Can Our Intentions Interact Directly With The Physical World?

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It is a truism that our mental processes can exert profound influences upon our own bodies, upon other people, and upon the physical world. I intend to wiggle my finger, and the finger obliges. I wish to move from one room to another, and the complex system of my musculature cooperates and takes me there. I intend to remember a particular event that occurred when I was five years old, and my memory recalls that scene for me and presents it to me in vivid detail. These interactions of mental processes such as intentions, volitions, purposes, aims, and wishes with our own physical bodies are familiar to all of us; we take them for granted and rarely give them a second thought.

Similarly commonplace are the many influences of our intentions upon the external physical world. I intend to build a stone house, and after a while it appears in the landscape, where it may remain for centuries as a physical embodiment of my intention. I intend to save a continent of children from the ravages of a particular disease, develop an effective vaccine, innoculate thousands of children, and hundreds of lives are saved. As a scientist, my intentions and wishes lead me to conceive and carry out specific types of experiments, test specific hypotheses, and construct particular theories. My intentions influence what I choose to study, how I study it, the types of observations I make, and the interpretations I prefer. The outcomes of these studies can have important impacts upon our understanding of the physical world and may have dramatic impacts upon the physical world itself.

All of these influences, although they can be quite dramatic, are *indirect*. The influences of intention within my own body are typically understood as effects mediated by systems of anatomical, neurohormonal, and biochemical pathways. Intentional influences upon the external physical world are mediated by my bodily reactions and words and through persons and objects in my vicinity.

One can ask, however, whether there might be special instances in which our intentions can have more *direct, unmediated* influences upon the physical world. Throughout history, there have been beliefs that, under certain conditions, such influences are possible, and there is indeed of body of anecdotal and laboratory evidence that suggests that direct intentional influences upon the physical world can indeed occur. Such influences have been described as "mind over matter" effects and are also known by their aliases, "telekinesis" and "psychokinesis". More recently, they have been termed "remote action" and "anomalous perturbation" effects. I prefer to call them, simply, "direct mental interactions".

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Although there is interesting suggestive evidence from other sources regarding the existence and nature of direct mental interactions with physical systems, I shall restrict my comments to cases in which these effects were studied under controlled laboratory conditions.

Mechanical Random Systems

The earliest formal tests of direct influences of intention upon physical systems were published by J. B. Rhine and his associates in the early 1940s. In these experiments, bouncing dice were used as the mechanical random physical system, and participants attempted to influence the fall of dice through mental processes of intention, imagery, and wishing. Many trials were conducted in which participants attempted to mentally influence which die face would be uppermost when a bouncing die finally came to rest. Results were analyzed statistically by comparing the number of obtained "hits" (successful outcomes in which the uppermost die face matched the intended "target" face) with the number of hits theoretically expected on the basis of chance (since a die has six faces, one sixth of all trials would be expected to be successful by chance alone). Rhine and his co-workers claimed to be finding significantly more hits than expected and concluded that their participants were indeed mentally influencing the randomly bouncing dice. A thorough and readable account of these experiments may be found in Rhine (1970).

Critics were quick to point out that these early dice-throwing experiments may have contained a number of methodological defects or potential flaws. They pointed out that dice are not truly unbiased but rather, due to their physical construction, they have a slight tendency to favor certain faces. The markings on dice faces are frequently made by scooping out little bits of the surface; consequently, the "six" face actually has more surface material removed and is in fact slightly lighter than the opposite "one" face, which has less mass removed. This mass asymmetry will result in slightly more "sixes" occurring if the dice are thrown many, many times. This physical bias criticism was met by choosing die face targets in a changing, balanced manner so that many trials were conducted with the "one" face as the intended target, followed by many trials with the "two" face as target, and so on until each face had served an equal number of times as intended target. This would assure that a physically biased die could not contribute systematically to a successful outcome. This methodological refinement did not eliminate the obtained positive results.

Critics also pointed out that hand-thrown dice might be subject to conscious or unconscious micro-manipulation by the person throwing the dice. This criticism of possible throwing bias was met by changing the dice throwing method from hand-thrown, to hand-thrown against a wall, to cup-thrown, to thrown by specially constructed mechanical devices. Despite these progressive methodological improvements, the investigators continued to find positive outcomes.

Critics suggested that perhaps there were observational or recording errors in noting which die faces actually were uppermost. This criticism was met by die face observations and recordings by multiple observers, by blind observers (persons who were unaware of the desired outcomes and who were therefore not biased in their outcome observations), and by objective recordings by

photographic equipment (the individual die face outcomes were photographed automatically and the photographs were later evaluated by persons who were not aware of the desired outcomes for any particular trial). Despite these methodological improvements, positive results continued to be observed. Among the most impressive dice-throwing experiments that made use of these photographic data-recording refinements were two studies reported by McConnell, Snowdon, and Powell (1955) and by McConnell and Clark (1987). The latter study included transcribing from photofilm the face number and the X- and Y-coordinates of 42,000 mechanically thrown dice, and the results indicated patterns of direct mental influence upon the thrown dice.

Recently, Radin and Ferrari (1991) published a meta-analysis of all of the dice-throwing experiments they were able to find in English language publications from 1935 to 1987. They statistically summarized the overall results of 148 studies reported by a total of 52 investigators, involving more than 2 million dice throws contributed by 2,569 participants. They concluded that this database provided weak cumulative evidence for a genuine relationship between mental intention and the fall of dice, and that the positive results could not be attributed to selective reporting of successful studies or to methodological flaws in the successful experiments.

In addition to these dice fall experiments, additional studies have been conducted in which other random mechanical systems have served at targets. Many of these studies involve "placement" tasks in which the participant's intention is to swerve or deflect small moving objects (such as dice or small spheres) in space so that they come to rest in the prescribed one of two equally likely final positions. For example, balls rolling down an inclined plane are "wished" to swerve slightly to the right or to the left. Descriptions of such experiments may be found in Rush (1986, 1987). An intriguing illustration of a modern placement experiment is one conducted at the Princeton Engineering Anomalies Research Laboratory at Princeton University. The experimental apparatus is a large one that covers an entire wall. Nine thousand small polystyrene balls cascade down the apparatus, bouncing from peg to peg, and finally distribute themselves randomly among several collecting bins at the bottom of the apparatus. The pattern of the balls describe an empirical Gaussian normal curve. Participants sit at some distance in front of the apparatus and mentally intend for the final distribution to shift one way or another, according to pre-specified instructions. A recent summary report of experiments conducted with this random mechanical cascade concludes that participants are indeed able to exert significant changes in the final spatial distribution of the falling balls, mentally and at a distance (Dunne, Nelson, & Jahn, 1988).

Electronic Random Event Generators

With the discovery that human intention could influence the fall of dice and other mechanical systems, it seemed natural to ask whether such direct intention interactions could be observed in the case of other indeterministic systems. An obvious one that comes to mind is radioactive decay. This is one of the most random processes known to contemporary physics; there is no known conventional method of either predicting or influencing individual quantum emissions of particles from radioactive sources. Beloff and Evans (1961) were the first to look for a possible intentional interaction with radioactive decay; they did not find any evidence for such an effect. A few years

later, however, Chauvin and Genthon (1965) did report a successful experiment in which their participants (children tested in a game-like setting) were able to increase or decrease the counting rate of a Geiger tube radioactivity detector. Somewhat later, Schmidt (1970) used radioactive decay as the random process in an electronic random event generator that he invented for testing direct intentional influences. Random emissions from a radioactive source stop a rapidly moving switch in one of two possible positions; the switch is connected to a feedback indicator (colored lights, tones of different pitches, etc.) which lets the participant know which of the two equally likely outcomes has indeed occurred. If such a binary random event generator is tested over a large number of control or baseline trials, it does in fact behave randomly, producing each of the two possible outcomes almost exactly 50 percent of the time. When motivated participants, without any conventional connection with the device and often at a distance from the device, intend for the generator to produce more of one event than the other, the machine does indeed shift its activity to favor the desired outcome. The departure of obtained results from expected results can be used as a quantitative measure of the degree of direct intentional interaction. The obtained outcome (the "hit rate" of wished-for events actually occurring) can be compared statistically with either a theoretically expected outcome or with an empirical baseline or control outcome (i.e., data collected in the absence of intentional influence).

As an alternative to radioactive decay, the randomly fluctuating thermal noise in certain semiconductors (e.g, Zener diodes) can be used as the random component of random event generators. Whether of the radioactive decay or the thermal noise variety, electronic random event generators have several advantages over mechanical systems for researching direct intentional interactions. They may be constructed and adjusted so as to be free of bias. They allow a large number of trials to be conducted automatically and efficiently. Scoring can be done objectively and automatically. The devices may be interfaced with computers to permit a large variety of interesting experiments to be conducted. The very nature of their construction and operation makes them proof against various conventional influence methods that could be employed by participants.

In view of these many advantages, it is not surprising that a large number of experiments have been conducted using such devices. In a 1989 meta-analysis, Radin and Nelson (1989) analyzed 832 studies conducted between 1959 and 1987 by 68 different investigators and included 235 control studies that were conducted in the absence of intentional influence. The meta-analysis revealed that the control studies produced outcomes very close to the zero effect size expected on the basis of chance; however, during the intentional influence segments of the experiments, the random generators did indeed depart from chance operation in a highly significant manner and in the direction appropriate to a successful intentional influence. Further, careful analyses indicated that the obtained overall positive results could not be attributed to methodological inadequacies in the successful studies or to selective reporting practices (i.e., publishing successful experiments but not unsuccessful ones).

The use of adequate electronic random event generators and the use of meta-analytic techniques to quantitatively assess and evaluate a large body of these studies would appear to address all criticisms of this work with one exception: the possibility of experimenter fraud. But even this

criticsm of last resort has now been addressed in a clever series of experiments by Schmidt in which he, as experimenter, is actually able to be supervised by independent observers. These experiments are difficult to describe within a limited time frame. Therefore, I shall simply report that external observers play critical roles in selecting the intentional aims of the study and in analyzing the data. According to the experimental protocol, experimenter negligence, error, and even fraud may be ruled out. To date, five such carefully monitored experiments have been conducted (Schmidt, Morris, & Rudolph, 1986; Schmidt & Schlitz, 1988; Schmidt, Morris, & Hardin, 1991; Schmidt & Braud, 1992; Schmidt, 1993). My own statistical summary of these experiments is presented in Table 1.

Insert Table 1 about here

Each of the five experiments yielded results in the expected direction, three of the five experiments were independently significant, and the entire set yields a highly significant overall outcome (Stouffer $z = 3.77$, $p = .000082$). These are perhaps the most adequately controlled of all of the intentional influence experiments; as such, they deserve serious attention by both proponents and critics.

Direct Mental Interaction with Living Systems

In addition to the inanimate target work described above, there exists a relatively large literature of reports of experiments in which participants have attempted to influence a wide variety of remote cellular and other biological systems through direct intention. When my colleague Marilyn Schlitz and I surveyed this literature in 1985, we found reports of 149 such experiments, of which 79 experiments (53 percent) yielded significant evidence of direct mental influence effect. The living target systems for these investigations have included bacteria, yeast, fungi, mobile algae, plants, protozoa, larvae, insects, chicks, mice, rats, gerbils, cats, dogs, and dolphins, as well as cellular preparations (blood cells, neurons, cancer cells) and enzyme activities. In human "target persons," eye movements, muscular movements, electrodermal activity, plethysmographic activity, respiration, and brain rhythms have been affected through direct mental influence. Many of these experiments are reviewed in papers by Solfvin (1984) and by Benor (1991).

The Mind Science Foundation Research Program

In order to illustrate these experiments on direct intentional interactions with living systems, I shall briefly summarize our own research program which was carried out in the laboratories of the Mind Science Foundation in San Antonio, Texas. We sought to determine whether persons would be able to exert direct intentional influences upon a variety of biological systems that were situated at a distance and shielded from all conventional informational and energetic influences. In these experiments, the spontaneously fluctuating activity of a biological target system was monitored objectively during randomly interspersed influence and non-influence (control) periods while, in a distant room, a participant attempted to influence the system's activity in a prespecified manner

(increasing or decreasing the system's ongoing activity) using mental processes of intentionality, focused attention, and imagery or visualization of the desired outcomes. The experimental designs ruled out subtle cues, recording errors, expectancy and suggestion (i.e., "placebo") effects, artifactual reactions to external stimuli, confounding internal rhythms, and coincidental or chance correspondences. Overall, this research program included 37 experiments, 655 sessions, 13 different experimenters, and hundreds of different human influencers, human "influencees", and sets of nonhuman biological target systems (fish, small mammals, and cellular preparations). The distantly influenced systems included: another person's electrodermal activity (a peripheral indicator of degree of sympathetic nervous system activation or arousal which also reflects emotional and mental activity), another person's blood pressure, another person's muscular activity, the spatial orientation of fish (a small electric knife fish in a distant tank of water), the locomotor activity of small mammals (gerbils running in an activity wheel), and the rate of hemolysis (destruction by osmotic stress) of human red blood cells in test tubes in a distant room (monitored spectrophotometrically). A meta-analysis of the entire body of these experiments provided strong evidence for replicable direct intentional influences within the specific target biosystems and across the entire set of experiments. Details of these experiments may be found in two recent publications (Braud & Schlitz, 1989, 1991). The results of these experiments are presented in Table 2 and in Figure 1.

Insert Table 2 and Figure 1 about here

Included in these experiments is a sub-set of studies in which we sought to determine whether remote attention or intention could be detected physiologically in a "staring detection" design. It had been reported that persons are able to know when they are being stared at or gazed at by someone beyond the reach of their regular senses. Would this awareness register more sensitively at a more "unconscious" autonomic nervous system level? In four separate experiments, involving a total of 78 sessions, one person stared intently at the closed-circuit television monitor image of another person who was located in a distant room. The television arrangement ruled out the possibility of subtle sensory cues, and computer control allowed objective measurement of the "staree's" electrodermal activity. Numerous staring periods were interspersed randomly among an equal number of non-staring control periods. The staree, of course, was not informed about the timing and scheduling of the periods. The starees' electrodermal activity levels were significantly different for staring *versus* non-staring periods. Remote attention had a measurable nonlocal infuence upon a distant person's autonomic nervous system activity. In "sham control" sessions in which the procedural and analysis details were exactly the same, but true staring did not occur, these electrodermal differences did not occur. Rationales, details, and discussions of these experiments may be found in Braud, Shafer and Andrews (1990, 1992).

In the latest addition to these experiments, we extended this work to determine whether one person's focused attention and intention to help a distant person concentrate and be less distracted by interfering thoughts could indeed influence the distant person's success in attending to a focusing object. Sixty persons, tested individually, simply attempted to attend fully to an attentional object

and indicated whenever their mind wandered (i.e, whenever they experienced distractions) by pressing a hand-held button. In a distant room, a "helper" engaged in two different activities according to a random schedule. During Control periods, the helper did not think about the distant participant or about the experiment but rather thought about everyday matters. During Help periods, the helper focused on her own identical focusing object and concurrently held a strong intention that the participant would be better able to focus attention and would be less influenced by distracting thoughts. A computer controlled the experiment and monitored the distraction-indicating button presses. The participants evidenced significantly fewer distractions (i.e., they attended better) during the Help periods than during the Control periods. The details of this experiment may be found in Braud, Shafer, McNeill and Guerra (1993).

Nonstatistical Intentional Interactions

In all of the cases described thus far, remote intentional interactions have been observed upon randomly varying external physical processes and statistical methods have been used to assess the relatively small, albeit consistent and replicable, direct intentional influences. There are claims of intentional interactions occuring in relatively stable physical systems; in these cases, there have been reports of large scale influences which do not require statistical detection, since the observed effects are akin to large "signals" occurring against backgrounds of little or no "noise". These findings are more controversial than those I have been summarizing and, due to time constraints, I shall not review these nonstatistical findings here. The interested reader is referred to various published summaries of these "macro" and "directly detectable" direct intentional effects (Gregory, 1982; Isaacs, 1989; Rush, 1986).

Interacting Factors

A thoughtful review of the entire body of experimental evidence for direct mental interaction with the physical world leads us to conclude with some confidence that such effects are real and replicable. We are much less confident, however, in our knowledge of how these effects interact with other physical, physiological, and psychological factors.

Interactions With Physical Factors

In the realm of physical variables, some useful "negative" findings may be mentioned. The degree to which persons are able to interact mentally with remote physical or biological systems does not appear to interact importantly with the physical nature of the system or with the system's distance from the influencer in space or in time, nor have we found any physical substance or materials capable of either shielding or amplifying these direct mental effects (Stanford, 1977). However, several physical characteristics do seem important. It appears that systems characterized by randomness, indeterminacy, or free variability are more susceptible to direct mental influence than are systems lacking these qualities (Braud, 1981; Mattuck & Walker, 1979). It is not yet clear whether the critical facilitating aspect is this physical randomness *per se* or, rather, the psychological perception of randomness (which might encourage confidence in those attempting the

influence that a system can indeed change). There are indications that biological systems may be more susceptible to direct mental influences than are inanimate ones (Braud, Schlitz, & Schmidt, 1989), but this possibility has yet to be evaluated adequately in the proper direct comparison experiments. Finally, there are some indications that these direct mental interactions may be related to the degree of "storminess" of our geomagnetic environment (Braud & Dennis, 1989; Gissurarson, 1992).

Interactions With Physiological Factors

There are indications that heightened sympathetic nervous system arousal in the influencer may be favourable to the occurrence of the effects we have been discussing (Braud, 1985). More investigations of this relationship are needed, as are attempts to determine whether the key factor here is autonomic arousal *per se* or, rather, the increase in focused attention that may accompany such arousal.

Interactions With Psychological Factors

It is in the psychological area that we have learned most about conditions that are favourable to these effects. Unfortunately, time constraints forbid anything other than a brief summary of these facilitating psychological conditions. Evidence suggests that attitudes of belief, confidence, trust, and positive expectation may facilitate the occurrence of direct mental interactions (Braud, 1991). In the case of biological systems, the presence of a *need* seems to facilitate the effect. Need may be defined in terms of a deviation from balance or from homeostasis, and the satisfaction of the need through direct mental interaction helps restore the biological system to a more balanced state (Braud & Schlitz, 1983; Braud, Shafer, McNeill, & Guerra, 1992). Other facilitating psychological factors include a thorough focus of attention upon the desired goal outcome (sometimes, but not necessarily, through the use of imagery or visualization of the desired goal outcome), and the absence of effortful striving to achieve the goal.

Theoretical Interpretations

The ultimate outcome of a direct mental interaction with a physical or biological system resembles what would be expected if a subtle force were applied to the system. Although the effect appears force-like, it does not seem that actual forces are involved in the carrying or "transmission" of these direct mental interactions. In order to explain what we have learned about these effects, conventional forces would have to behave in quite unusual ways. In other words, it does not appear to be the case that these direct mental interactions are *directly mediated* by any of the four conventional physical forces (electromagnetic, strong nuclear, weak nuclear, or gravitational). The conventional forces do not behave with respect to spatial distance, time, focusing of influence, nature of system material, or shielding/amplification in ways that would be necessary in order to account for the specific forms of the obtained effects.

A preferred set of alternative explanations suggests that nothing really "travels" from one place to

another in these direct mental interactions. Rather, it has been suggested that the observed effects involve a reorganization or restructuring of the noise, disorder, randomness, or chaos *already present* in the physical system that is being influenced. How such reorganization comes to occur in connection with some distant mental intention remains, of course, the major mystery of these effects. Informational exchange seems critical to the occurrence of these effects, rather than the provision of additional energy. Although some preliminary models have already been suggested along these noise-reorganization lines (e.g., Mattuck & Walker, 1979), much additional research and theorization are needed in these areas.

Implications

There appear to be two major implications of the findings we have been discussing. The first is that any physical theory, explanatory scheme, or worldview that does not have a place for these effects is incomplete and should be expanded in order to encompass these findings. The second is that these direct mental interactions appear to require, for their very occurrence, a profound and extensive degree of interconnectedness between mental processes and all aspects of the physical world. These findings seem to be reminders of interconnections that we typically overlook or ignore.

Applications

A number of practical applications of direct mental interactions may be possible, provided these interactions can be sufficiently strong, reliable, consistent, and properly applied. The two most obvious applications include the mind's possible interaction with delicate physical instruments (e.g., very sensitive electronic devices) and its interaction with other human bodies in the form of remote or mental healing. Indeed, the work of the Princeton Engineering Anomalies Research Laboratory has been devoted to the first possibility and our own work at the Mind Science Foundation was inspired by the second possibility. It is possible that direct mental interactions are already occurring in many conventional contexts, including the healing of others and of ourselves, but have not yet been recognized because such effects cannot be separated from more conventional physical, chemical, and biological processes. Under the special conditions of laboratory experiments, or under exceptional everyday life conditions, the effects may sometimes be made evident. It remains for future research and practice to determine the extent to which practical applications of these direct mental interactions may be realized.

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Table 1

Statistical Summary of Five Externally Supervised
Pre-Recorded Direct Mental Interaction Experiments

Reference	z-score	p
Schmidt, Morris & Rudolph (1986)	2.71	.0032
Schmidt & Schlitz (1988)	1.89	.029
Schmidt, Morris, & Hardin (1991)	0.62	.27
Schmidt & Braud (1992)	1.98	.0239
Schmidt (1993)	1.23	.1093
Set of Five Studies	3.77 *	.0000816

* Stouffer z

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