. Their action is affected by factors that cannot be specified, quantified, and controlled in double-blind designs. Everything that counts cannot be counted. To subject alternative therapies to sterile, impersonal, double-blind conditions strips them of intrinsic qualities that are part of their power. New forms of evaluation will have to be developed if alternative therapies are to be fairly assessed.

This point of view is regarded largely with disdain by double-blinders. One reason is that the argument is so poorly articulated. How are alternative methods different from drugs and surgical procedures? Why is the double-blind standard inappropriate? What can't be quantified, and why? Alternative practitioners are often unable to say. They commonly refer to spiritual factors as determinants in therapy, and concepts such as chi, prana, and chakras crop up frequently. They routinely speak of the power of the consciousness of both healer and healee to affect the outcome of therapy and the results of experimental tests. Alternative partisans often employ terms such as subtle energy, healing vibrations, and energy patterns. They appear

blithely unconcerned that currently within empirical science these concepts are considered metaphors and not demonstrated facts. The differences between analogy and homology, fact and belief, are often blurred in the arguments advanced by alternative enthusiasts. Profound impasses in communication develop. Convinced that alternative therapists have strayed into an intel-

lectual no-fly zone, double-blinders roll their eyes and lament, "Here they go again." It is just as they thought: "alternative therapy" is a cover for mysticism. Alternative therapists aren't interested in science; they prefer a double standard to the double-blind. They want lenient criteria of efficacy so their zany therapies can slip under the scientific wire.

To alternative practitioners, this hardbitten attitude confirms what they knew all along: the double-blinders just don't get it. They are too much in their heads. They seem to have "a prejudice [for] objective data, and a relative neglect of the universe of inner meanings, of the inner flow of experiencing—presumably because of the uncomfortable unmanageability of experiential data rather than because the data lack intrinsic importance."³

Alternative partisans suspect that the arguments of the double-blinders, although couched in logic, are a smokescreen for deeper psychological factors—perhaps the need "to desacralize [the world] as a defense...against being flooded by emotion, especially the emotions of humility, reverence, mystery, wonder, and awe," as psychologist Abraham Maslow put it in his treatise on these questions, "The Psychology of Science."³

When double-blinders take over, alternative therapists believe something gets left out. But what? We can get a hint of this "something" in an observation by scientist-philosopher CF von Weizsäcker: "It is characteristic of physics, as practiced nowadays, not to really ask what matter is, for biology not to really ask what life is, and for psychology not to really ask what soul is."⁴

These opinions don't faze genuine double-blinders. Science is about facts, not feelings. All talk of "soul" and "spirit" should be checked at the laboratory door. The arguments of alternative advocates prove they are willing to bail out of the hardball game of science in the early innings. Their irrational views show that

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the uncompromising demands of the double-blind method are needed now more than ever. How could this debate go forward? A first step might be to declare a moratorium on the acrimonious nitpicking and name-calling and acknowledge that something of value is likely in both the above positions.

Double-blind testing hardly needs defending. It is a landmark achievement in the historical march of scientific medicine. The burden lies with anyone who objects to it to provide better alternatives, and to show why they may be better. This is being done on several fronts, inside and outside the alternative community. *Alternative Therapies* will examine many of these proposals in future issues. Rather than examine specific alternatives to the double blind, we want to take a more fundamental approach by examining the above assumptions about initial conditions, determinism, and consciousness that underlie double-blind testing.

REEXAMINING THE ASSUMPTIONS:

INITIAL CONDITIONS AND CONSCIOUSNESS

Researchers never really duplicate all the initial conditions of an experiment. To do so would require a level of knowledge and precision that are unattainable in practice. Were the subjects in a fair or foul mood, and were these psychological states held constant from test to test? What did they have for breakfast? What was the time of day, week, and month of the experiment? Was the clinic decor pleasing to them? What about the pattern of the experimenter's tie? His after-shave lotion? When investigators claim to have duplicated the initial conditions of an earlier experiment, they do not really mean they have done so. They mean, rather, that they believe some factors are negligible and can be ignored, and that others are important and must be taken seriously. "Initial conditions," therefore, is an imprecise concept in double-blind testing procedures.

The results of this imprecision can be far from trivial. Consider, for instance, one of the initial conditions almost always ignored in evaluating treatments for coronary artery disease—the nature of the interpersonal relationships of the subjects. How much love, caring, and empathy do they experience? In a study involving 10,000 men with heart disease,⁵ subjects who had a loving, supporting relationship with their wife experienced a 50% lower incidence of angina than those who did not.

What might be the possible consequences of neglecting this

factor in the initial conditions? Imagine that, in a double-blind study of an antianginal drug, most of the men having a supportive spouse were randomized to the treatment group, and those having an unsupportive spouse wound up in the placebo group. This skewing would make the drug appear more effective than it really was. Even if it were totally worthless, it might appear to

exert a 50% lowering of the incidence of angina. Even if it were harmful it might appear to exert, say, a 25% improvement. Now, imagine that a different investigator tries to replicate this study, again ignoring spousal support as an initial condition, and suppose in this study that most of the men with supportive spouses wound up in the placebo group. In this event the placebo might outperform the antianginal medication. Even if the experimental drug were capable of lowering the incidence of angina by, say, 25%, it might appear less effective than the placebo. These double-blind studies would be inconsistent, all because important factors constituting the initial conditions

of the experiments were ignored.

Some of the initial conditions likely to be ignored are various "factors of consciousness" such as caring, love, empathy, and spousal support, as well as depression, hostility, and loneliness. The primary reason they are disregarded is our underlying assumption that the world is overwhelmingly physical in nature. This assumption assures us that mental effects, even if present, constitute no more than a placebo-type nuisance that will "wash out" between the treatment and control groups.

It is widely believed that these pesky effects can be annulled by serially testing a therapy on the same person, because the psychological conditions of the person remain largely constant from test to test. This assumption is highly irrational; human beings whose psychological landscape is constant from day to day probably don't exist.

Nobel physicist Eugene P Wigner thought deeply about this question. In a 1979 symposium titled "The Role of Consciousness in the Physical World," sponsored by the American Association for the Advancement of Science, Wigner questioned whether or not initial experimental conditions could ever be duplicated for human beings, or even for simple systems such as atoms and subatomic particles.

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times. There are no two identical people and if we repeat the same experiment on the same individual the individual will remember at the second experiment the event of the first one—his mental outlook will have changed thereby. This means that the...theory encompassing life will be terribly different from those of the present natural sciences.”⁶

According to Wigner, our current “theory of life” is deficient because it, like the above experiment with the antianginal drug, ignores consciousness: “Evidently, the most important phenomena not dealt with by our physical theories are those of life and consciousness. . . . The fundamental principles of our present-day physics would have to be modified if this were to be extended to encompass consciousness.”^{6(pp13,14)}

The dominant view in medical science is that “consciousness” is a euphemism for electrochemical processes occurring in the brain. What is the relationship between consciousness and chemistry? How do electrochemical fluxes in human tissue give rise to something we experience as a thought? These questions resurrect the venerable “mind-body problem,” which has been called the most difficult question in the history of Western philosophy. Meaningful discussions of this question are almost completely missing in medicine today, because it is widely presumed that the answers are in. Typical of the dominant point of view is that of astronomer Carl Sagan: “[The brain’s] workings—what we sometimes call mind—are a consequence of its anatomy and physiology, and nothing more.”⁷

Although seldom articulated, the general feeling of alternative therapists is that double-blind testing procedures ride roughshod over consciousness and that a deep injustice is committed. Many believe their therapies are infused with consciousness as a living force. These views about consciousness are a major difference—perhaps the major difference—separating double-blinders and alternative advocates on how therapies should be tested.

The alternative position on consciousness may be more scientifically credible than is generally believed. Nobel neurophysiologist Roger Sperry has offered ammunition to this perspective. Sperry has insisted that the effects of consciousness are not always secondary to deeper biochemical processes, and neither are they trivial. He has introduced the concept of “downward causation,” according to which “. . . things are controlled not only from below upward [by physical events within the organism] but also from above downward by mental, social, political, and other macroproperties. [Furthermore,] primacy is given to the higher level controls rather than the lowest.”⁸

Sperry is aware that this is a major departure from the canonical wisdom of our time:

[These] concepts of the mind-brain relation involve a direct break with the long-established materialist and behaviorist doctrine that has dominated neuroscience for many decades. Instead of renouncing or ignoring con-

sciousness, the new interpretation gives full recognition to the primacy of inner awareness as a causal reality.⁹

If this is mysticism, as skeptics often charge, then mysticism envelops not only alternative partisans but Nobelists as well.

Most neuroscientists believe that if we possessed a complete understanding of the workings of the brain, we could account for the contents of the mind. Many who hold this opinion look to quantum physics, our most precise science, as the eventual proving ground for this point of view. Although they are a minority, several prominent scientists have seriously questioned the adequacy of modern physics to solve the relationship between consciousness and matter, mind and brain. Among them, again, is Nobel physicist Wigner. In a provocative article, “Are We Machines?” he stated: “[Q]uantum mechanics is ‘passing the buck.’ . . . [W]e have at present not even the vaguest idea how to connect the physico-chemical processes with the state of mind . . .”¹⁰

Moreover,

. . . Even if the physical theories could completely describe the motions of the atoms in our bodies, they would not give a picture of the content of our consciousnesses, they would not tell us whether we experience pain or pleasure, whether we are thinking of prime numbers or of our granddaughters. This fact is, in my opinion, the most obvious but also the most convincing evidence that life and consciousness are outside the area of present day physics.¹¹

Niels Bohr, whose name is virtually synonymous with modern physics, seemed to agree: “We can admittedly find nothing in physics or chemistry that has even a remote bearing on consciousness.”¹⁴ Bohr is implying, contrary to the popular view, that the physical sciences are simply not equipped to “solve consciousness.” His contemporary, Nobelist Werner Heisenberg, expressed a similar opinion on the chasm separating the physical sciences and consciousness: “There can be no doubt that ‘consciousness’ does not occur in physics and chemistry, and I cannot see how it could possibly result from quantum mechanics.”¹²

It is odd that these points of view, advanced by some of the most prominent figures in the history of science, are almost never acknowledged when scientists discuss the relationship of mind and body. One often hears that pundits within science have thought deeply about these questions and that the debate is practically over. This implication is presumptuous; the debate is alive and well. Alternative therapists who believe there is something special about consciousness, some fundamental quality separating it from matter, may be on firmer ground than they realize.

Why do many physicists, who have never treated a patient and whose workaday world is remote and invisible, seem more cordial to the “specialness” of consciousness than are life scientists? This paradox has been noted by respected British physicist Paul Davies: “Physics, which has led the way for all other

sciences, is now moving towards a more accommodating view of mind, while the life sciences, following the path of last century's physics, are trying to abolish mind altogether."¹³

Bioscientist Harold Morowitz has also been struck by this curious reversal:

What has happened is that biologists, who once postulated a privileged role for the human mind in nature's hierarchy, have been moving relentlessly toward the hard-core materialism that characterized nineteenth-century physics. At the same time, physicists, faced with compelling experimental evidence, have been moving away from strictly mechanical models of the universe to a view that sees the mind as playing an integral role in all physical events. It is as if the two disciplines were on fast-moving trains, going in opposite directions and not noticing what is happening across the tracks.¹⁴

Closely connected to the materialistic view of consciousness is the philosophy of behaviorism, which dominated experimental psychology for most of this century. Behaviorism, like the materialistic view of the mind, does not regard mental actions as primary and causal but as links in a deterministic chain of stimulus and response. All behavior is mechanical. This uncompromising point of view was expressed by BF Skinner, perhaps the best-known behaviorist of all time, by his dictum, "The rat is always right."¹⁵

Behaviorism has exerted enormous influence on how humans are handled in double-blind experiments. Just as behaviorists consider the rat's "mind" to be a superfluous or even silly concept, many research methodologists consider the human mind to be generally inconsequential in double-blind testing. As we have observed, even when the human mind does "act up" in an experiment—for instance, when subjects "succumb" to the effects of suggestion and expectation—it is believed that these so-called placebo effects can be brought into line and annulled by proper double-blind methodology.

Because double-blinders and alternative methodologists differ radically about the nature of consciousness, and since assumptions about consciousness figure so heavily in double-blind methodology, it is unlikely that these two sides will come together on how alternative therapies should be tested until this issue is at least partially resolved.

IS THE DOUBLE-BLIND BLIND?

Double-blind enthusiasts assume that placebo effects are by definition local—that is, they are intrapersonal, affecting only the subject experiencing them. This follows from the belief that consciousness is a completely private phenomenon. There is considerable evidence, however, that the effects of consciousness may extend farther than the individual to exert nonlocal or transpersonal effects, shaping events outside the person in whom they originate.

Researchers William Braud and Marilyn Schlitz have

demonstrated that the mental images and visualizations of one individual may affect the physiology of a distant person who has no sensory contact with the imager.¹⁶ They have termed these effects transpersonal imagery. In addition, scores of controlled experiments suggest that individuals who experience empathic, compassionate, and loving concern for a distant being can exert significant physiological effects, whether the distant being is human or a lower organism.¹⁷ Moreover, several studies strongly suggest that the mind can affect mechanical systems at a distance. These "direct mind-machine interactions" involve instruments as diverse as electronic circuits and oscillating pendulums.¹⁸⁻²⁰ The sheer number of these studies, as well as their generally high quality and statistical significance, which we will examine shortly, is little known in the medical community. As one reviewer recently stated, "Anyone still doubting the reality of [this evidence] should have one of these graphs stapled to the inside of their eyelids."²¹

If nonlocal, distant effects can influence mechanical systems and simple organisms, can they influence experimental studies involving human beings and "contaminate" double-blind tests? Solfvin²² has described a series of double-blind drug studies²³⁻²⁷ in which the effects of the drug correlate with the preexisting beliefs of the principal investigator. These studies suggest that the consciousness of the experimenter, in effect, "push the data around." Assessing these findings, Solfvin observes:

[S]tudies with a wide variety of treatments have conclusively affirmed that the administering physician or researcher is not independent of the results in . . . double-blind . . . studies. . . . As a general rule, the double-blind cannot any longer be assumed to guarantee the exclusion of the nonspecific effects of the treatment, especially when the actual treatment has a weak or variable effect.²²

If these observations are valid, interesting questions arise. Should alternative therapies be evaluated by hostile skeptics or by researchers who are sympathetic and cordial to them? These differences might help explain why "failure to replicate" is a common result when alternative therapies are tested by skeptical investigators in unfriendly surroundings. These considerations apply, however, not just to alternative therapies but to orthodox treatments as well.

We have not yet begun to confront these troubling possibilities. They introduce immense complications, which many feel are simply too vexing to contemplate. Until these issues are clarified, how should we proceed? At a minimum, the preexisting attitudes and beliefs of the investigators should be assessed prior to beginning an experiment. This is almost never done, because the possibility that consciousness might act nonlocally is excluded from the worldview of most scientists. This cumulative information, however, might eventually shed light on the validity of these proposed effects. If verified, experimenter beliefs may eventually be considered vital elements of the initial conditions

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of all future double-blind studies. Such beliefs may also cast doubt on past double-blind evaluations in which these effects were not specified in the studies' initial conditions.

If these correlations prove valid, we shall have to reconsider what we mean by "false positive" and "false negative" test results. If a researcher who is skeptical of a particular therapy fails to replicate its effects, is this a "false negative" study? If an investigator who is cordial does succeed in replication, is this a "false positive?" Who decides? Should this terminology be revised or perhaps abandoned? Should researchers who are having a "bad day" and who feel morose or depressed not be allowed in the lab until their mood lifts? Will the grant request of the future query the beliefs of the principal investigator?

THE END OF SCIENCE OR A NEW BEGINNING?

The possibility that the consciousness of an experimenter could somehow penetrate the double-blind setting evokes considerable emotional and intellectual indigestion. For example, Martin Gardner has said, "If such an effect is real it would throw doubt on all empirical findings since Galileo."²⁸ Such dire predictions are probably overwrought. If an experimenter's beliefs act nonlocally to affect experimental outcomes, this would not mean the end of science. These effects would probably be a matter of degree.

Alternative therapies, like orthodox treatments, occupy a spectrum. Some appear to be relatively physical in nature, some less so. For those on the physical end of the spectrum, the effects of consciousness are likely to be meager, in which case double-blind testing may be generally appropriate for them. For consciousness-laden interventions, this may not be so. Physicist Wigner is again helpful:

I believe that life and consciousness are phenomena which have a varying effect on the events around us—just as light pressure does. Under many circumstances . . . the phenomenon of life has an entirely negligible influence. There is then a continuous transition to phenomena, such as our own activities, in which this phenomenon has a decisive influence.⁶

PSYCHIC HEALING AND THE 4-MINUTE MILE

The collision of consciousness and the double-blind method is most obvious in therapies in which consciousness may have a decisive influence. Of these, none is more dramatic than psychic healing, sometimes called spiritual, mental, or distant healing. Psychiatrist Daniel J Benor has reported more than 130 controlled laboratory studies in this area, over half of which demonstrate statistically significant results.²⁹⁻³²

In spite of this evidence, individual healers are often unable to perform identically from day to day or from experiment to experiment. This variation is interpreted by skeptics as conclu-

sive proof that all mental healing is bogus. They insist that "real" therapies—drugs and surgical procedures—do not have an off day. If healers were authentic, they should be able to heal on command—any time, any place.

We may have to reevaluate these objections. As noted above, Solvvin has shown that the effects of drugs are not constant; their effects appear to vary according to the belief system of the person evaluating them. If the effects of drugs vary according to psychological factors, why not with the effects of healers?

Numerous studies have demonstrated that subjects who believe in parapsychological phenomena such as clairvoyance score higher on tests of these abilities than do nonbelievers. In addition, personality variables such as extroversion correlate with these skills.³³ These findings suggest that consciousness-related talents such as psychic healing cannot be accurately studied without incorporating key psychological variables in the initial conditions of an experiment.

Imagine two experiments testing the effect of penicillin on streptococcal infections. One experimenter administers 100 units intravenously per day; a second experimenter administers 1,000,000 units intravenously every 4 hours. With such divergent doses, how can the results be compared? In the same way, studies in psychic healing that ignore the psychological variables of the healer in the initial conditions may be impossible to compare because they may be delivering, in effect, different "doses" of healing. These differences may be caused by any emotion that is known to vary in intensity. Is the healer fascinated and challenged by the task, or is she bored stiff? Did he have a good night's sleep? Is she worried about a pending job promotion, the weather, or her relationship with her husband? In addition to whatever conscious factors we might identify that may be affecting the healer, what of the unconscious factors that may also be at work?

Should healers be expected to heal on each and every attempt, as skeptics demand? We do not make this demand of other human abilities. If an athlete runs a 4-minute mile on one occasion, we do not require that he repeat the achievement on every successive attempt in order to prove that the initial accomplishment was valid. Even if he never repeated the feat, we would not say his first achievement was phony. We realize that running a 4-minute mile is a human achievement and that human beings are affected by many factors, some of which are beyond their control. Each attempt of the athlete stands on its own and speaks for itself. If a 4-minute miler fails to duplicate his feat, we do not say that all previous 4-minute milers are imposters; neither do we deny that other athletes may be able to run a 4-minute mile in the future. The same view could be taken for any human activity, such as making love. Most people cannot make love identically from occasion to occasion, or on command, because the initial conditions of love-making are exceedingly complex and are never constant.

Consciousness-based therapies such as mental healing, transpersonal imagery, and intercessory prayer should be viewed in the same way. They are initiated by human beings whose initial psychological and physical conditions may vary greatly from occasion to occasion. To the extent that we cannot specify these conditions, the double-blind method may be inappropriate for evaluating consciousness-based therapies. A single, well-designed demonstration of mental healing would not be annulled by 10 successive failures to replicate it, any more than a 4-minute mile would be wiped from the books by 10 subsequent failures.

**CHAOS AND COMPLEXITY:
DETERMINISM
RECONSIDERED**

Even if we could specify and duplicate the initial conditions from one experiment to another, could we then predict the effects of a treatment variable in a given experiment? The answer seems to be: Not always.

Samuel Vaisrub, whose editorials graced the pages of the *Journal of the American Medical Association* for many years, offered this prophetic observation in 1979:

New cybernetic mechanisms have added further complexities to understanding causality in human physiology. Cause and effect no longer bear a straight linear relationship to each other. Circular mechanisms of positive and negative feedbacks have taken over in the operational depths of homeostasis. The chain of causation is fast dissolving before our eyes to be replaced by some form of invariable association that does not lend itself readily to a graphic, mathematical, or any other representation.³⁴

The “invariable associations” Vaisrub referred to are all around us. Consider, for example, an assessment of the state of general internal medicine by Harvard’s Thomas L. Delbanco. His description shows how chaotic and complex clinical medicine has become:

Even as our knowledge increases . . . with new data being developed and algorithms being placed on firmer footing, uncertainty not only persists in most areas of clinical practice,

but is increasing in several. Although alcohol may improve the lipid profile, it may also promote carcinoma of the breast. Is coffee safe this year? Eating fish and/or swallowing numerous (expensive) capsules filled with fish oils may protect against coronary artery disease, but may there be a tendency to bleed if the oils are used together with other antiplatelet agents? Make sure you exercise regularly, but should one search for silent myocardial disease? If the physician is confused, pity our patients! The medical columnists in the lay press bewail the confusion; no one seems to have reliable answers about how to behave to preserve health.³⁵

The most fundamental message of chaos theory is that one cannot predict future states from a knowledge of initial conditions,

even though that knowledge may be utterly precise. But just because our medical predictions are failing, as Delbanco describes, does this mean that medicine has become genuinely chaotic? Perhaps our knowledge will improve in the future, clearing away our current confusion. We are struggling, it is said, not with true chaos but with temporary obstacles to progress. Surely, the predictability and precision can be restored. It is really only a matter of more research funding, manpower, and bigger computers.

Is our confusion in medicine just a temporary blank spot on the scientific map? This appears unlikely. Sir James Lighthill, while President of the International Union of Theoretical and Applied Mechanics, wrote in 1986 in the Proceedings of the Royal Society:

[T]here might be some other discipline where practitioners could be inclined to blame failures of prediction on not having formulated the right differential equations or on not

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employing a big enough computer to solve them precisely *or* on not using accurate initial conditions; yet we in mechanics know that, in many cases where the equations are known exactly and are solved precisely, nevertheless however accurately the initial conditions may be observed, [prediction] is *still* impossible beyond a certain . . . horizon.³⁶

The belief in order, predictability, and determinism underlies the confidence in the double-blind method of experimentation. In medicine we took our cues from the classical physicists, who assured us that the behavior of all large-scale objects, whether human bodies or free-swinging, spherical pendulums, was unquestionably deterministic. Now physicists have discovered that these systems were not deterministic as previously thought; even the motion of simple pendulums becomes chaotic and unpredictable.³⁶ Thus the lamentation: if determinism has broken down in physics, our most accurate science, it may be back to the drawing board in medicine. In truth, however, there is no “breakdown” of determinism in medicine; we had it wrong to begin with. We were never as simple as we believed, and our testing procedures, which rested on deterministic, linear chains of cause and effect, were never as reliable as we thought.

If we downsize our faith in determinism, how will this affect medicine? We do not, of course, fully know. But if the new outlook has changed the way we regard the function of simple, classical pendulums, shall our views of human function remain unshaken?

As clinicians and researchers, we should acknowledge that many of the assumptions made in our education and training about determinism were simply wrong. Lighthill:

We are deeply conscious today that the enthusiasm of our forebears for the marvelous achievements of Newtonian mechanics led them to make generalizations in this area of predictability which . . . we now recognize are false. We collectively want to apologize . . . for spreading ideas about determinism that after 1960 were to be proven incorrect.³⁶

Ilya Prigogine, the Belgian physical chemist who was awarded the Nobel Prize in 1977 for his work in dissipative structures, suggests that we face a considerable renovation of our world view. “Chaos,” he says bluntly, “changes the formulation of the laws of physics.”³⁷

It also may change our concepts of “mind” and “consciousness.” In a paper provocatively titled “A (very) Brief History of Certainty,” Prigogine quotes with approval the British physicist and mathematician Roger Penrose: “It is our present lack of understanding of the fundamental laws of physics that prevents us from coming to grips with the concept of ‘mind’ in physical or logical terms.”³⁶

Our concept of initial conditions will almost certainly be affected by the developing sciences of chaos and complexity. Lighthill again:

Initial conditions can never be specified . . . beyond a cer-

tain level of precision. . . . We are able to come to this conclusion without ever having to mention quantum mechanics or Heisenberg’s uncertainty principle. A fundamental uncertainty about the future is there, indeed, even on the . . . basis of the good old laws of motion of Newton.^{36(p47)}

Some in medicine believe the fuss over chaos and complexity is a tempest in a teapot. In human bodies and organ systems, the small-scale effects of chaos do not become biologically amplified but are eventually swamped and annulled. Can chaos be ignored in human bodies? Does chaos become less important as physical systems become more complex? No, it is the other way around. Lighthill says: “[T]he more complicated systems exhibit still more complicated forms of chaos. . . .”³⁶

The concepts of chaos and complexity are already affecting our basic ideas of health and illness. The nonlinear dynamicist, the guru of chaos theory, has already taken his seat alongside the cardiologist in some coronary care units, as chaos theory is being applied to the analysis of cardiac arrhythmias. Such developments suggest that chaos in the biological domain, far from being trivial, can be a matter of life and death. Lipsitz and Goldberger have proposed that chaos in human beings can also be a good thing. They have suggested that highly variable physiological fluctuations resembling chaos are necessary for healthy organ function. When we lose complexity we are unable to adapt to physiological stress, which leads to faster aging. These investigators state: “If further research supports this hypothesis, measures of complexity based on chaos theory and the related geometric concept of fractals may provide new ways to monitor senescence and test the efficacy of specific interventions to modify the age-related decline in adaptive capacity.”³⁸

Summing up these new directions, George Solomon of UCLA offers this opinion:

[W]e need now to develop new, nonlinear, nonmechanistic understandings [of the body] based on systems, chaos, and informational theories. . . . There are systems that are so complex and so interrelated that the conditions of the whole are not predictable on the basis of its elements. The body is more than anatomy, physiology, biochemistry, or even psychosomatics and molecular biology. Disease may be more complex than even a multifactorial model can adequately describe.³⁹

CHAOS AND CONSCIOUSNESS

What does chaos have to do with how we evaluate therapies? The proposal here is that consciousness can create chaos in test situations. It can act as the monkey wrench in the causal chain. Earlier we saw an example of how this might occur—Solfvin’s findings that the beliefs of an investigator may act non-locally to influence the outcome of double-blind experiments.

How might we obtain clearer insights into these possibilities? One way is to test whether or not consciousness can exert

nonlocal, chaotic effects in principle—not in complex entities such as human bodies but in objects that are much simpler, such as electronic systems. Many such experiments have been done. Radin and Nelson performed a meta-analysis of 152 of these reports gathered from refereed journal articles, technical reports, dissertations, conference proceedings, and unpublished manuscripts. These were written by 68 principal investigators, representing 15 laboratories in eight countries. These reports encompassed a total of 597 experiments, consisting of over 1 billion “mentally influenced” bits, and 235 control studies, consisting of over 2 billion bits. These studies were begun in the mid-1950s at US government laboratories, Boeing Laboratories, AT&T Bell Laboratories, MIT, Princeton University, University of Edinburgh, and many other industrial and academic laboratories. Most of the experiments were conducted by physicists interested in the ability of consciousness to affect quantum states and by psychologists interested in the nature of human intention. In their report in the prestigious journal, *Foundations of Physics*, Radin and Nelson state: “The overall results showed that control data conformed to theoretical chance expectation, but the experimental data was highly significant, equivalent to a 15 standard error shift of the mean from chance. In other words, the results of these studies was not due to chance.”⁴⁰

Contrary to the claims of skeptics, the meta-analysis demonstrated that the effects of consciousness on distant electronic instruments does not diminish as the quality of the experiments improves. In fact, the reverse was found: better-controlled experiments produced slightly larger effects. Overall, the meta-analysis showed that the mental effects on the machines (a) are not due to chance, (b) have been successfully replicated by many different experimenters, and (c) are not accounted for even if more than 50,000 studies averaging a null effect had been overlooked in the process of searching the literature.⁴¹

There is remarkable resistance to the evidence suggesting that consciousness may act nonlocally to exert physically significant effects. In its 1988 report dealing with parapsychology, the field of science devoted to the study of these phenomena, the National Research Council commissioned psychologist Robert Rosenthal of Harvard University to evaluate several controversial areas. Parapsychology researcher Richard S Broughton describes these events:

Rosenthal is widely regarded as one of the world’s experts in evaluating controversial research claims in the social sciences and has spent much of his career developing techniques to provide objective assessments of conflicting data. Neither Rosenthal nor his coauthor, Monica Harris, had taken any public position on parapsychology . . . The report by Harris and Rosenthal determined that the “research quality” of the parapsychology research was the best of all the areas under scrutiny. . . . Incredibly . . . [the] committee chairman . . . asked Rosenthal to withdraw the parapsychology section of his report. Rosenthal refused. In the final document the Harris and Rosenthal report is cited only in

the several sections dealing with nonparapsychological topics; there is no mention of it in the parapsychology section.⁴²

The demonstration of nonlocal mental effects in distant electronic systems does not necessarily mean that nonlocal effects of consciousness occur in medical evaluations. But the fact that physicists now study them should create a greater permissiveness for clinicians and medical researchers to search for these effects in their domain.

DOUBLE-BLIND OR DOUBLE STANDARD?

Judging from the enthusiasm of many double-blinders, one might conclude that the double-blind test is absolutely essential to modern medicine and that medical progress would have ground to a halt long ago without it. How necessary is the double-blind test? What is its track record in ensuring high scientific standards in contemporary medicine? Richard Smith, editor of the *British Medical Journal*, recently observed: “[O]nly about 15% of medical interventions are supported by solid scientific evidence. . . . This is partly because only 1% of the articles in medical journals are scientifically sound and partly because many treatments have never been assessed at all.”⁴³

This point of view has been recently affirmed by David A. Grimes of the University of California-San Francisco Medical School. In a 1993 paper, he stated: “. . . [M]uch, if not most, of contemporary medical practice still lacks a scientific foundation.” Grimes cites several examples of unproved but widely practiced therapies, including noninvasive electrical stimulation for nonunited bone fractures; chemotherapeutic, immunologic, or physical methods of “purging” prior to autologous bone marrow transplantation; episiotomy; laparoscopic vaginal hysterectomy; and radial keratotomy.⁴⁴

Judging from the comments of many critics of alternative medicine, it is primarily alternative researchers who have been remiss in employing double-blind testing methods. This is not the case. In 1978 the Congressional Office of Technology Assessment found that only an estimated 10% to 20% of the techniques that physicians use are empirically proven.⁴⁵

If double-blind criteria have so often been ignored in contemporary medical practice, does the insistence that all alternative therapies be required to submit to this method constitute a double standard?

ALTERNATIVE THERAPISTS: THE DEEP OBJECTIONS

As mentioned earlier, alternative therapists who object to double-blind testing methods often appear unable to articulate their objections. Although I have tried to interpret some of them, I am certain I cannot adequately express the views of most alternative therapists. I am convinced that many of their objections are not intellectual but emotional, perhaps spiritual and ineffable.

In the end, I believe alternative therapists object to double-blind testing because it attempts to eliminate the subjective. (This is, of course, the reason double-blinders prefer this

method.) They sense, along with Nobel physicist Werner Heisenberg, that something has to be added to the laws of physics and chemistry before certain biological phenomena can be understood completely. This “something” is related to the mysteries of consciousness, which in orthodox medicine has not yet found a home.

I don't believe the subjective can ever be eliminated from scientific testing. The primary reason lies in the fundamentally nonlocal nature of consciousness. We have assumed that consciousness is an entirely local event—that it can be confined to points in space, such as brains or bodies, and time, such as the present moment. These assumptions are contradicted by several lines of evidence as we have seen, and have been examined elsewhere at length.^{17,46,47}

I have long suspected that many alternative advocates bear a grudge against double-blind testing because this method not only devalues consciousness, it ignores “spirit” and “the spiritual.” These concepts occupy a high place in many alternative therapies.

Although materialists place little or no value on these ideas, it is doubtful that science can sanitize medicine of the spiritual. Erwin Schrödinger, whose wave equations lie at the heart of modern quantum physics, has suggested that science can never disprove spirit:

... [W]e shall not expect the natural sciences to give us direct insight into the nature of the spirit; we shall not hope to penetrate it, however much we learn about the physics and chemistry of the bodily processes with which we find perception and thought objectively linked; and we shall not fear that even the most exact knowledge of the mechanism of these processes and the laws by which they operate—a knowledge the subject of which is and will always remain in the spirit—can lay fetters upon the spirit itself, that is, can compel us to regard it as un-free, ‘mechanically determined,’ on the ground that it is linked with a physiological process that is mechanically determined and subject to laws of nature.⁴⁸

WHAT LIES AHEAD?

Three developments—the evidence favoring the nonlocal

nature of consciousness, the effects of chaos and complexity in biological systems, and the abandonment of hard-core materialism—will decisively influence our decisions about how to test both alternative and orthodox therapies in the future. How shall we proceed now?

Double-blind methods, in spite of their limitations, can be

used to test alternative therapies. For example, Jacobs found homeopathy to be effective in the treatment of acute childhood diarrhea.⁴⁹ Reilly and colleagues found positive results from homeopathy in a meta-analysis of several studies involving a total of 202 patients,⁵⁰ and an independent criteria-based review of more than 100 published controlled trials of homeopathic treatments also showed these methods to be effective.⁵¹ Using orthodox standards in current use, the reviewers commented that this body of evidence “would probably be sufficient for establishing homeopathy as a regular treatment for certain conditions.”

These findings create an interesting situation. Many researchers believe that homeopathy has such a high

degree of “inherent implausibility”⁵² (the final homeop at h i c solution has no solute) that it cannot work. Therefore, any study confirming homeopathy must be flawed. Does this reasoning also incriminate the double-blind methodology which confirms that homeopathy is effective?

Opponents of homeopathy are faced with an interesting dilemma. As Reilly and colleagues put it, either homeopathy works, or clinical trials don't. To dismiss the double-blind evidence for homeopathy is to sully the reputation of the double-blind method. And to admit the evidence for homeopathy in order to preserve the sanctity of the double-blind method allows homeopathy a place as a proven therapy, which many consider outrageous and unthinkable. Double-blinders who oppose homeopathy cannot, it would seem, have it both ways.⁵⁰

If the debate about how best to assess alternative therapies is to progress, we must stop lumping these techniques together as if they are a homogeneous lot, and we must cease assuming that a single method of evaluation applies to all of them. Alternative therapies occupy a spectrum, as already mentioned. At one end are those that can be considered rather

OPPONENTS OF HOMEOPATHY ARE FACED WITH AN INTERESTING DILEMMA. AS REILLY AND COLLEAGUES PUT IT, EITHER HOMEOPATHY WORKS, OR CLINICAL TRIALS DON'T.

physical in nature, in the sense that insulin and craniotomies are physical. At the other end of the spectrum are therapies that are difficult or impossible to describe in physical terms, such as so-called psychic healing, distant hypnosis, and distant or intercessory prayer (note 1). Most alternative therapies lie somewhere between these two extremes. For those at the physical end of the spectrum, double-blind testing methods may be more or less appropriate. For those at the other end, they may not be.

ABOUT SKEPTICISM

Many in medicine are hardly overjoyed to contemplate the developments we have discussed. Some equate chaos and chaotic with bad. They lament the loss of certainty and predictability, and long nostalgically for earlier times when these beliefs gave great comfort. Some seem intent on restoring determinism to its original preeminence by simply ignoring the new developments or by insisting they are clinically irrelevant. Others prefer to believe that the debate over the mind-brain-matter relationship is over, and that matter and brain are the victors. But the greatest obfuscation of all concerns the denial of evidence demonstrating the nonlocal nature of consciousness. This evidence, still evolving, may affect the evaluation of alternative therapies more decisively than any other development within science.

The resistance is understandable. After all, it is the nature of human beings, including physicians and scientists, to prefer order and predictability to ambiguity and uncertainty. The world of empirical science can be kept more orderly if consciousness—the wild card in the scientific deck—is kept off the table.

Russell McCormach, professor of the history of science at The Johns Hopkins University, in his stunning novel *Night Thoughts of a Classical Physicist*, captures the emotional and intellectual turmoil that arose when classical physics encountered the new relativistic ideas around the turn of the last century.⁵³ He shows how agonizing scientific progress can be for those who are centrally involved. The resistance of scientists compelled physicist Max Planck, whose work was pivotal in the quantum-relativistic revolution, to observe that science changes funeral by funeral.

Researchers and practitioners of alternative medicine should resist the strategy of skeptics to lump their therapies with the “paranormal,” as is often done. If the effects we have discussed are demonstrable in controlled experiments, there is nothing “para” about them. We can expect skeptics to continue their attacks on alternative therapies, often with paranoid fanaticism. Our greatest ally in confronting this assault will be science itself—not the restricted, limited view of science that characterizes the skeptics who seem to know in advance how the world should behave, but the open-ended approach that sets dogma, prejudice, and preconceived notions aside.

Consciousness researcher Charles Honorton has described a perspective toward science and an attitude toward skepticism that might serve alternative medicine well:

I believe in science, and I am confident that a science that can boldly contemplate the origin of the universe, the nature of physical reality 10^{33} seconds after the Big Bang, anthropic principles, quantum nonlocality, and parallel universes, can come to terms with the implications of parapsychological findings—whatever they may turn out to be. There is no danger for science in honestly confronting these issues; it can only be enriched by doing so. But there is a danger for science in encouraging self-appointed protectors who engage in polemical campaigns that distort and misrepresent serious research efforts. Such campaigns are not only counterproductive, they threaten to corrupt the spirit and function of science and raise doubts about its credibility. . . . True skepticism involves the suspension of belief, not disbelief. In this context, we would do well to recall the words of the great nineteenth-century naturalist and skeptic, Thomas Huxley: “Sit down before fact like a little child, be prepared to give up every preconceived notion, follow humbly to wherever and to whatever abysses nature leads or you shall learn nothing.”⁵⁴

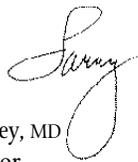
STAYING OPEN

One of the greatest impediments to progress in science is to assume that our fundamental concepts are basically complete. They have never been. Mary Hesse, mathematician and philosopher of science at Cambridge University in England, in a paper titled “Miracles and the Laws of Nature,” offers a reminder that science is still extraordinarily unsettled:

Abandonment of the deterministic world-view in physics has made it more difficult to regard the existing state of science as finally legislative of what is and what is not possible in nature. The very fact that what appeared for three centuries to be an absolutely true and universal theory has been shown to be false must cast doubt on all future claims of science to have reached such a universal theory. Science is continually growing and changing, sometimes quite radically. It is far less easy to see it today as a monolithic and cumulative progress toward the whole truth than was the case a hundred years ago. We are by no means sure, even in physics, that existing quantum theories will prove adequate in sciences other than physics, and in the sciences of complex systems such as the human psyche and human social groups we have only the bare beginnings of any theories at all.⁵⁵

Because alternative medicine challenges so many time-honored assumptions, it is a doorway through which we may, if we have the courage, encounter a radically new understanding of the physical world and our place in it. The questions raised by alternative therapies have fractured the bedrock of many hallowed ideas. Old foundations are beginning to creak and groan. The lowlands of scientific certainty are being flooded by anomalous data that call into question many ideas thought inviolable.

But floods, although unpleasant in the short run, bring life and renewal. They are where the greatest fertility is found.



— Larry Dossey, MD
Executive Editor

Notes

1. A discussion of these “nonlocal therapies” and the evidence surrounding them can be found in Dossey L. *Healing Words: The Power of Prayer and the Practice of Medicine*. San Francisco, Calif: Harper; 1993.

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