JOURNAL OF SCIENTIFIC EXPLORATION

VOLUME 3, NUMBER 2, 1989
ISSN 0892-3310

A Publication of the Society
for Scientific Exploration

PERGAMON PRESS
New York ■ Oxford ■ Beijing ■ Frankfurt
São Paulo ■ Sydney ■ Tokyo ■ Toronto

JOURNAL OF SCIENTIFIC EXPLORATION

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Publishing, Subscription and Advertising Offices: Pergamon Press, Inc., Fairview Park, Elmsford, New York 10523, USA and Pergamon Press plc, Headington Hill Hall, Oxford OX3 0BW, England.

Published Two Per Annum. Annual institutional subscription rate (1990): US$100.00; *Two-year institutional subscription rate* (1990/91): US$190.00. *Professional subscription rate* (1990): US$40.00. Prices are subject to change without notice. Members of the Society of Scientific Exploration receive personal subscriptions as part of their dues; details of membership are available upon request. Notify 8 weeks in advance of address change with a copy of the subscription mailing label. *Back issues*: Back issues of all previously published volumes, in both hard copy and on microform, are available direct from Pergamon Press offices.

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The Item-Fee Code for this publication is: 0892-3310/89 $3.00 + .00

Printed in the U.S.A.

Journal of Scientific Exploration, Vol. 3, No. 2, pp. 103–112, 1989
Pergamon Press plc. Printed in the USA.

0892–3310/89 $3.00+.00
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INVITED ESSAY

New Ideas in Science

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Abstract—The pace of scientific work continues to accelerate, but the question is whether the pace of discovery will continue to accelerate. If we were driving in the wrong direction—in the direction where no new ideas can be accepted—then even if scientific work goes on, the progress would be stifled. This is not to suggest that we are in quite such a disastrous position, but on the other hand, not all is well.

New ideas in science are not always right just because they are *new*. Nor are the old ideas always wrong just because they are *old*. A critical attitude is clearly required of every scientist. But what is required is to be *equally* critical to the old ideas as to the new. Whenever the established ideas are accepted uncritically, but conflicting new evidence is brushed aside and not reported because it does not fit, then that particular science is in deep trouble—and it has happened quite often in the historical past. If we look over the history of science, there are very long periods when the uncritical acceptance of the established ideas was a real hindrance to the pursuit of the new. Our period is not going to be all that different in that respect, I regret to say.

I want to discuss this danger and the various tendencies that seem to me to create it, or augment it. I can draw on personal experiences in my 40 years of work on various branches of science and also on many of the great controversies that have occurred in that same period.

I will start very naively by a definition of what a scientist is. He is a person who will judge a matter purely by its scientific merits. His judgment will be unaffected by the evaluation that he makes of the judgment that others would make. He will be unaffected by the historical evaluation of the subject. His judgment will depend only on the evidence as it stands at the present time. The way in which this came about is irrelevant for the scientific judgment; it is what we now know today that should determine his judgment. His judgment is unaffected by the perception of how it will be received by his peers and unaffected by how it will influence his standing, his financial position, his promotion—any of these personal matters. If the evidence appears to him to allow several different interpretations at that time, he will carry each one of those in his mind, and as new evidence comes along, he will submit each new item of evidence to each of the possible

interpretations, until a definitive decision can be made. That is my naive definition of a scientist.

I may have reduced the number of those whom you think of as scientists very considerably by that definition. In fact, I may have reduced it to a null class. But, of course, we have to be realistic and realize that people have certain motivations. The motivation of curiosity is an important one, and I hope it is a very important one in most scientists' minds. But I doubt that there are many scientists to whom the motivation of curiosity about nature would suffice to go through a lifetime of hard struggle to uncover new truths, if they had no other motivation that would drive them along that same path. If there was no question about appealing to one's peers to be acknowledged, to have a reasonably comfortable existence, and so on, if none of this came into the picture, I doubt that many people would choose a life of science.

When the other motivations come into the act, of course the judgment becomes cloudy, becomes different from the ideal one, from the scientific viewpoint, and that is where the main problem lies. What are the motivations? If there are motivations that vary from individual to individual, it would not matter all that much because it would not drive the scientific community as much to some common, and possibly bad, judgment. But if there are motivations that many share, then of course that is another matter; then it may drive the whole scientific community in the field in the wrong direction. So, we must think: What are the communal judgment-clouding motivations? What is the effect of the sociological setting? Is our present-day organization of scientific work favorable or unfavorable in this respect? Are things getting worse, or are they getting better? That is the kind of thing we would like to know.

The pace of scientific work continues to accelerate, but the question is whether the pace of discovery will continue to accelerate. If we were driving in the wrong direction—in the direction where no new ideas can be accepted—then even if scientific work goes on, the progress would be stifled. I am not suggesting that we are in quite such a disastrous position, but on the other hand, I am not going to suggest that all is well.

What are the many factors that many people might share that go against the acceptance of scientifically valid new ideas? One obvious factor that has always been with us is the unwillingness to *learn* new things. Too many people think that what they learned in college or in the few years thereafter is all that there is to be learned in the subject, and after that they are practitioners not having to learn anymore. Of course especially in a period of fairly rapid evolution that is very much the wrong attitude; but unfortunately it is shared by many.

I can give you there an example from my own experience where, when I was still very green and naive, just after the war, I had worked on the theory of hearing: how the inner ear works. As I had just come from wartime radar, I was full of signal processing methods and sophistication and receiver techniques and all that, and there I found myself discussing the physiology

of hearing in those terms. I thought it was very appropriate because it is a very fine scientific instrument that we were discussing, the inner ear. But I had to address myself to an audience of otologists—the doctors and the medical people who deal with hearing—the only ones who were doing any kind of research in this field. The mismatch was obvious; it was completely hopeless. There was no common language, and of course the medical profession just would not learn what it would take to understand the subject. On the other hand, they sure made their judgments about the matter, without having any basis at all.

So it just essentially forced me out of the field. The theory of hearing which I proposed then involved an active—not a passive—receiver, one in which positive feedback, not just passive detection is involved. We now have very clear evidence, after these 36 years, that indeed an *active* receiver is at work, but we still have not got a receptive group of physiologists who deal in this field.[1] The medical profession still hasn't a clue as to why 15 kilocycles should be coming out of somebody's ears. Thirty-six years is not yet enough to get that learning into the profession.

A motivation which is in a way more serious and more avoidable than the nonlearning one, a motivation that hones out new ideas, is what I brutally call the "herd" instinct. It is an instinct which humans have. It presumably dates back to tribal society. I am sure it has great value in sociological behavior in one way or another, but I think on the whole the "herd instinct" has been a disaster in science. In science what we generally want is diversity —many different avenues need to be pursued. When people pursue the same avenue all together, they tend to shut out other avenues, and they are not always on the *right* ones.

If a large proportion of the scientific community in one field are guided by the herd instinct, then they cannot adopt another viewpoint since they cannot imagine that the whole herd will swing around at the same time. It is merely the logistics of the situation. Even if everybody were willing to change course, nobody individually will be sure that he will not be outside the herd when he does so. Perhaps if they could do it as neatly as a flock of starlings, they would. So this inertia-producing effect is a very serious one.

It is not just the herd instinct in the individuals that you have to worry about, but you have to worry about how it is augmented by the way in which science is handled. If support from peers, if moral and financial consequences are at stake, then on the whole staying with the herd is the success-

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[1] Since writing this, we do. I recently went to a conference on Mechanics of Hearing; NATO advanced workshop, University of Keele (UK), subject: "The Active Chochlea," July 1988. Also, there are various recent papers on the subject, including one in the Proceedings of the Royal Institution by Dr. David Kemp: "Hearing in Focus." It is now possible to record a clear, high-frequency noise coming out of people's ears, with a sensitive external receiver. The ears make clear, clean-pitched noises. They run into self-oscillation, which is clearly the symptom of an ill-controlled *active* receiver.

ful policy for the individual who is dependent on these, but it is not the successful policy for the pursuit of science.

Staying with the herd to many people also has an advantage that they would not run the risk of exposing their ignorance. If one departs from the herd, then one will be asked, one will be charged to explain *why* one has departed from the herd. One has to be able to offer the detailed justifications, and one's understanding of the subject will be criticized. If one stays with the herd, then mostly there is no such charge. "Yes, I believe that because *doesn't everybody else believe that?*" That is enough justification. It isn't to me, but it is to very many other people. The sheep in the interior of the herd are well protected from the bite in the ankle by the sheep dog.

It is this tendency for herd behavior that is greatly aggravated by the support structure of science in which we believe nowadays. I will read out just one passage here to show that other people than myself have recognized the herd problems: David Michland writes in the *Reviews of Astronomy:*

> I sometimes wonder if the much encouraged and proclaimed interaction among western astronomers leads to a form of mental herd behavior which, if it does not actually put a clamp upon free thinking, insidiously applies the pressure to follow the fashion. This makes the writings of our Soviet colleagues who have partly developed ideas in comparative isolation all the more valuable.

Yes, I have often wondered whether one should in fact pursue subjects with a big wall between two groups that are working in the same field, so that they absolutely cannot communicate, and see a few years later whether they come even approximately to the same conclusion. It would then give some perspective of how much the herd behavior may have been hurting. But we don't have that. Even with our Soviet colleagues, unfortunately, we have too much contact to have a display of real independence, to see where it would have led.

This question of how the support of science—and I don't mean only the financial support but also the journals, the judgment of referees, the invitations to conferences, acknowledgements of every kind—how that interacts with the question of herd behavior, is what I will now discuss.

It is important to recognize how strong this interaction really is. Suppose that you have a subject in which there is no clear-cut decision to be made between a variety of opinions and therefore no clear-cut decision to be made in which direction you should put money or which direction you should favor for publications, and so on. No doubt opinions would need a multidimensional space to be represented, but I will at the moment just represent them in a one-dimensional situation.

Suppose you have some curve between the extreme of *this* opinion and the extreme of *that* opinion. You have some indefinite, statistically quite insignificant distribution of opinions. Now in that situation, suppose that the refereeing procedure has to decide where to put money in research, which papers to publish, and so on. What would happen? Well, people

would say, "We can't really tell, but surely we shouldn't take anybody who is out here. Slightly more people believe in this position than in any other, so we will select our speakers at the next conference from this position on the opinion curve, and we will judge to whom to give research funds," because the referees themselves will of course be included in great numbers in some such curve. "We will select some region there to supply the funds."

And so, a year later what will have happened? You will have combed out some of the people who were out there, and you will have put more people into this region. Each round of decision making has the consequence of essentially taking the initial curve and multiplying it by itself.

Now we understand the mathematical consequence of taking a shallow curve and multiplying it by itself a large number of times. What happens? In the mathematical limit it becomes a delta function at the value of the initial peak. What does that mean? If you go for long enough, you will have created the appearance of unanimity. It will look as if you have solved the problem because all agree, and of course you have got absolutely nothing. If no new fact has come to light and the subject has gone along for long enough—this is what happens. And it does happen! I am presenting it in its clearest form, and it is by no means a joke. If many years go by in a field in which no significant new facts come to light, the field sharpens up the opinions and gives the appearance that the problem is solved.

I know this very well in one field, which is that of petroleum derivation, where the case has been argued since the 1880's. At the present time most people would say the problem is completely solved, though there is absolutely nothing in the factual situation that would indicate a solution. It is also very clear there that the holding-in that has taken place has been an absolute disaster to research. It is now virtually impossible to do any research outside the widely accepted position. If a young man with no scientific standing were to attempt this, however brilliant he might be, he wouldn't have a hope.

I believe that our present way of conducting science is deeply afflicted by this tendency. The peer review system, which we regard as the only fair way we know of to distribute money (I don't think it is, but it is generally thought to be) is an absolute disaster. It is a completely unstable method. It is completely prone to this tendency; there is no getting out of it. The more reviews you require for a proposal—now the NSF requires seven reviewers for a proposal—the more you require, the more certain it is that you will follow the statistical tendency dictated by this principle. If you had noise in the situation, it would be much better. There used to be in the United States many different agencies, and there was perhaps an odd-ball over here who gave out some money for one agency, and a funny fellow over there for another. This was a noisy situation, and it was not driving quite as hard towards unanimity. But now we have it all streamlined and know exactly to whom we have to go for a particular subject and, of course, it is an absolute disaster.

Why is it thought that the peer review system would work for science? How about trying to make a peer review system work for other forms of endeavor? Suppose we had a national foundation for the arts and every painter had to apply to it to get his canvas and his brushes and his paints. How do you suppose that would work? I can imagine some of the consequences, but better than that, we can look them up in historical examples. If you want to read such, in the book *The Experts Speak,* you can do that. There is a long list of them that you can read—it makes marvelous reading.

Eduard Manet wrote to his colleague Claude Monet, of Renoir: "He has no talent at all, that boy. Tell him to give up painting."

"Rembrandt was regarded as not comparable with an extraordinarily gifted artist, Mr. Ripingill."

William Blake spoke of Titian and the Venetians as "such idiots are not artists."

"Degas regarded Toulouse-Lautrec as merely a painter of a period of no consequence." One wonders how art would have fared in a peer review system.

Or would it be different in music? We can read what was said of Beethoven's compositions by musicians of his time:

"An orgy of vulgar noises" was the verdict of Beethoven's Fifth Symphony by Mr. Spore, a German violinist and composer.

On Tchaikovsky's appreciation of Brahms, "I played over the music of that scoundrel Brahms. What a giftless bastard. It annoys me that this jumping, inflated mediocrity is hailed as a genius." But one could go on almost endlessly with such quotations. Music would not have fared any better.

So we see that the herd instinct is a tendency in the human makeup, which is itself a severe handicap for science. Instead of combatting it as best we can, we have arranged a method of nurturing science which actually strengthens it enormously—makes it virtually impossible to depart from the herd and continue to have support, continue to have a chance of publication, continue to have all the advantages that one requires to work in a field.

If in a subject there was initially a diversity of opinions, the review system will assure a very short life for that condition, and soon the field will be closed to all but those who are in the center.

Once a herd is established, by whatever historical evolution this has come about, it obtains such firm control that it is extremely difficult to do anything about it. And even if it were appreciated that that is the situation, one just doesn't know how to interfere. Where then is the right to free speech if every journal has to send each article out to a number of people to review, and the bulk of the people are with the herd? Usually with just one-third of the reviewers very negative the paper does not get published.

So there is no free speech in that sense that you cannot publish diverse viewpoints. There is also no free speech at conferences because the same is true there. Would all those who have a divergent opinion be able to organize

their own conference? Very rarely. We represent perhaps an example here showing that it is possible, but it is pretty rare that one can raise funds to run conferences. Essentially once the herd is established, it will interfere in any one of the activities that one would need to further that science.

Would the Dean in a university be willing to promote somebody to tenure who was outside the pack? He can't, because he has to send out letters to the leading persons in the field—he may inquire from 20 people before he gets permission to appoint somebody to tenure—and how can he get that when the pack is running in another direction than this person? It is absolutely hopeless! So you establish the situation more and more.

Once a herd has been established in a subject, it can only be broken by the most *crass* confrontation with opposing evidence. There is no gentle way that I have ever seen in the history of science where a herd once established has been broken up.

In many subjects such clear evidence is very hard to come by. In the complex subjects, especially I always think of the earth sciences in this respect, there are always different ways of interpreting any one fact; so many complicated things have taken place that any one fact can have three or four interpretations and the crass confrontation is very rare.

So then when you have a herd, all the money that you spent on it may be wasted, or worse than that, it may actually serve to cement further the bad situation. So it is very likely that money is often spent in science in a way that is absolutely detrimental to that science.

What does the refereeing procedure really look like? How does it really go on? If, for example, an application was made in the early 60's or late 50's suggesting that the person wanted to investigate the possibility that the continents are moving around a little, it would have been ruled out absolutely instantly without questions. That was crack-pot stuff, and long been thought dead. Wegener, of course, was an absolute crack-pot, and everybody knew that and you wouldn't have any chance.

Six years later you could not get a paper published that doubted continental drift. The herd had swung around—but it was still a firm and arrogant herd.

Shortly after the discovery of pulsars I wished to present an interpretation of what pulsars were, at this first pulsar conference—namely that they were rotating neutron stars. The chief organizer of this conference said to me, "Tommy, if I allow for that crazy an interpretation, there is no limit to what I would have to allow." I was not allowed 5 minutes of floor time, although I in fact spoke from the floor. A few months later, this same organizer started a paper with the sentence, "It is now generally considered that pulsars are rotating neutron stars."

I will tell you about a recent application to the Department of Energy by a colleague of mine and myself for some money to investigate the chemistry of hydrocarbons at high pressures and high temperatures in the conditions in which they might be at some depth in the earth. We had the referee's reports

because you are allowed to get them, but not signed. We got one voluntarily from one of the referees, so we know who *he* was. He wrote, "This proposal *must* be funded. In science every research project is a risk, but here the risk is negligible because even if the hypothesis is not correct, this research proposal will contribute strongly to fundamental science in petroleum engineering, the thermodynamics of fluids, and geochemistry. If the hypothesis is correct, the Department of Energy will have hit the jackpot beyond its wildest imagination." And he continued with the detailed questionnaire with top marks in every part: the competence of the proposer, the institution, the test, the facilities, and all that. He gave it top marks on every point.

There was a second referee who also gave it top marks for all the questions that are posed on the form. But then the last question is: "Should this proposal be funded?" and he wrote, "No." And then there was just a single word after that where it said, "If no, why not?" And he wrote down, "Misguided." It was not funded despite the fact that most of the referees in fact gave it very high marks, due to the "misguided," and also similar words were used by two or three other referees. No reason given; just "don't touch it."

It wasn't the only such that I have submitted over the years now, and they have all been turned down both at NSF and DOE. It is absolutely hopeless to get any money in contravention of the opinions that are so firmly established in the petroleum business now.

That brings me to another problem. If in a subject you have a large number of people because it has economic applications, that immediately aggravates the problem. And, of course, in petroleum related matters there are a huge number of people involved at every step. This means firstly that a lot of mediocrity is brought into the field and overpowers the field by sheer numbers; and it also means that much more commitment to a particular viewpoint has been made by many people. Do you suppose that the petroleum geologist who has been advising Exxon to drill for hundreds of millions of dollars for maybe 30 years, will go to his bosses at Exxon and say, "I am sorry, Sir, but I have been wrong all those years. We have been finding the petroleum, but if we had searched for it in another way, we would have found 10 times as much." It is very unlikely that they will do that. In fact, even if his methods and his understanding were completely, clearly wrong —even if you had the crassest confrontation in this case—I don't think that it would be acknowledged. A very small proportion of people would have that stature that they would turn around and say, "All my life I have taught or struggled with these problems on the wrong lines, and now I understand the right thing." So in this case, the herd is so firmly established that one cannot think of converting it. A quotation from Tolstoy comes to mind:

> *I know that most men, including those at ease with problems of the greatest complexity, can seldom accept even the simplest and most obvious truth, if it be such as would oblige them to admit the falsity of conclusions which they have delighted in explaining to colleagues, which they have proudly taught to others, and which they have woven, thread by thread, into the fabric of their lives.*

Another area where it is particularly bad is in the planetary sciences where NASA made great mistakes in the way in which they set up the situation. NASA made the grave mistake not only of working with a peer review system, but one where some of the peers (in fact very influential ones) were the *in-house* people doing the same line of work. This established a community of planetary scientists now which was completely selected by the leading members of the herd, which was very firmly controlled, and after quite a short time, the slightest departure from the herd was absolutely cut down. Money was not there for anybody who had a slightly diverging viewpoint. The conferences ignored him, and so on. It became completely impossible to do any independent work. For all the money that has been spent, the planetary program will one day be seen to have been extraordinarily poor. The pictures are fine and some of the facts that have been obtained from the planetary exploration with spacecraft—those will stand but not much else.

So yes, it is possible to make what is a bad tendency in humans in the first place (for science at least a bad tendency) that much worse with a lack of understanding of how the inward looking effect can be controlled or at least how it should not be augmented by the method of nurturing of science.

You may think that what I am saying is that the support for science poses this intrinsic problem, and that if you want to be fair you have to go for an unstable system which doesn't work. At first it looks like that. So should you go for something that's fair—makes people reasonably happy—but that doesn't work? Or should you go for something that is not so obviously regarded as fair but does work? It is a difficult decision to make, but you know there is nothing that says that things that are fair must also be the things that work. The world is just not so benign to us. Life is not that easy.

Is there another way of doing it? I suppose that the best that I can think of is roughly on the lines of what my friend, Arthur Katrowitz proposed at least for major decisions: The "science court" idea is the best one. Where a lot is at stake, where a subject has been driven into an alley, one must set up a science court where the different viewpoints would be heard, would be argued by the protagonists of each one, with carefully prepared work. The different viewpoints could be judged, not by others working in that same field, which would merely take you back to the herd, but would be judged by a group of very knowledgeable and very competent scientists distributed over other fields, but with enough general competence to be able to listen and understand the detailed arguments of the field in question. I would be much happier to have subjects surveyed every now and again by a jury of that kind. It has to be a scientific jury because it would have to understand detailed scientific arguments, but they do not have to be—and should not be—from the field in which the decision is to be made.

That is the avenue which I would advise the NSF and such organizations to pick at this time. I would say that in every field they should set up such a science court to hear all the different opinions on a reasonably regular basis. It is true that you cannot do it for every application that comes along, but it

is true that you could do it sufficiently often for major decisions to break, or at least spoil somewhat, the herd system. As it is at the moment, the situation seems not to be understood at all. I have discussed the herd problem with many people in the funding agencies, and found no understanding of that problem at all.

I could give you many more examples from my own life of the difficulties of getting subjects funded. At the present time I am struggling with the oil and gas business, and after being turned down very firmly by DOE and NSF, I finally was able to get money from the gas industry itself to do research which is in good progress now. In this area, which is one of the worst because no really significant facts have come to light and everything has been interpreted time and again in the time-honored fashion, and everyone believes they know in detail now how oil and gas come to be where they are. And the fact that we find that oil and gas exist on the other planetary bodies, obviously not due to biology, is completely ignored. They say there was no oil or gas here, and all that happened on the Earth was something that was completely specific to the Earth. Of course, it is a peculiar attitude, but that is the one that is widely accepted.

There is one more point that I should make. When in a subject a general attitude or a viewpoint has become established, then it is very easy to obtain funds to do work in that subject on the basis of what I call "shoehorn science." I think you will understand what I mean by that. If you make your proposal which says: "I will demonstrate how this fact and that fact, that apparently are difficult to see in the accepted framework, can be figured into that framework," they are all delighted to give you money. And by the time that has gone on for a long time, so much work of the shoehorn kind has been diligently done to force the facts into the pattern that is preordained, that it then looks to many people as if it all was firmly established. What happens is that they build a superstructure on what may be no foundation —if I may invent a "Confucius say" sort of proverb, "Never judge strength of foundation from size of building."

In the field of petroleum geology that is really what has happened. The moment you dare to look at the foundation, you are a scoundrel. I have made people absolutely wild, shaking their fists at me, when I proposed in my talks that there was some uncertainty about the origin of petroleum. One fellow actually wrote a paper that got published, that there must be life on Jupiter because hydrocarbons have been seen on Jupiter.

That is my sad story. I believe that we could do something about it, that we could propose that this kind of a situation be understood in high quarters—that we could try and have something in the nature of science courts established, or at any rate some review by independent persons and not by the herd; but as it is at the moment, I feel that we are dealing with a large proportion of science funding very firmly in the wrong hands, and much of it is therefore counterproductive.

Journal of Scientific Exploration, Vol. 3, No. 2, pp. 113–131, 1989
Pergamon Press plc. Printed in the USA.

0892–3310/89 $3.00+.00
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Photo Analysis of an Aerial Disc Over Costa Rica

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Abstract—An unusual image was photographically recorded by an official mapping aircraft of the Costa Rican government at 08:25 am (EDT) on September 4, 1971 while flying at 10,000 feet altitude over a body of water known as Lago de Cote. None of the flight crew or photographers saw the object. Second generation negative and positive black and white transparencies were obtained and analyzed by the authors. Both transparencies were photographically enlarged and printed on various contrast papers for purposes of making visual inspections and linear measurements. Computer enhancement showed variations in surface brightness. The preceding frame, taken 20 seconds earlier of the same ground region, did not show the disc. The angular position of the sun was determined for the date, time and location of the event and was found to be consistent with cloud shadow positions but not with the dark regions on the disc. A shadow of the disc could not be found. The oval image measured 4.2 mm on the negative and was enlarged to 41 mm (9.76 × magnification). If the disc was located 10,000 feet away from the camera, its maximum dimension would be 210 meters (683 feet). The various analyses failed to identify the image. The same body of water was the site of a visual observation of a partially submerged object on October 25, 1986.

Background

On September 4, 1971 a mapping aircraft of the government of Costa Rica with a crew of four recorded an unusual disc-shaped image as it was flying over the region of Arenal. It took several years for this photograph to find its way into the hands of a Costa Rican investigator, Mr. Ricardo Vilchez who

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Editor's Note. Customarily, research articles are either accepted or rejected after review by the editor and two referees. However, one of the motivations for founding SSE was to provide a forum for open and scholarly discussion of anomalies which are sometimes controversial. Therefore, in cases where research methods are sound but disagreement arises regarding interpretation or conclusions, we may publish (after consultation with authors and referees) articles followed by dissenting referees' reviews.

Acknowledgements. The authors wish to thank Joe Kirska for his expert assistance in preparing the positive and negative enlargements and Kenneth Weinstock for assistance in running the computer enhancements.

(along with his brother Eduardo) runs a civilian research group in San Jose. In 1980 Mr. Vilchez met in person with Sergio L. V., the specialist in aerial photography who was aboard the aircraft that day. They discussed the circumstances surrounding the flight and the photograph without reaching a conclusion regarding the nature of the object. One of the authors saw the photograph while attending a meeting in Costa Rica in 1985, and Mr. Vilchez was kind enough to provide a second-generation negative to be taken back to the United States for analysis. Later we requested and obtained detailed maps of the area in question, as well as copies of the immediately preceding and following frames, respectively numbers 299 and 301. These photographs did not show the disc that was present on frame number 300.

In spite of the lack of a first-generation negative, we felt several unusual factors justified a detailed analysis of this photograph, if only to refine our methodology in dealing with such evidence: (1) it was taken by a high-quality professional camera; (2) the camera was looking down, which implies a maximum distance, hence a maximum size for the object; (3) the disc was seen against a reasonably uniform dark background of a body of water; and (4) the image was large, in focus and provided significant detail.

Geographic Locale

The disc was located about 3 miles North of the town of Arenal and some 25 miles South of the border with Nicaragua. The precise site was at latitude 10.583 degrees North and longitude 84.916 degrees West in the province of Alajuela above a small lake called "Lago de Cote" measuring approximately 1800 × 1600 meters. Lake level is about 640 m above sea level and the surrounding countryside consists of rolling and sharp hills rising several 100 meters above the valley floors. The region is densely wooded, with some broad grassy patches. A dirt road which is only passable in summer runs along the southern edge of the lake. It connects the small town of Cabanga to the northeast with Aguacate to the southwest. When the photograph is carefully examined, a few houses or other structures can be seen along this road, as well as animals in the fields.

The location of the disc was about 800 meters due North of the boundary between the province of Alajuela and the province of Guanacaste.

Figure 1 is a black-and-white contact positive print of most of the aerial negative.

Figure 2 is a copy of the 1:50,000 chart in the region of Lago de Cote above which the disc was located.

Figure 3 is a copy of a geological chart with an arrow pointing to the Lago de Cote. A heavy long dashed line labelled "Fila Vieja Dormida" is seen passing almost directly through the location where the disc was recorded. This line represents a geological fault. The legend on the chart indicates that the dark areas are of volcanic origin.



Fig. 1. A black-and-white contact positi



Fig. 1. Contact positive print of most of the aerial negative.

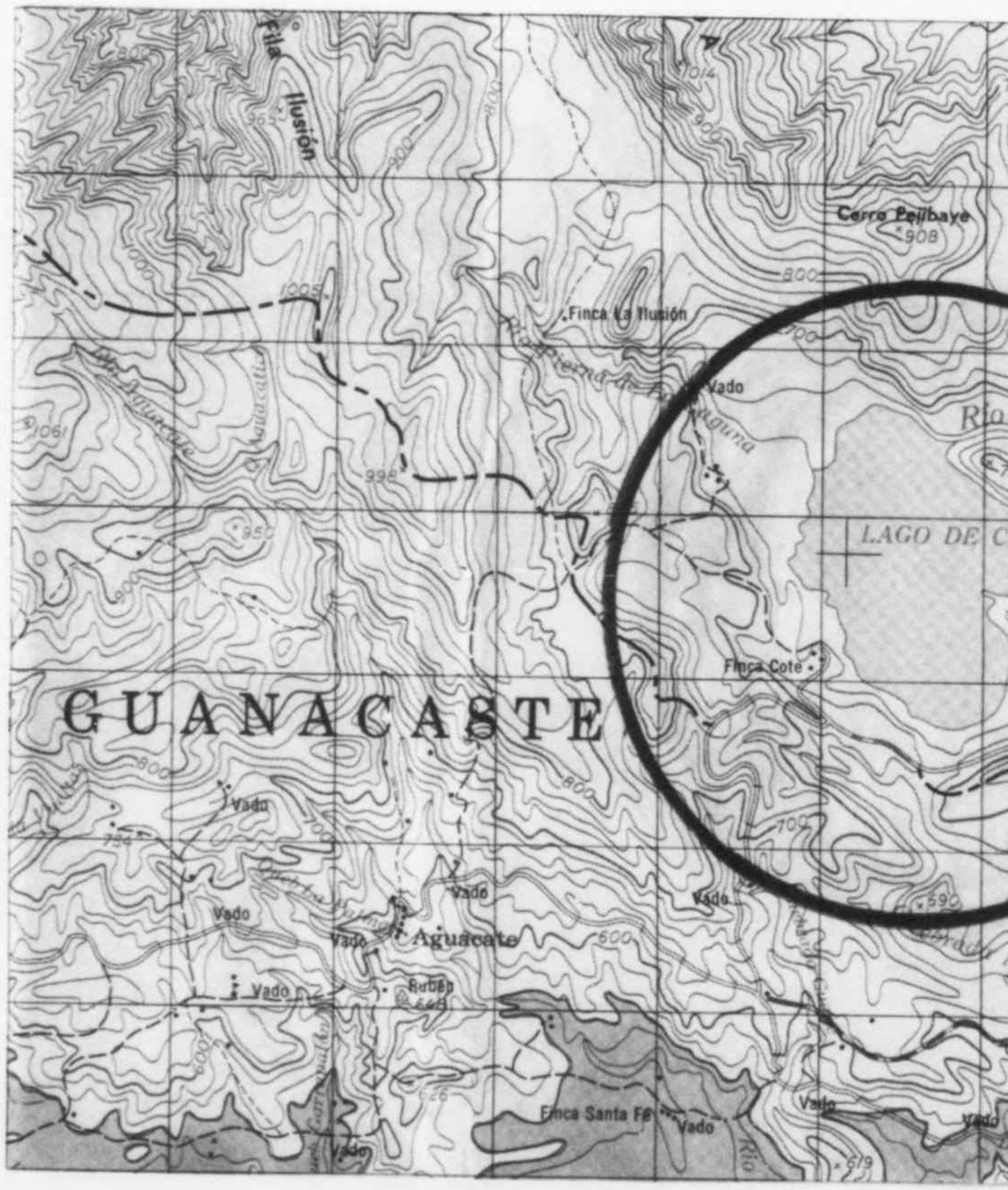
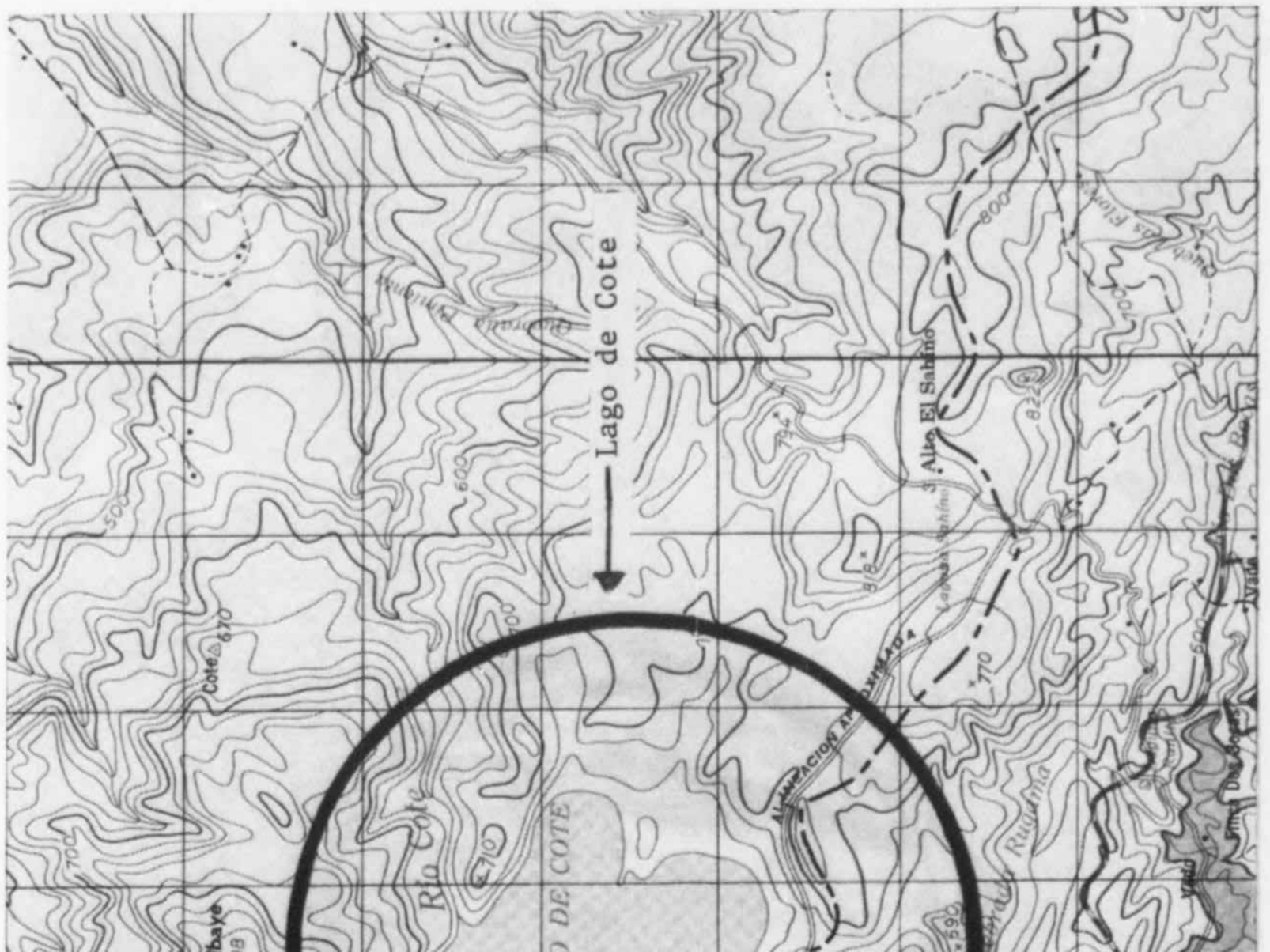


Fig. 2. Detail from the 1:50,000 chart in the region of Lag



of Lago de Cote above which the disc was located.

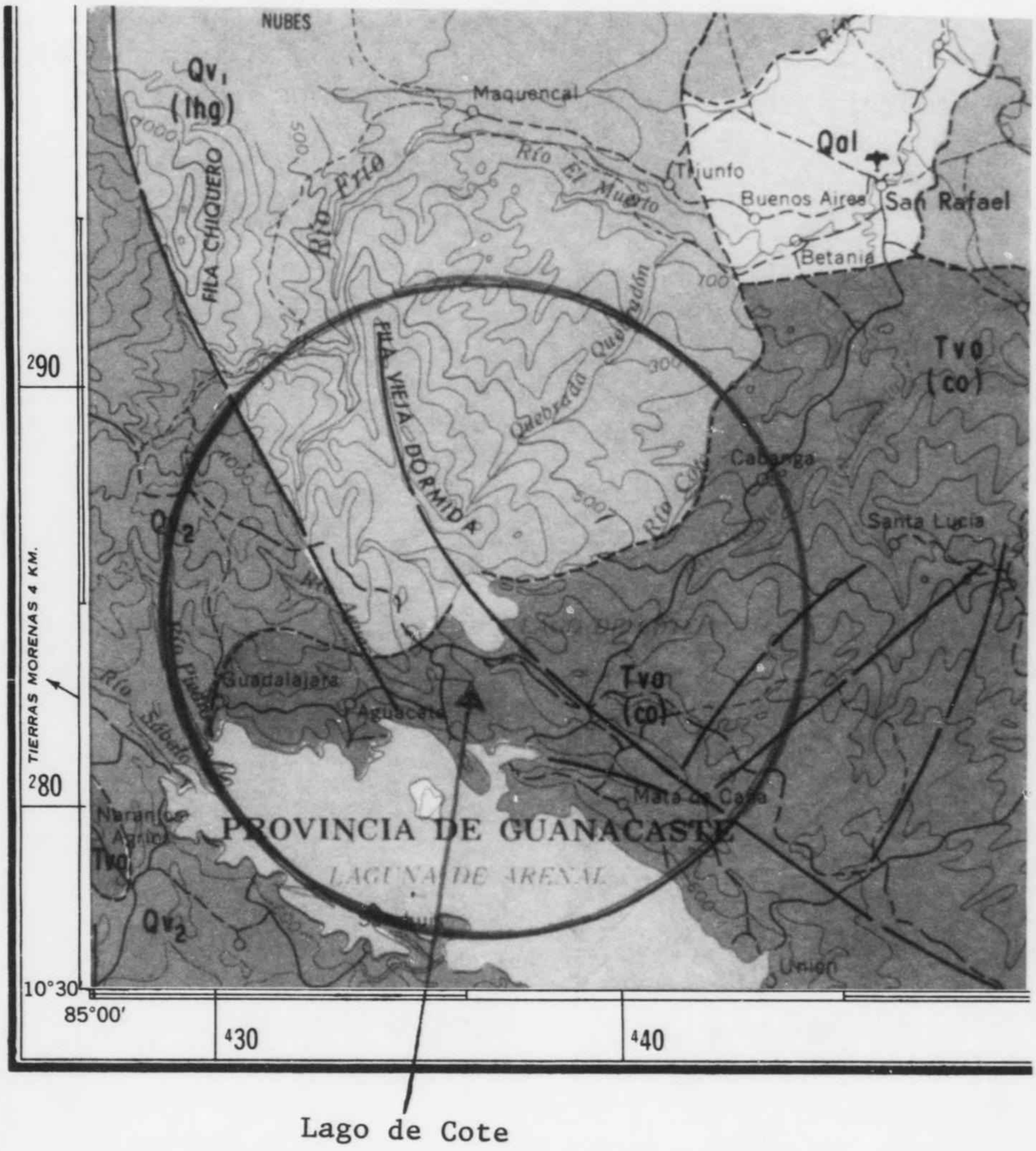


Fig. 3. Detail from the geological chart with an arrow pointing to the Lago de Cote.

Parameters of the Photograph

According to Mr. Vilchez the camera used was an R-M-K 15/23. The lens would have featured a fixed focus and a 6-inch focal length. The shutter speed was 1/500 second at *f*:5.6. The intervallometer was set at 20 seconds between successive exposures.

The film used was black-and-white emulsion with an ASA speed of 80. This fine grain film produces a high resolution negative given a stable film plane and camera and sufficiently fast shutter speed.

The negative was printed on Kodak Safety aerial film, type 3665. The image measured 23 cm × 23 cm (529 square centimeters) while the film base measured 25.3 cm × 23.8 cm. Comparing the image area with the

reduced scale topographical chart indicated that the negative included a region of the earth measuring approximately 11.5 km on a side.

The following information was recorded on one side of the film:

Frame counter: 909
Altimeter: 10,000 feet
Bubble level: Approx. level
C = 152.44
Nr 21186
Clock: 08:25 am local time
Notations: ARENAL
10,000 feet
4-9-71 (September 4, 1971)
R.L.B.

Handwritten between the frame counter and the above information is the notation: 300 L-11 M-13.

On board the aircraft were four men, namely: Sergio L. V., specialist in aerial photography, as well as Omar A. (pilot), Juan B. C., geographer, and Francisco R. R., topographer. No member of the crew observed anything unusual during the flight.

The Disc Image: Analysis Results

Figure 4 is a photographic positive black-and-white enlargement of intermediate contrast of the disc, showing (a) a dark edge across the top and upper-right corner, which is the edge of the frame and fiduciary mark included for measurement purposes, (b) the shoreline, also for measurement purposes, and (c) the ellipsoidal disc. This figure is oriented with the true North facing up.

A number of features are worthy of note on Figure 4.

First, the disc image appears to possess light/dark shading that is typical of a three-dimensional object which is illuminated by sunlight. At this time and location, the sun's azimuth was 85.4 degrees (clockwise from true North) and altitude was 16.7 degrees which explains the lateral displacement of the cloud shadows from the cloud locations.

Second, the generally triangular dark region on the right-hand side of the disc cannot be a solar shadow cast by the (assumed) opaque disc from the right-hand side. If the disc is an opaque, flat conical section of revolution (the dark spot being the tip of the cone) and if the right side is tipped upward, then the entire surface of the disc should be dark. It is more likely that the light and dark regions are surface markings.

Figure 5 shows measured and calculated parameters for this image. The longitudinal axis of the disc was 7 degrees CW from true North. The total included angle of the dark triangular region was about 110 degrees arc with the most northerly edge of this shadow 38 degrees from true North. The



Fig. 4. A photographic positive black-and-white e

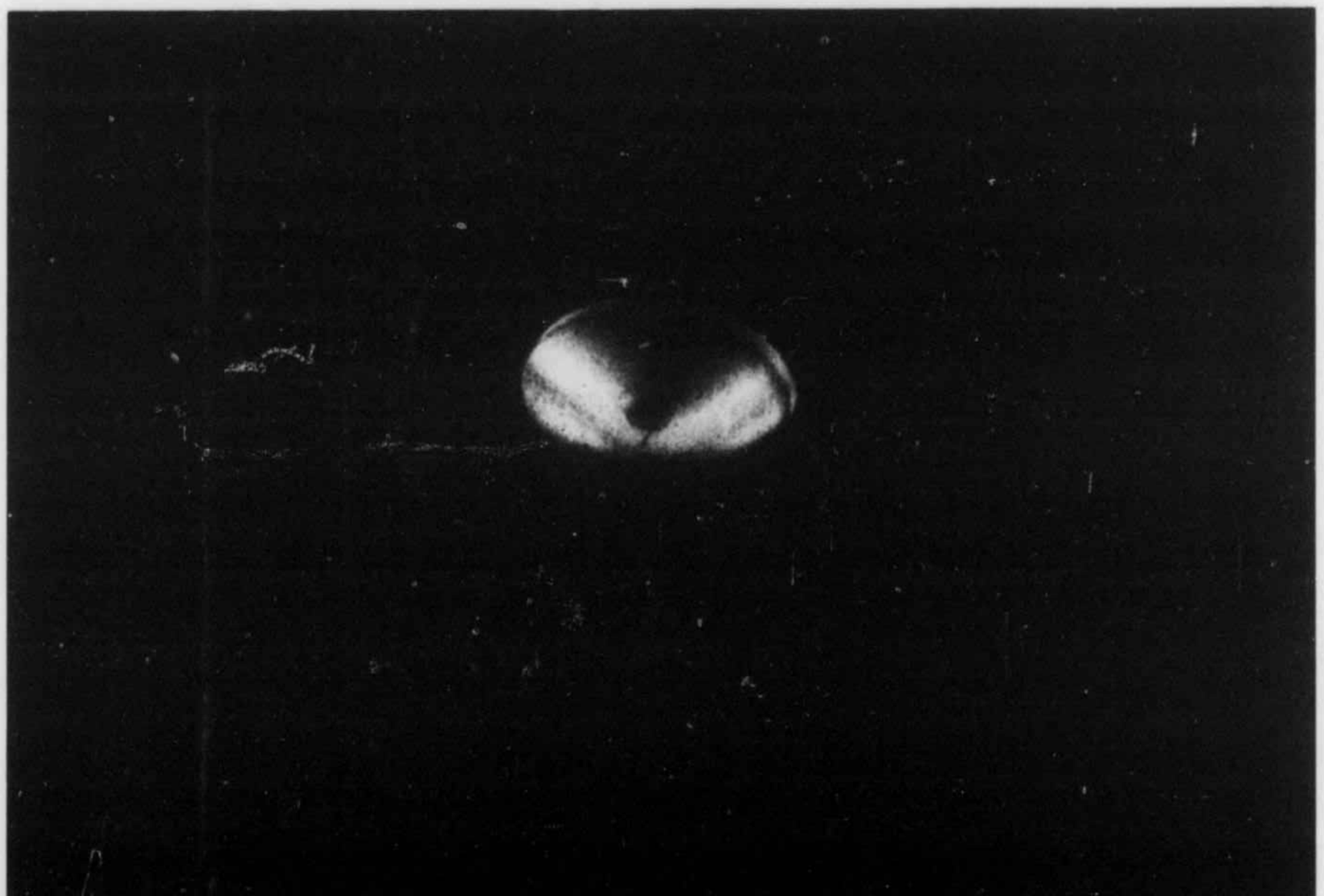


Fig. 1. Black and white enlargement of intermediate contrast of the disc.

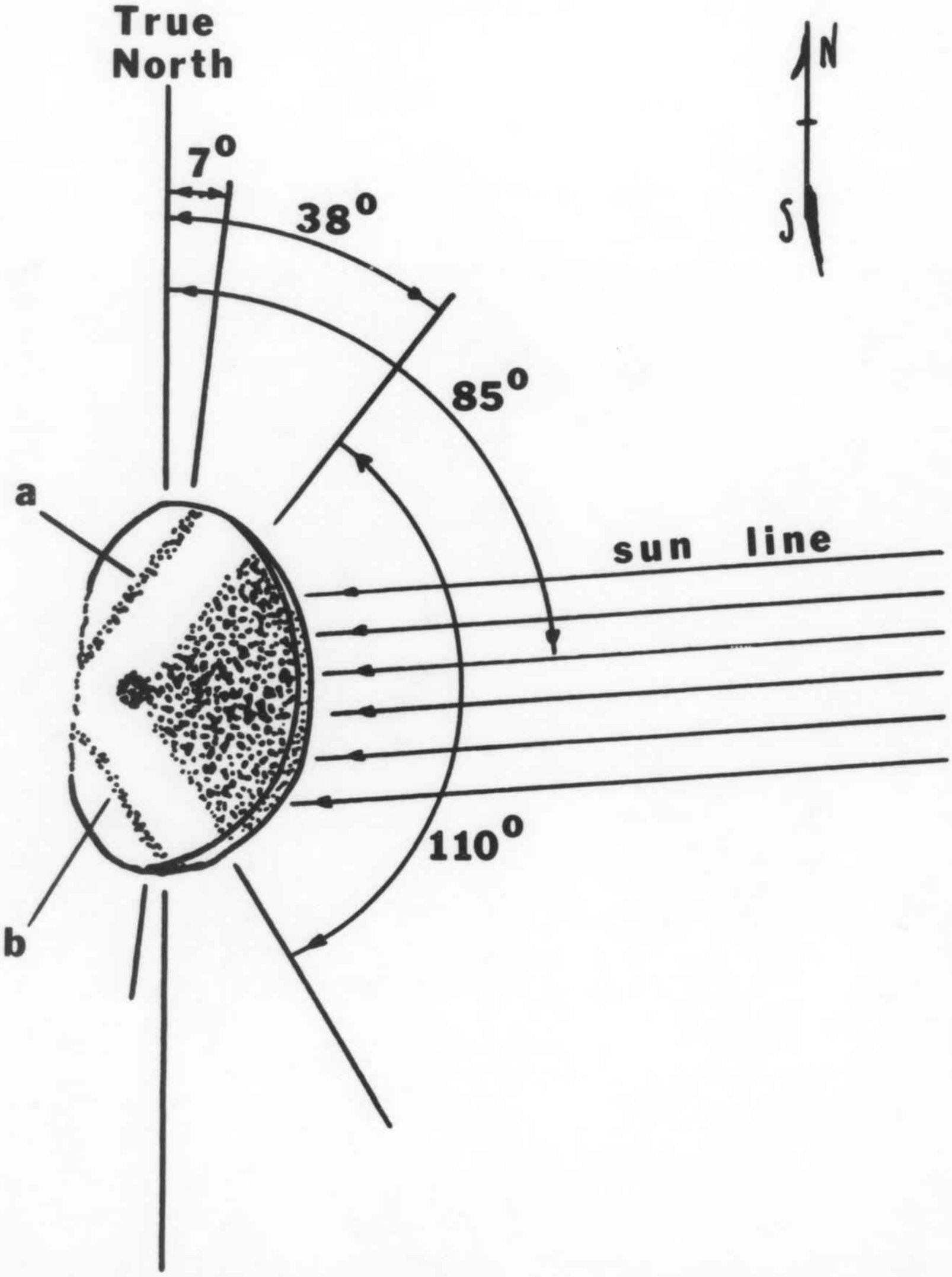


Fig. 5. An illustration of the measured and calculated parameters of the image.

approximate centerline of the triangular shadow region was 93 degrees CW from true North.

Third, the finite thickness of the disc is suggested by the curved thin dark line parallel to the right-hand side of the disc (facing East). Two straight, thin dark lines (a, b) are also visible spanning the top of the disc diagonally and pointed toward the West. Each line is generally parallel with an edge of the triangular darker shadow area.

Fourth, while the right-hand edge of the disc image is in very sharp focus, the left-hand edge is diffuse and appears to be an irregular boundary which

almost transits the light of the background in a transparent manner. It is of interest to note that the general orientation of this left-hand boundary of the image runs North and South rather than being parallel with the visible longitudinal axis of the disc. This irregular edge is shown more clearly in following computer enhancement photographs.

The top (North facing) edge of the disc is in extremely sharp focus with not even the grain structure of the film being apparent. Whereas the entire top "surface" of the disc shows a mottled graininess which could be representative of a diffusely reflecting surface.

If the disc image was of a real object travelling at a high rate of speed relative to the film plane, then one would expect a blurred image on both the leading and the trailing edge. This did not occur here.

Fifth, the entire image is in sharp focus suggesting that (a) the shutter speed was fast, (b) the disc was not moving relative to the earth background, or both. It is known that the exposure lasted 1/500 second which would "stop" a slowly moving object but not necessarily a fast-moving one.

Of equal interest is the calculated maximum dimension of the disc if it was located at the earth's surface, 10,000 feet away from the camera. The 4.2 mm length of the image is equivalent to an object 210 m in length or 683 feet. The object cannot be farther away than this.

The apparent shadow structure on the disc deserves further comment. Using the location on the ground where defined clouds produce shadows, straight (sun) lines were drawn, all of which should point back toward the sun. Interestingly, these lines are not parallel but converge to a common point near the bottom left corner of the photograph. This suggests that the camera's optical axis was not pointed gravitationally down to the earth but at an oblique angle.

Figure 6 is a photographic enlargement of the negative contrast in which the film's grain structure is apparent. In this regard, there is no distortion of the grain anywhere around the disc's image which suggests that it was not the result of a double exposure. Nor is there any obvious indication of heat-produced atmospheric distortion around the object. There are no visible lines to or from the disc. The magnification is identical to that of Figure 4. It is noted that the finite thickness of the disc is apparent, as is the edge sharpness on its right and diffuseness on the left.

Ground Shadows

All available photographic evidence was studied for the existence of a shadow of the disc. Since the lighting geometry is known, the existence of a shadow would make it possible to calculate the linear size of the disc. The sun-line extending from the disc's location was traced on the negative, positive prints, and digital enhancements and any evidence for an approximately symmetrical shadow was sought. None was found. In this regard it

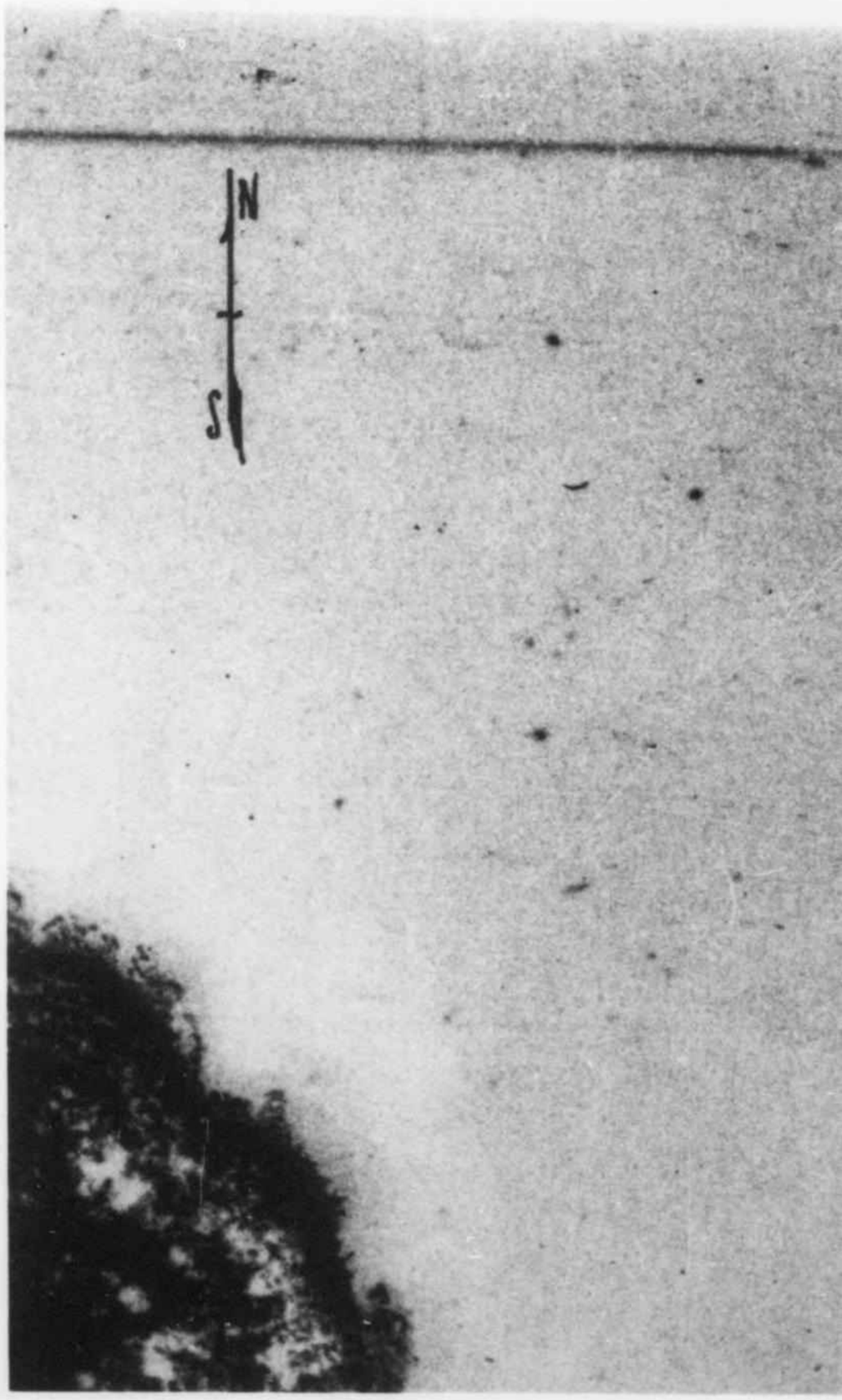
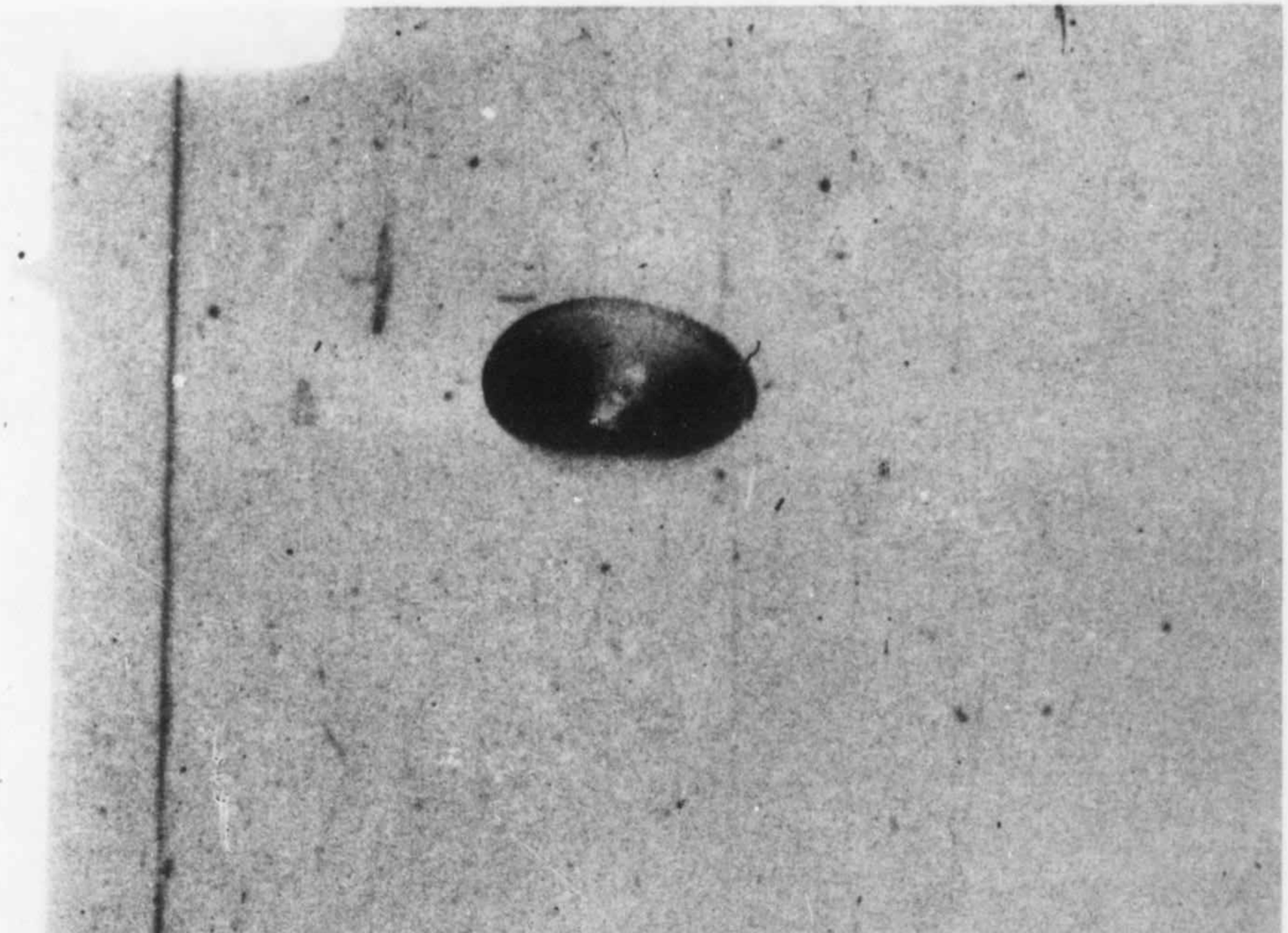


Fig. 6. A photographic enlargement of the negativ



negative contrast in which the film's grain structure is apparent.

may be pointed out that the atmosphere was relatively clear (between the clouds) so that the 32′ arc solar collimation angle should produce a sharply defined shadow on the ground. Of course, the greater the altitude of the disc above the ground the more diffuse would be the shadow edge due to light scatter/diffusion effects. It should also be emphasized that if the disc was located at the earth's surface one would not expect to find a significant shadow.

Digital Enhancement

This negative was also subjected to digital enhancement. A region measuring 13 × 13 mm centered on the disc was digitized using an aperture of approximately 1 micrometer diameter and 16 bit resolution. A number of color assignments to the density distribution were made to emphasize different features. Unfortunately, the following 4 figures are printed in black and white and do not show all of this rich detail.

Figure 7 is a high reverse contrast image to illustrate two features. First, the density gradient on the left-hand side of the disc which is not visible on the photographic prints (Figures 4 and 6). The same density was found on the left and right sides of the disc. The left side of the disc is not a circular extension of the rest of the disc but is flattened to some unknown extent. Second, the brightness of the lake behind the disc varies regularly from the top of the photograph to the bottom which is consistent with its reflection of collimated sunlight over the range of angles involved.

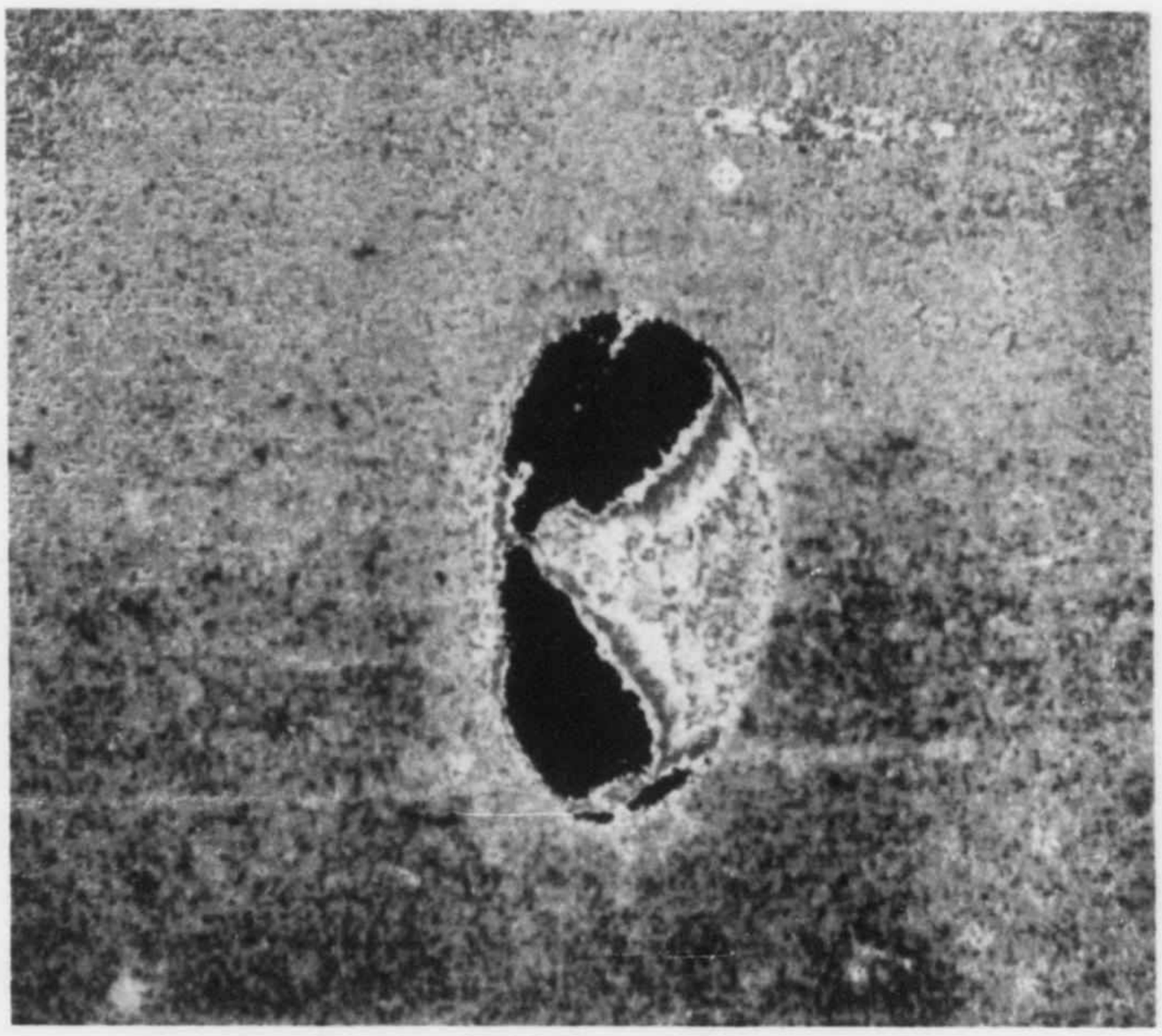


Fig. 7. A high reverse contrast image ($f = 4$, $t = \frac{1}{8}$ sec.).

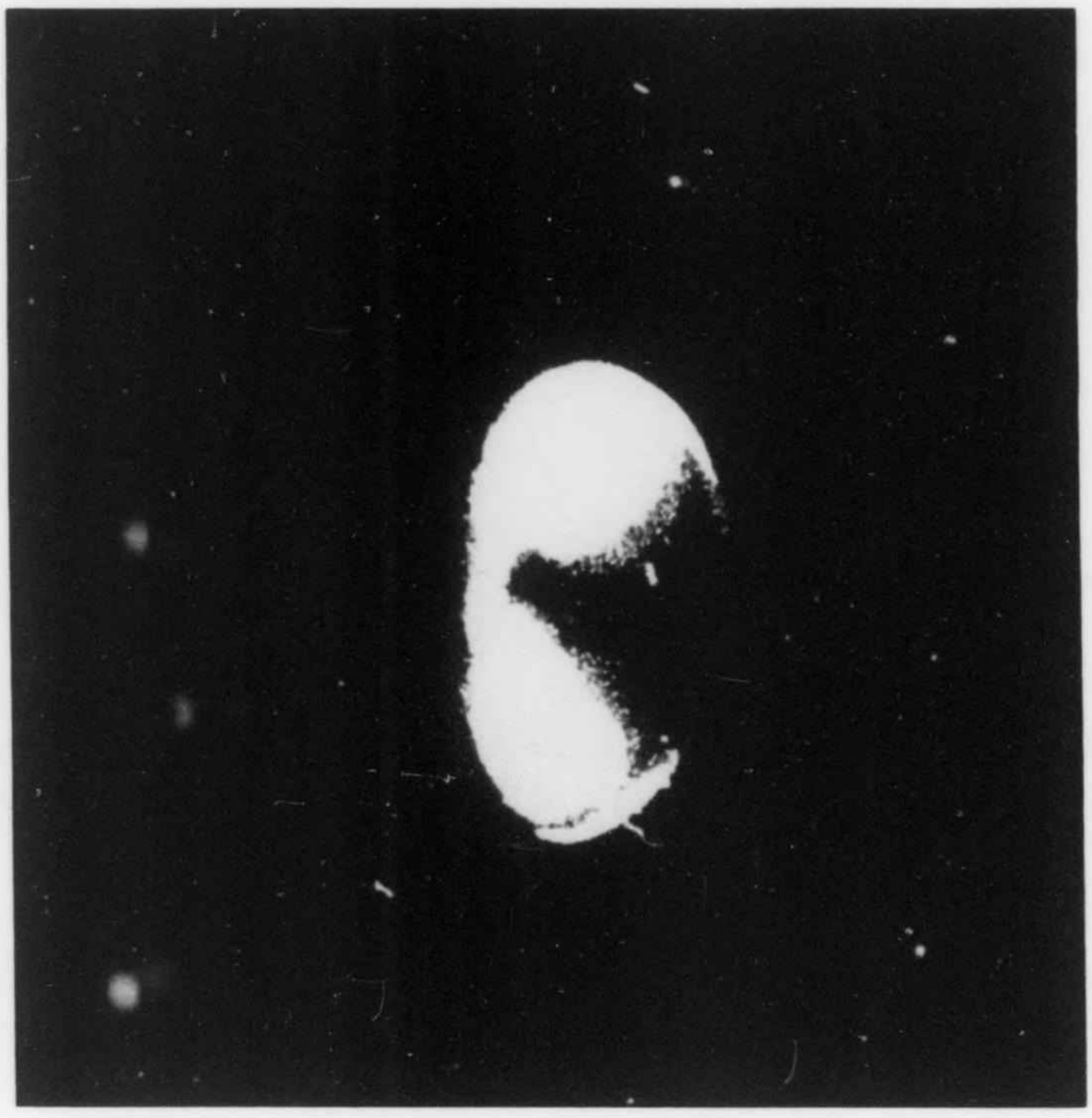


Fig. 8. The original densities of 100 to 125 were mapped or expanded to 1 to 256 levels of grey ($f = 4$, $t = \frac{1}{8}$ sec.).

In Figure 8 the original densities of 100 to 125 were mapped or expanded to 1 to 256 levels of grey to demonstrate extremely subtle optical density changes, mainly in the area of the disc's dark regions and edge.

In Figure 9 the original densities of 175 to 200 were mapped to 1 to 256 levels of grey. The dark and light regions on top of the disc become more evident here as does the apparent third dimension of the object.

In Figure 10 a wider variety of colors were used to better emphasize the disc's surface density differences as well as the lake's luminance distribution. Located above the disc is a generally oval shaped region of higher density (darker). However, it cannot be the shadow of the disc on the water's surface because it is in the wrong position relative to the sun.

Subsequent Ground Sightings

On October 25, 1986 at about 9:00 am, by clear weather, two men saw an object at the surface of the Lago de Cote. They are Joaquin U.A., 40 years old, a farm manager, and Ronald-Alberto L.A., a 23-year-old farmer. Their sketch of what they saw is presented as Figure 11.

Interviewed at the site 2 weeks after the observation by Ricardo and

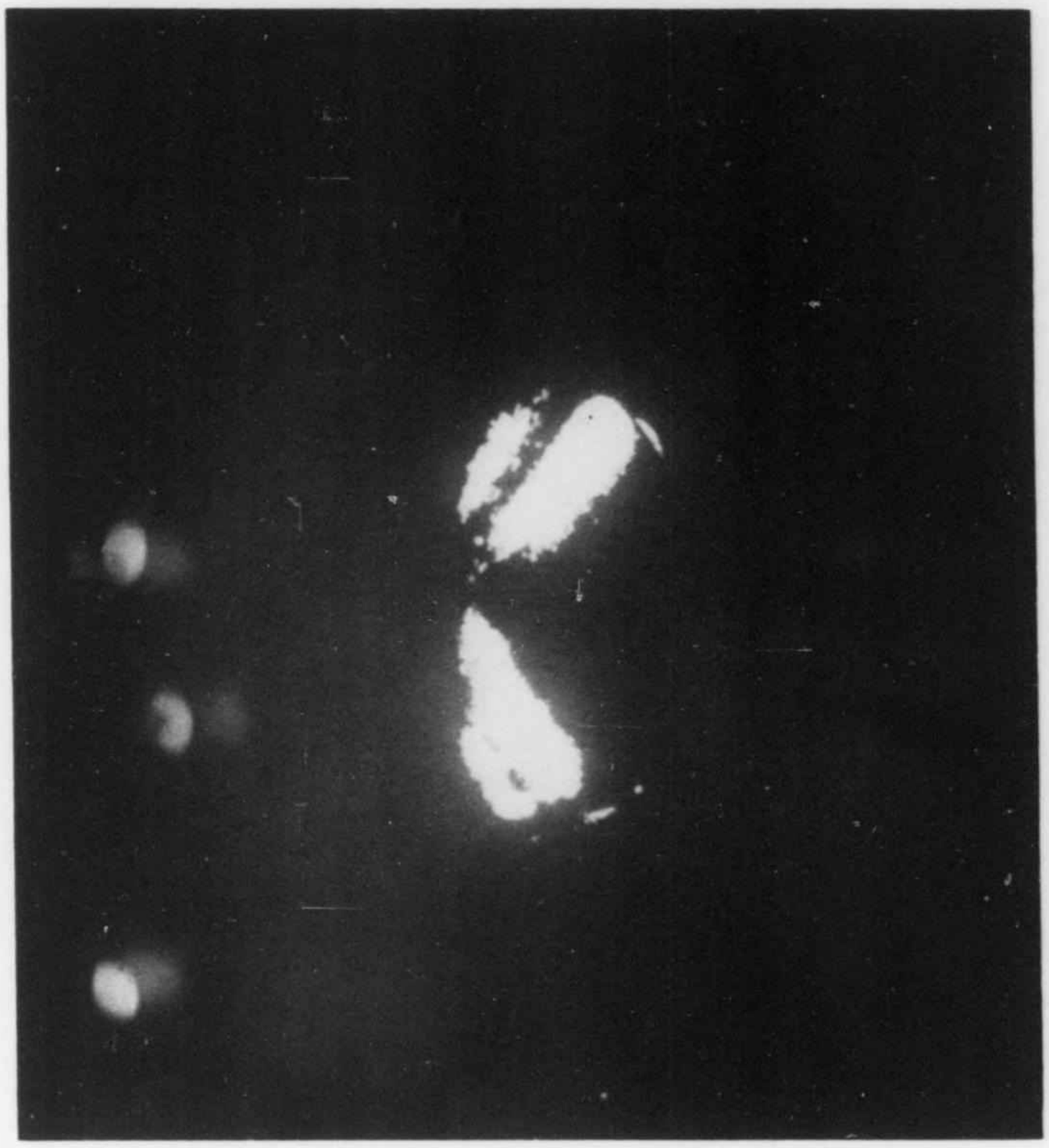


Fig. 9. The original densities of 175 to 200 were mapped to 1 to 256 levels of grey ($f = 4$, $t = \frac{1}{8}$ sec.).

Carlos Vilchez, they gave a detailed description of the events: First they saw, about 1,800 feet away, a row of three or four post-like cylinders rising to about 3 feet above the surface of the lake, which was quiet and flat as a mirror. These cylinders appeared to be attached to a structure that remained submerged. Later they again saw a series of objects sticking out about 3 feet above the water and 3 feet apart. By then they had driven their tractor much closer to the lake, and they could clearly observe the cylinders which were of a dark hue, either grey or coffee-colored.

After 5 or 10 minutes these objects disappeared, the emerged portions again tilting together as if they were attached to a single submerged structure, and the whole object disappeared back into the lake with significant turmoil and waves.

It should be noted that such observations of submerged objects, although rare, are not unknown in the UFO literature. For example, on September 27, 1978 at 6:40 pm two Italian fishermen in Falcone (Piombino) saw a luminous, bell-shaped object come out of the sea with a metallic sound and fly to within 150 feet of their location, as reported in the February 1979 edition of *Notiziario UFO*.

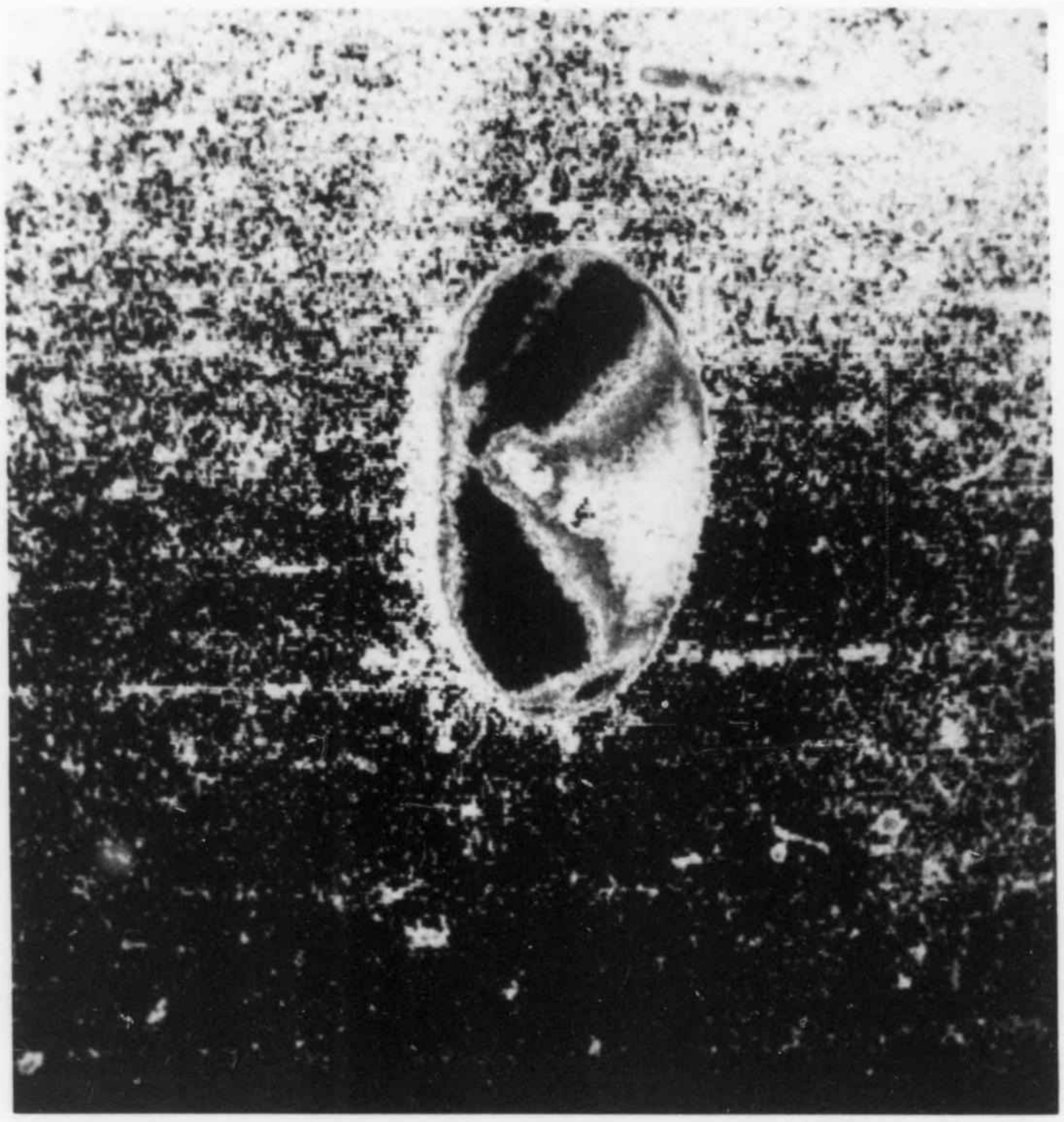


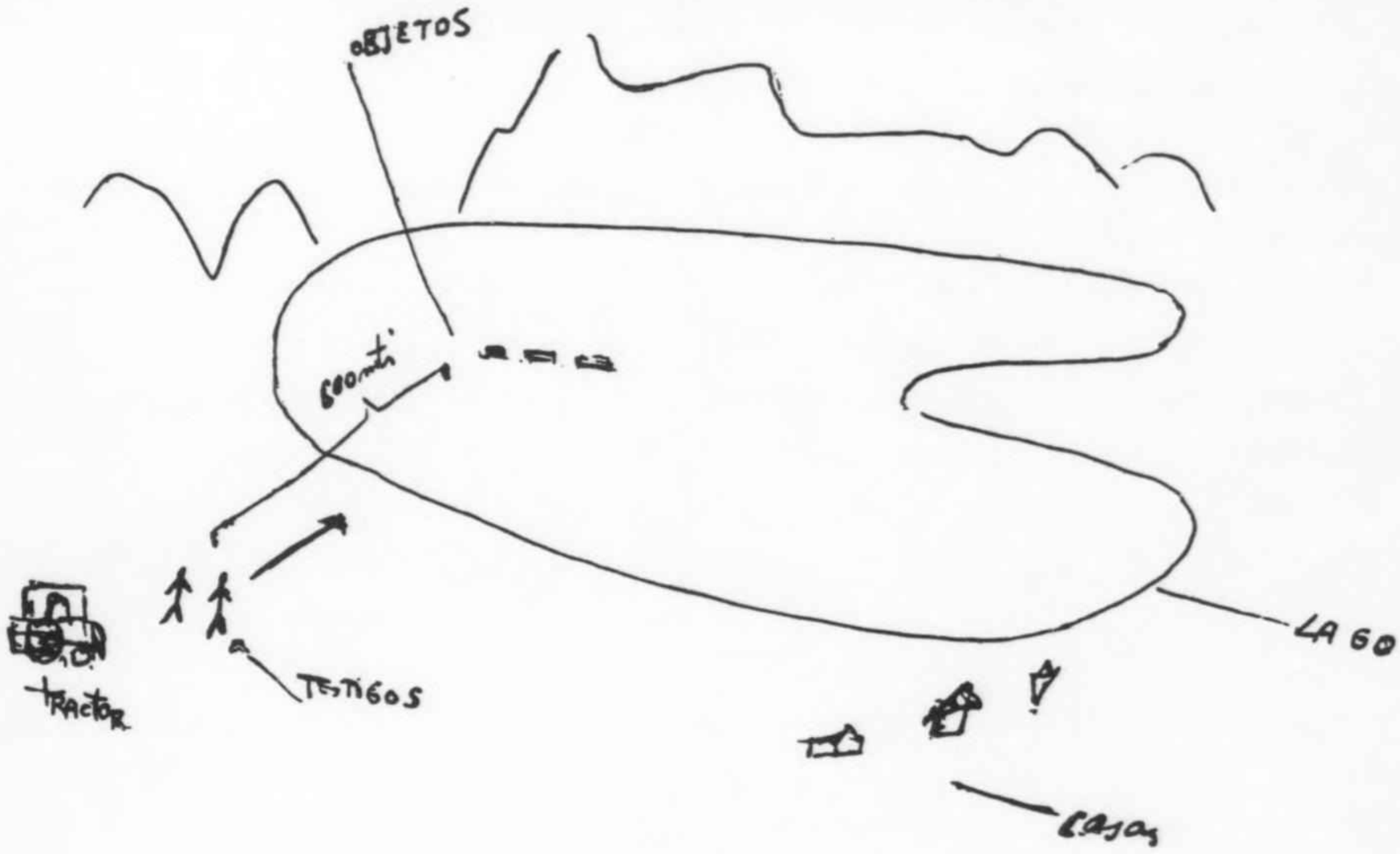
Fig. 10. Emphasis on the disc's surface density differences as well as the lake's luminance distribution ($f = 2.8$, $t = \frac{1}{8}$ sec.).

Discussion

A number of questions are raised by this analysis. In particular, we have not been able to provide an interpretation for the fact that the disc's image has a sharply defined edge on the sun's (right) side and a fuzzy edge on the opposite side. The possible significance of the proximity of a geologic fault line is unknown. There is no indication that the image is the product of a double exposure or a deliberate fabrication.

Computer enhancement (cf. Figures 7 and 10) emphasizes extremely small variations in background brightness. Several horizontal lines are most likely printing artifacts rather than real, environmental-related effects. Another feature of interest has to do with the edge of the dark triangular region on the disc's right-hand side. Figures 7 through 10 all show that the top edge of this dark region is more convex than is its lower edge, as would be expected if the disc presented a generally conical surface of revolution.

In summary, our analyses have suggested that an unidentified, opaque, aerial object was captured on film at a maximum distance of 10,000 feet. There are no visible means of lift or propulsion and no surface markings



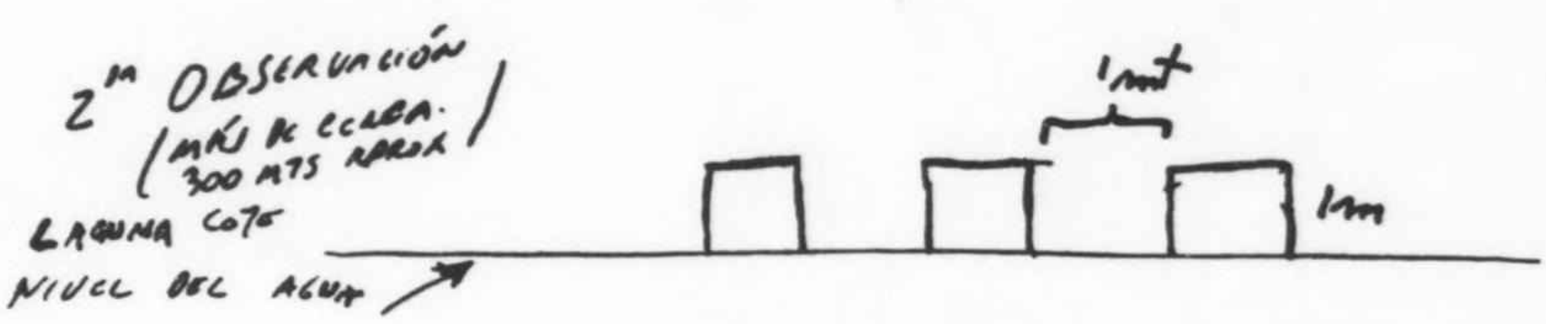


Fig. 11. Sketch by the witnesses.

other than darker regions that appear to be nonrandom. This case must remain "open" until further information becomes available.

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Referee's Review of "Photo Analysis of an Aerial Disc Over Costa Rica," by Haines and Vallee, prepared by Marilyn E. Bruner, Sr. Staff Scientist, Lockheed Palo Alto Research Laboratory

I have examined the photograph exhibited in the paper submitted by Haines and Vallee and read their discussion with considerable interest. While I agree that the image seen in Figure 1 is very suggestive, my impression is that it probably does not represent a physical object. This impression is based primarily on a visual inspection of the negative (Figure 6) under levels of magnification ranging from 3 × to 12 ×. The following observations were noted:

- The grain patterns in the northern edge of the oval image appear to be of a different character than those in the remaining parts of the field. Grains are smaller and more closely packed.
- The photographic density is quite high, appearing to be nearly saturated at the northern boundary.
- The northern edge of the image is abnormally sharp; much sharper, for example, than any physical feature on the coastline.
- There is no evidence of light diffusion or halation that would normally be found adjacent to an image formed by a bright light source.
- The light areas on the negative (i.e., the "portholes" on the positive image) appear to have the same photographic density as the surrounding water.

The most troubling point is probably the very high density and unusual sharpness of the northern edge of the image. It appears to be a step function. The only other features of comparable sharpness are obvious scratches and other artifacts on the negative. If the high density were due to a bright source, at least some level of flaring, some evidence of lens aberrations, and some diffusion in the emulsion should have been seen. This is certainly the case for the trees, shrubs, and rocks seen along the coastline. I suspect that a quantitative analysis of the image would show that the steepness of the step function exceeds the resolving power of the lens, a point that could easily be tested. The strong variations in sharpness with position around the image boundary are also quite difficult to explain in terms of a photograph of a physical object.

On the basis of these observations and on the authors' discussion of the inconsistent shadow patterns, it is my opinion that the oval image is more likely to be an artifact such as a pressure mark than a photographic image of a physical object. Such a mark could have been caused by a foreign particle trapped between two layers of the film on the supply spool. The gradations in density across the image (the "shadow patterns") could easily be due to thickness variations in the particle; these, of course, would bear no relation to the direction of scene illumination. Thickness variations could also explain the sharpness variations around the perimeter of the image. The doubled appearance of the image on the southeast edge could result if the particle shifted and made a second impression while it was being spooled or being transported in the camera. I did a simple experiment with pencil and tracing paper that suggests that the appearance is consistent with rotation of the postulated particle about a point on the northern boundary of the image.

Obviously this part of the discussion is based largely on conjecture, since the original film was not available for inspection. The particle hypothesis could, in principle, be tested by examining the original negative under strong, glancing incidence illumination. If the image is a pressure mark, it may be possible to find marks or scratches on the emulsion or local deformations in the film base.

To summarize, there are enough inconsistencies in the appearance of the image to raise doubts that it represents a physical object. The most serious of these is that the image's sharpness appears in places to exceed the resolving power of the lens. This issue can and should be evaluated quantitatively. If the resolving power has, in fact, been exceeded, then the observation must be rejected as representing a photograph of an aerial disc. A hypothesis has been advanced to explain the image as a photographic artifact, proposing a method for its formation and a suggested test of its validity.

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Authors' Reply to Referee's Review

We are grateful to Marilyn Bruner for her reading of and technical observations on our paper "Photo Analysis of an Aerial Disk over Costa Rica." She raises several points which deserve further comment. These will be addressed in the same order as in her critique. We sympathize with her difficulty in making judgments about our analysis solely on the basis of a third-generation *positive* contrast print since its grain pattern might well misrepresent what is found on earlier generation negatives. In her first paragraph she suggested that she had the negative to study which she did not. We only had a second-generation *negative* to work from. Fortunately, a careful examination of the entire area on this negative under various levels of magnification provides the basis for several clarifications of the points she raises.

Bullet One. We could find no significant change in grain size or spacing anywhere around the outside of this disk on this negative; this is what we said in the original text with regard to Figure 6.

Bullet Two. We agree that photographic density is high along the northerly boundary of the negative suggesting a high level of exposure. Of course this fact, by itself, does not point toward an optical artifact. Based upon optical density measurements alone, the brightest part of the disk is still lower in luminous intensity than sunlit cloud (i.e., <13,500 ft-L).

Bullet Three. Another point she raises is the "abnormally sharp" step function of density on the northern edge of the image which, she states, is "much sharper, for example, than any physical feature on the coastline." This is true. However, careful inspection of the entire negative shows several roofs on houses having significantly sharper edges. This fact indicates clearly that the edge of the disk's image has not exceeded the resolution limit of the lens. It is unfortunate that Dr. Bruner could not have inspected the negative prior to making this observation.

The differential sharpness of the disk's image around its circumference is more difficult to explain, at least in terms of a solid, three-dimensional object. One speculative explanation for the diffuse edge on the left side is

that the object is partially submerged so that the water interface produced an irregular boundary.

Bullet Four. Her comment that one would expect more light diffusion or halation around the bright disk than is found here is interesting and raises a number of technical questions that requires far more space than is available to discuss. Suffice it to say that there are several other objects in the field of view that are brighter than the disk which possess extremely sharp edges (viz., roof tops of various buildings). In none of these regions is there significant light spillover from the roof area onto darker, adjacent areas of the film.

The absence of a shadow from the disk remains a puzzle to us. As stated in our article, an obvious explanation is that the object is at the surface of the earth where no shadow would be expected. Another possibility is that the object is opaque, small, and much nearer the airplane so that its shadow's reduced size and darkness would be difficult or impossible to locate on the ground.

Bullet Five. Her reference to light areas on the negative, that is, "the "portholes" on the positive image" is unclear. We did not use the term "porthole" or "portholes" and do not refer to any such areas. Perhaps she is referring to the single circular shaped region at the approximate center of the disk which is a good deal lighter than the average luminance of the disk (on the negative). That particular region is approximately the same density as is the surface of the lake surrounding the disk.

Concerning the Possibility of a Trapped Foreign Particle

We have two major comments concerning this possibility. The first has to do with the kind of an optical image that could be produced purely by a "pressure mark" caused by a "foreign particle trapped between two layers of the film on the supply spool," in the words of Dr. Bruner. If the particle merely produced a dimple in the unexposed film and then came off the film prior to exposure then one would not expect such a highly geometric pattern of light and dark regions produced by the incoming rays from ground-reflected sunlight. It is also unclear how such a film deformation could occur without leaving an oval shaped region of deformation in both the size and spatial distribution of the film grains in that region. A careful examination of the second generation negative shows no such grain deformation. Second, if the particle somehow remained attached to the unexposed film as it rapidly spooled forward within the camera, it would have had to be located on the lens side of the film so its shadow could have differentially exposed the film. Subsequently, as the roll of continuous film spooled on top of itself on the take-up reel, it would have produced another (smaller) dimple there on adjacent film. It is likely that this secondary dimple would have produced a slight physical (and optical?) distortion either on preceding and/or following frames in an equivalent position on the film. The linear distance be-

tween these successive dimples would be approximately the same and a function of the circumference of the film reel at that point. Linear distances between successive dimples would range from 9.42″ to 14.1″ corresponding to take-up reels with film having diameters of from 3″ to 4.5″, respectively. A careful examination of frames 299 and 301 show no areas of distortion at the same distance from the edge of the film and between 9.42″ and 14.1″ on either side of the disk's image position.

In order for thickness variations of an adhered particle to account for the present disk image detail the particle must remain stuck to the film during its initial exposure and must possess a highly geometric pattern of light transmission. While this is possible, it is considered highly unlikely.

If the particle somehow shifted position it would have to have occurred during the optical exposure period of 1/500th second. Several issues arise: (a) Why isn't there a set of double edges on the opposite side of the disk as well? (b) Also, the disk's off-optical axis location on the film would have produced a continuous differential density within the two boundaries on the easterly side of the image rather than only a set of two darker lines with lighter region between them. (c) Finally, a differential blur of these two lines should occur at intermediate points around its circumference. There does not appear to be any such blur.

Dr. Bruner's suggestion to examine the original negative using oblique illumination is an excellent one. However, her suggestion that the disk is due to an optical effect produced by an adhered foreign particle is not supported by a careful analysis of the negative that is in our possession. We are continuing to try to obtain the original negative for further study.

Journal of Scientific Exploration, Vol. 3, No. 2, pp. 133–184, 1989
Pergamon Press plc. Printed in the USA.

0892–3310/89 $3.00+.00
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A Replication Study: Three Cases of Children in Northern India Who Are Said to Remember a Previous Life

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Abstract—This replication of Ian Stevenson's studies of spontaneous cases suggestive of reincarnation presents data from 3 of the 10 cases investigated by the author in northern India during 5 weeks in the summers of 1987 and 1988. The purpose of the study was to see if an independent investigator, following Stevenson's methods, would reach conclusions similar to his. Stevenson reports that the numerous cases in which a child speaks and acts from the point of view of a verifiable but deceased person about whom the child could not have normally known are best explained as cases suggestive of reincarnation. With one possible exception the author was satisfied that the cases she studied were not cases of deceit or self-deceit, although she noted that acceptance of the concept of reincarnation played a part in the diagnosis and unfolding of the case. While in some instances the child said no more than could be presumed to be known by the parents, in other cases the child's accurate and intense identification with someone unknown to the parents indicates something paranormal has taken place.

At the invitation of Ian Stevenson, M.D., in August and the first week of September 1987, in July 1988, and for 3 weeks in December 1988–January 1989, I investigated 10 cases of children in northern India who had been reported to spontaneously identify themselves as being someone in fact deceased. The purpose of the study was to ascertain if an independent investigator using methods similar to those developed by Stevenson would reach conclusions comparable to his, that while none of the cases offer irrefutable proof that reincarnation has taken place, they suggest that no normal explanation accounts for the phenomena of children who make accurate statements about and identify themselves with someone about whom they could not have had prior knowledge.

Stevenson has made detailed studies of cases which he calls suggestive of reincarnation in a number of cultures, in most of which the majority of

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Acknowledgements. I would like to thank the Division of Personality Studies of the Department of Behavioral Medicine and Psychiatry of the University of Virginia for covering the expenses of my research in India, and the Social Sciences and Humanities Research Council of Canada for its award of Postdoctoral Fellowships #456-85-1804 and #457-86-0071, to study belief in and cases suggestive of reincarnation among the Beaver, Gitksan and Wet'suwet'en Indians of British Columbia, Canada.

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people believe in reincarnation: for example, India (1974, 1975a); Sri Lanka (1977a); Thailand and Burma (1983a); Lebanon and Turkey (1980); Brazil (1974); among the Indians of the Northwest Coast of North America (1966, 1974, 1975b); as well as describing characteristics of cases among the Igbo of Nigeria (1985). However, he has also reported 79 cases among American children (1983b, 1987). He reports that while cases vary from culture to culture they tend to follow a similar pattern: An otherwise normal child on occasion speaks and acts from the point of view of someone else, typically beginning between the age of 2 and 4. Such children usually cease making these statements by the time they are 7 or 8 years old, although behavioral characteristics of the reputed previous personality often persist much longer. Many investigated cases show that there was a verifiable person meeting the child's description. Such a person often died a violent or sudden death, usually less than 2 years before the child's birth (Stevenson, 1986, 1987).

Because the implications of Stevenson's research are far-reaching and controversial (cf. Stevenson, 1977b), he has sought to have his studies replicated. In 1979 Pasricha and Stevenson conducted a partly independent replication of cases of the reincarnation type, comparing cases studied by Stevenson with those studied by Pasricha. Later (1987) they conducted a longitudinal survey comparing cases in which the subject was born before 1936 with those in which the subject was born in 1965 or later. Both studies indicated stability in the patterns of the cases. Since Pasricha was trained by Stevenson, she could be expected to make studies of comparable quality to Stevenson's, but her association could have subtly influenced her to expect to find his data confirmed. Pasricha and Barker (1981) and Pasricha (1983) have demonstrated how different investigators assessing the same case can differ in their interpretations of its authenticity. Stevenson has therefore sought other qualified persons to carry out further replication studies.

I first met Stevenson in 1984 when he inquired at the Anthropology Department of the University of British Columbia if anyone would be interested in pursuing his studies among the Northwest Coast Indians. Through extensive field work with the Beaver Indians, a Northern Athapaskan tribe in northeastern British Columbia, Canada, I had learned that reincarnation played an integral part in their world view (Mills, 1986). In research for my doctoral dissertation (Mills, 1982) I sought to see how prevalent belief in reincarnation was among a sample of 10 different tribes from 10 different North American culture areas. I found that the information in the literature is quite sporadic and incomplete on the topic of reincarnation. Having met Stevenson and learned of his studies I agreed to make a survey of cases among the Beaver Indians in the following summer, while working on another project, and to ask some outstanding questions from Stevenson's studies among the Gitksan. The month with the Beaver and 5 days with the Gitksan produced much interesting material (Mills, 1988, 1989). I applied for and received a 2-year postdoctoral grant to study belief in and cases

suggestive of reincarnation among the Beaver, Wet'suwet'en and Gitksan Indians of British Columbia, Canada.

Among these peoples, children with what are interpreted as past life memories are born to close relatives of the previous personality.[1] While some of these British Columbia cases present evidence suggestive of the existence of reincarnation, it is often difficult to eliminate the possibility that many of the apparent past life recollections are based on information the child has learned through normal means when the child is close to relatives with intimate knowledge of the alleged previous personality. Information can be internalized, reworked and even improved upon without the source of the information remaining accessible to the individual. Helen Keller offered an example of this kind of source amnesia or cryptomnesia in composing a story for which she was accused of plagiarism (Keller, 1954, pp. 342–362).

India offers a better opportunity to control the variable of contact between the child and people knowledgeable about the previous personality, because in 43% of 183 cases analyzed by Stevenson the subject and the previous personality are from families unknown to each other (1986, p. 211), sometimes from villages widely separated from each other (Barker & Pasricha, 1979; Stevenson, 1987). Therefore I was interested in accepting Stevenson's offer to investigate cases in India so as to study the phenomena in a culture where more opportunity exists to eliminate the factor of normal means of obtaining knowledge of the previous personality. As of July 1988 I accepted a joint position with the Division of Personality Studies and the Anthropology Department at the University of Virginia, but in order to preserve the independence of my evaluation, Stevenson has not read my notes or any reports I have written.

Procedure

Stevenson gave me addresses for 9 cases about which he had learned during his studies or through contacts in India. One of these he and Pasricha had already investigated. The other 8 cases Stevenson has not studied nor does he have any first-hand information about them. Although comparison of 2 independent investigations of the same case might offer the best replication, I found that in the case previously studied by Stevenson and Pasricha the child had been intimidated from revealing his past life memories, and I was therefore not able to complete the study of the case.[2] A 10th case which came to our attention was also studied in the summer of 1987.

In the summer of 1988 I reinvestigated 7 of the cases to ask questions I found to be still outstanding and to catch witnesses who had eluded me during the first trip, and I investigated an additional Hindu case and 5 cases in which the subject or the previous personality was Moslem. These half Moslem cases will form a separate report. In December 1988 and January

1989 I returned to ask further questions and began investigation of an additional 3 cases. As the information on these latter 3 is still incomplete, I have not included them in the analysis. This paper is based on the original 10 cases studied. All 10 cases were in northern India, 9 in Uttar Pradesh province, and 1 across the border in the province of Rajasthan.

Stevenson has described the methods he has developed to investigate cases of the reincarnation type (Stevenson, 1974, 1975a, 1987). In the summer of 1987 I attempted to follow this procedure as closely and thoroughly as possible. In each case I endeavored to interview the child, its family members and other witnesses to the child's speaking of what was eventually identified as a past life, and subsequently the relatives of the previous personality. The statements of these people were checked for internal consistency and accuracy. Accounts of the child's meeting with the family and friends of the previous personality and the recognitions made were also solicited from the child, his relatives and independently from the witnesses among the previous personality's family. Descriptions of the previous personality's nature and likes and dislikes were obtained.

After the informants had recalled all the details that spontaneously came to their minds, I asked further questions using the "Registration Form for Cases of the Reincarnation Type" and sometimes the "Computer Codebook for Rebirth Cases" which Stevenson has developed, to ensure that I gathered demographic and other information Stevenson has found useful for analysis. I also took notes of relevant behavior on the part of the child. Written records of births, deaths, postmortems, or journals were sought and copied whenever they existed. In the summer of 1988 I asked additional questions to ascertain more information about the place of the subject in the parent's affections and assess the similarity or difference with Multiple Personality Disorder (cf. Coons, Bowman, & Milstein, 1988).

All 10 cases investigated follow the pattern of "solved" cases in which the child and/or his family had been successful in tracing and meeting the relatives of a deceased person who corresponded to the child's statements. Ideally the investigator should arrive before the case has been solved in order to obtain a record of statements made before contact with the family of the previous personality and to witness the child's first meeting with and apparent recognitions of the relatives of the previous personality (Stevenson & Samararatne, 1988). Unfortunately, it is difficult to find cases at this stage of development. The 2 unsolved cases we came across in the course of our study could not be pursued because there was too little information to trace the previous personality and the parents were reluctant to have the cases studied, for reasons described in the discussion section.

In some cases the child visited the previous personality's family again in our presence, which allowed us to observe the relationship between the child and the various members of the previous personality's family. However, statements made after the initial meeting generally lack the value of statements made before the meeting, as there is inevitably information exchange

between the family of the deceased person and the child and his relatives, information which in some, but not all, cases can account for the further revelations made by the child.

Dr. N. K. Chadha, Lecturer in Psychology at the University of Delhi, was my translator and assistant. Vinod Sahni, a graduate student of Dr. Chadha's at the Department of Psychology, accompanied us on most of the investigations and translated my interviews with women. When Dr. Chadha was translating, Ms. Sahni took notes, making an independent translation of what was said. These notes were compared with those of the author working from the translation of Dr. Chadha. The comparison revealed a high level of consistency between the two independent translations. In January, 1989 Ms. Geetanjali Gulati, a graduate student of Dr. Chadha's, replaced Vinod Sahni.

Results

In 5 of the 10, or 50% of the cases, the previous personality was initially unknown to the child and his or her family. In the other 50% of the cases, the child's family had either heard of the existence (or the demise) of the previous personality or was slightly acquainted. In none of the initial 10 cases I studied was the child related to the previous personality.

In 6 of the cases the child was between the age of 4 and 6 years old at the time of the interviews and still speaking from the point of view of being someone else, while in 4 cases the child was between 8 and 16 and recalled only what he or she was said to have said. Six of the subjects were male and 4 female (see Table 4 for a comparison of these features with Stevenson's data).

For the purpose of brevity, only 3 of the 10 cases are presented below in some detail so that the reader can evaluate the evidence these cases present. Data from the other cases are included in the discussion section. I intend to publish similar reports on the other cases.

Case 1: Reena Kulshreshtha of Agra

The informants for this case in Agra were Mr. and Mrs. Kripa Shanker Kulshreshtha, their son Pankaj Kulshreshtha, Kailash Kumari (former neighbor of Shyam Babu Yadev), Shyam Babu Yadev and his second wife Urmila. Phoowati Devi, Shyam Babu's mother, was interviewed in Tilitila.

According to her parents, Reena Kulshreshtha was born on September 13, 1976 at their home in Agra. She is the youngest of six children: she has a sister 20 years her senior, a sister 17 years her senior, a brother about 13 years her senior, a second brother 9 years her senior, and a sister 6 years her senior. Her father began working some years before her birth for the Telecommunications Department. Raised initially in Agra, where her father owns a house, after her father was transferred to the Telecommunications

office in Lucknow in 1980, Reena spent part of her time in Lucknow, and part of her time in Agra, as her mother maintained the house in Agra during the time her husband was assigned to Lucknow. In 1988 Mr. Kulshreshtha was reassigned to Agra. The Kulshreshthas are of the Kayastha subcaste of the businessman's caste of the Hindu caste system. The name means "upper most ancestry."

When Reena was approximately 9 months old, Reena said the word "groom," and then got up and lay down on the bed and mimed dying by lying down and stopping breathing (refer to Table 1 for further notes on the chronology and differing estimates of Reena's age when the various events in the case occurred). For approximately the next 8 months Reena looked through magazines or books every morning for several hours. At first it was not apparent to her parents what she was doing. Eventually she found a picture which resembled her "groom" and was greatly attached to it. She would stare at it for some time every morning.

When Reena was about 10 months old, Reena's mother reported that she said she had died on a day like this (on which a storm was brewing) from an injection that produced blisters all over her body. After hearing a song "Radhay Shyam" on the radio when she was about 12 months old, Reena said her husband was named Shyam. She used to ask her parents to find her husband.

When Reena was about 18 months old, she tried to point out the route to "her" home when she was on the roof of her parents' house, but when brought down from the roof where she could no longer see the turns in the maze of lanes in the neighborhood, she could not direct her parents there.

From earliest childhood Reena identified herself as a married woman and a mother. She insisted on wearing, for months at a time, the necklace that is in India a mark of being a married woman. At the age of 2 and a half Reena said to her mother that she understood why her mother liked to lie down with her father, which her mother interpreted as an indication that Reena had an unusual awareness of sexual relations for a child so young. She was observed carefully covering a doll with a cloth, and when asked by her mother what she was doing, Reena said, "My son is feeling cold. I am keeping him from the cold."

When Reena was less than 3 years old, she described all the steps of her cremation. When she first began speaking about this, her parents could not make out where she said she had been cremated. Reena said that after cremation she was made to lie down for many days in a temple with a mat on the floor; after questioning her, her father concluded that this was a description of her state after death.

When Reena was about 3 years old, Shyam Babu Yadev, a fellow employee of the Telecommunications Department in Agra, of the "backward" of lowest caste, came to her house to drop off some dried tea. Shyam Babu had a side line of selling tea. Reena was happy to see him. After he left, Reena told her mother, "He is my groom. Call him." Her mother did.

In fact, Shyam Babu had met Reena when she was 14 months old. As a

colleague of Reena's father, although of a lower or "backward caste," Shyam Babu had come to the Kulshreshtha home to attend the wedding of Reena's eldest sister. Reena's father remembers Shyam Babu remarking, "Whose influence is upon this child?" because Reena was dark complexioned, unlike her parents (but only somewhat darker than her eldest brother). Because Reena used the word "groom" rather than "husband" to describe the picture, I wondered if Reena had begun the identification of herself as Shyam Babu's wife at the time of her sister's wedding. Both her parents were adamant that she had used this word, indicated how she had died, and sought a likeness of her groom before the sister's wedding. Table 1 shows some of the variation in the age they attributed to Reena when these events began.

Shyam Babu had indeed had a wife, one Gompti Devi (who had the same dark complexion). She had died on February 18, 1975 after about 15 years of marriage to Shyam Babu (19 months before Reena was born). She was approximately 30 years old at the time of her death. According to Shyam Babu, Gompti Devi died when given an injection to which she was allergic which produced blisters on her body. She was cremated that same evening at the white temple near the Taj Mahal. Mr. Kulshreshtha, Reena's father, being a colleague of Shyam Babu Yadev, was asked to attend the funeral but could not go. Gompti Devi was the mother of two daughters and a son. The son was about a year old at the time of her death.

After meeting Shyam Babu when she was about 3 years old, Reena insisted that Shyam Babu was her "husband," and repeatedly asked her parents to "call him" to attend the special events in the family. Hearing from Reena's parents the statements that Reena had made, and seeing that Reena responded to him as her husband, Shyam Babu was convinced that Reena was his wife reborn and came on about 10 such occasions. At these functions Reena would act appropriately for a Hindu wife: She would serve him food and tea and then retire. After he was gone, she would ask her parents to call him again and ask for and give gifts in keeping with a husband–wife relationship. For example, she asked that Shyam Babu give her material to make a long dress. Reena insisted that her parents provide her with a sweater and a baby bonnet for her to give to Shyam Babu.

Shortly after Reena met Shyam Babu when she was about 3 years old, she requested that her mother accompany her to his home. The directions Reena had given her parents to "her" house from the roof of the Kulshreshtha home, prior to her identification of Shyam Babu as her husband, correctly described the way to the house Shyam Babu owned and occupied with Gompti Devi in Agra. The house was about a half kilometer from the Kulshreshthas' home. Reena's parents had been ignorant of the location of his home until Reena asked to go there after she had identified Shyam Babu as her husband. As they approached, Reena led her mother to the correct house.

When Reena arrived at Shyam Babu's house, he was absent but his second wife was present. Reena learned for the first time that Shyam Babu had remarried. Reena did not ask to go back to this house again but frequently

TABLE
Summary of statements and recognitions

Item	Informants	Verification
1. She had a "groom."	Mrs. Kulshreshtha, Reena's mother	Shyam Babu Yadev, Gompti Devi's husband
2. She mimed her death.	Mrs. Kulshreshtha	Shyam Babu Yadev
3. She sought and found a likeness of her husband.	Mrs. Kulshreshtha Mr. Kulshreshtha, Reena's father	Mr. Kulshreshtha
4. She said her husband's name was Shyam.	Mrs. Kulshreshtha	Shyam Babu Yadev
5. She said she died from an injection and had blisters all over her body.	Mr. Kulshreshtha	Shyam Babu Yadev
6. She described the steps from her death to the cremation of her body.	Mr. Kulshreshtha	Shyam Babu Yadev
7. She said that after the cremation she was made to stay in a temple with a mat on the floor for many days.	Mr. Kulshreshtha Mrs. Kulshreshtha	

TABLE 1
itions and behavior of Reena Kulshreshtha

	Comments
dev, s	Reena's father said this occurred when Reena was 6 months old; his wife corrected him, saying this was when Reena was 9 months old (07/08/87). Later (01/09/89), her mother said Reena was 1 and a half when she said this, but thought she was 2 and a half at her sister's wedding when she was in fact 14 months old. Shyam Babu attended this wedding and commented on Reena. However her parents are both sure she said this before the wedding, when she was very little.
dev	Reena lay down and held her breath when she was old enough to stand.
a	Reena began her search in magazines and books at 9 months and continued until she found one that satisfied her. Reena's father noted that the picture she finally selected was not of Shyam Babu Yadev but resembled him. (Note: there is a similarity of face and physical type between Reena's father and Shyam Babu Yadev.) Reena's parents noted she made her search of her husband in the morning, at 5 or 6 a.m.
dev	Reena said this after hearing the radio play the song "Raday Shyam."
dev	On 01/09/89 Reena's mother said Reena said this when she was 10 months old. On 07/05/88 Reena's mother said Reena said this when she was 12 months old.
dev	At first her parents could not make out the name of the place where she said she was cremated. Reena described the cremation when she was 3 years old, before she met Shyam Babu Yadev.
	Her father sought to learn the location of the temple by asking if there were tea shops near the temple. Reena said there was no desire to take tea. Her father interpreted this to refer to an after-death state. He had also interpreted her talk about sparrows to refer to an intervening life, but after learning the interval between Gompti Devi's death and Reena's birth he thought that less likely.

8. She repeatedly said, "Find my husband."	Mrs. Kulshreshtha		
9. She said she was protecting her son from the cold when covering a doll.	Mrs. Kulshreshtha	Shyam Babu Ya	
10. She insisted on wearing the necklace that is the sign of being a married woman, as well as other jewelry typically worn by married women.	Mrs. Kulshreshtha		
11. She pointed out the route to her former house.	Mr. Kulshreshtha Mrs. Kulshreshtha	Mr. Kulshreshth	
12. She told her mother that she understands about sexual activity.	Mrs. Kulshreshtha		
13. She became very upset when taken to the Taj Mahal, near where she said she was cremated.	Mr. Kulshreshtha Mrs. Kulshreshtha	Shyam Babu Ya	
14. She recognized Shyam Babu Yadev.	Mrs. Kulshreshtha	Shyam Babu Ya	
15. She predicted her father would be promoted.	Mr. Kulshreshtha	Mr. Kulshreshth	

bu Yadev Gompti Devi's son was about a year old at her death. She had also raised her half brother after her step-mother's death.

She insisted on wearing such a necklace for months at a time for several years. I did not ask if Gompti Devi wore one. Such a necklace is typically tied by the groom around the bride's neck at the wedding.

reshtha Reena pointed out the route from the roof of her house, but could not direct her parents when she could not see the maze of lanes when on the street level. After her parents learned Shyam Babu's address they saw that her directions were correct (see 21 below).

This began at 2 and a half years old. Mrs. Kulshreshtha says she continues to talk without embarrassment about sexual matters.

bu Yadev Shyam Babu confirmed that Gompti Devi was cremated in the white temple near the Taj Mahal. While not visible from the Taj Mahal, the cremation ground is adjacent to it. One route to the Taj Mahal goes right past the cremation ground.

Reena's father thought the trip was before she identified Shyam Babu as her husband, but Reena's mother was not sure which came first and thought that perhaps the trip to the Taj Mahal came after the identification. Reena has henceforth refused to go to the Taj Mahal and is upset if she hears it mentioned in songs, or hears the cremation ground referred to.

bu Yadev Reena's age at this meeting was given as 2 and a half by her mother and between 3 and 4 by her father.

reshtha The exact interval between the prediction (in 1979) and the promotion (in 1980) is unclear. Reena did not predict that the promotion would entail a move to Lucknow, as it did.

(*continued*)

TABLE 1 (

Item	Informants	Verification
16. She has a phobia of injections and has not lost this phobia.	Mrs. Kulshreshtha	
17. She asked that Shyam Babu come to her home for special occasions.	Mrs. Kulshreshtha Mr. Kulshreshtha	
18. She acted like a wife in Shyam Babu's presence.	Mrs. Kulshreshtha Mr. Kulshreshtha	Shyam Babu Yadev
19. She insisted on giving Shyam Babu gifts such as sweaters and a baby bonnet.	Mrs. Kulshreshtha Mr. Kulshreshtha Shyam Babu Yadev Pankaj Kulshreshtha, Reena's brother	
20. She asked to be given material for a long dress by Shyam Babu.	Mrs. Kulshreshtha Mr. Kulshreshtha Shyam Babu Yadev	
21. She insists on going to S.B.'s home, and leads the way as they approach.	Mrs. Kulshreshtha	
22. She led her mother to Kailash Kumari and recognized her.	Mrs. Kulshreshtha	Kailash Kumari, Shyam Babu's neighbor
23. She acted as Gompti Devi had in Kailash Kumari's presence.	Kailash Kumari	Kailash Kumari
24. She said there was some trouble in her house.	Mrs. Kulshreshtha	Urmila Yadev, Shyam Babu Yadev's second wife

LE 1 (*continued*)

n	Comments
	According to her mother, Reena has not had any injections since her birth and first saw one occur when her mother was ill when Reena was about 4 years old. Shyam Babu says that he came about 10 times on such occasions.
'adev	She was shy, served Shyam Babu tea and food and then retired, correct for a Hindu wife.
	The first baby bonnet Reena may have thought was for Gompti Devi's son who was c. 1 year old at her death. See Item 23 for Reena's gift of a baby bonnet to the grandchild of Kailash Kumari.
	Young girls typically wear short frocks, while long dresses are worn by women.
	The house was in the direction Reena had indicated when c. 18 months old.
ıri, ı's ıri , u ond	Kailash Kumari was a surrogate mother-in-law who lived just in front of Gompti Devi whom Gompti Devi visited daily. Reena persistently asked to visit the neighbor of Gompti Devi. Reena would not eat in the presence of Kailash Kumari. Neither had Gompti Devi, as a sign of respect as for a mother-in-law. Reena asked her parents to give a baby bonnet to Kailash Kumari's new grandchild. This occurred when Reena was about 3 years old. Urmila confirmed that she had a very difficult delivery as the cord was wrapped around the baby's neck.

25.	She announced the birth of a son to Shyam Babu and celebrated the event.	Mrs. Kulshreshtha	Urmila Yadev
26.	She recognizes Phoowati Devi.	Phoowati Devi, Shyam Babu Yadev's mother Mrs. Kulshreshtha	
27.	She does not recognize Gompti Devi's son.	Urmila Yadev Mrs. Kulshreshtha	Urmila Yadev Mrs. Kulshreshtl
28.	She repeatedly asked her father to go and get her four rings and her bangles from her house.	Mrs. Kulshreshtha	
29.	She correctly described the colors of Gompti Devi's saris and sweaters.	Mrs. Kulshreshtha Kailash Kumari	Urmila Yadev Shyam Babu Ya
30.	She announced death of Shyam Babu's "elder brother."	Mrs. Kulshreshtha Mr. Kulshreshtha	Shyam Babu Ya
31.	She named the gods represented at the temple at the cremation grounds.	Mrs. Kulshreshtha	Not confirmed
32.	She announces that her husband has had an operation.	Mrs. Kulshreshtha	Shyam Babu Ya

dev

The birth occurred at Tilitila, 145 km from Agra. Reena's mother went to Kailash Kumari to ask if this was true. Kailash Kumari asked Shyam Babu who did not know. Sometime later he received a letter announcing the birth of a son on the date noted by Reena. Her parents knew of the pregnancy, however. Reena asked that her mother-in-law send *laddu* (a kind of sweet) so they could celebrate, and did, taking little for herself.

Phoowati Devi estimated Reena was 3 at this meeting; while Reena's mother said 2 and a half. Phoowati Devi saw Reena weep but she did not observe Reena when she went inside and covered her head, as appropriate for a daughter-in-law, nor did she hear her say, "My bangles are with you [mother-in-law]," and, "I died in her house," as Reena's mother did. Phoowati Devi was brought by Kailash Kumari. Clues to Phoowati Devi's identity may well have been given.

adev
hreshtha

Reena went to S.B.'s house to see Phoowati Devi. She saw Urmila, S.B.'s wife, (for the second time) and saw Gompti Devi's son for the first time but apparently did not recognize him.

Shyam Babu confirmed she had bangles, but couldn't recall the kind. Age at which she asked this was not ascertained.

adev
bu Yadev

bu Yadev

Three days later Shyam Babu learned his cousin whom he called "elder brother," had died three days before in Tilitila. Reena has never been to Tilitila. Like Item 11 the statement was made while on the roof of her house.

rmed

When in Lucknow we have checked some of the temples in the cremation ground, and have not found pictures of the three gods named.

abu Yadev

When about 9 years old, Reena asked her mother what an operation was and how one was made unconscious and said her husband had had an operation. The Kulshreshthas did not know at the time (as Shyam Babu was at Tilitila when he became ill), then learned through the office that he had had an operation.

asked her mother to accompany her to the home of the lady who lived across the lane from Shyam Babu, one Kailash Kumari Yadev, who had acted as a surrogate mother-in-law to Gompti Devi. At Kailash Kumari's home, Reena would be shy and would not eat the food offered her in Kailash Kumari's presence, just as Gompti Devi had not eaten in her presence, as a sign of respect as for a mother-in-law. When Reena repeatedly asked to visit Kailash Kumari, her mother would oblige her by taking her, but chide her saying, "At home you are always troubling me to bring you here, but when you are here, you are shy."

Reena continued to call Shyam Babu to her house after learning that he had remarried. He did not bring his second wife to Reena's home, "because of how she would feel," but he discussed the situation with his second wife, and they agreed to give Reena material for a long dress as well as bracelets, sweets, toys and some coins.

Gompti Devi had spent a considerable amount of her married life in the home of her mother-in-law in the village of Tilitila, 145 km from Agra. Gompti Devi's children were largely raised by her mother-in-law, Phoowati Devi, after her death. After Reena had declared Shyam Babu was her husband, when Phoowati Devi came to Agra she came in the company of Kailash Kumari to see Reena. To what extent introductions were made that identified Phoowati Devi in Reena's hearing remains unclear. Reena's response to Phoowati Devi was interpreted as a spontaneous recognition of her by Reena's mother: Reena wept upon seeing Phoowati Devi, went inside and covered her head with a cloth, as Gompti Devi and all traditional daughters-in-law do in their mother-in-law's presence. Reena said in her mother's hearing, "I left my bangles in your house. I died in your house." (This phrase is used generally, not just by Reena, to mean "when your daughter-in-law," rather than that the death occurred at her home; Gompti Devi died in the hospital in Agra.) Many other times Reena said she had a particular kind of bangle and four rings, and asked that her father get them for her.

After Phoowati Devi visited her, Reena went to return the visit. This was the second time she went to Shyam Babu's house. When she arrived Gompti Devi's son was there, but Reena did not greet him. Reena's mother felt this was because she was uncomfortable in Urmila's presence. This is the only time Reena has seen any of Gompti Devi's children.

Reena first went with her family to the Taj Mahal when she was about 3 years old. Her father thought this visit was before she had recognized Shyam Babu as her husband, while her mother thought that the trip to the Taj Mahal was perhaps after their meeting. At the Taj Mahal Reena became very upset. She said it was near the place where she had been cremated. Reena had a phobia of the area, and had not been willing to return to the Taj Mahal since. Reena continued to become upset if she heard songs that mention the Taj Mahal, or heard the cremation ground mentioned.

After Reena was in Lucknow when she was about 4 years old she saw a hypodermic needle for the first time when her mother became ill and was given injections. Reena was very alarmed. She continued to have a phobia of injections, and runs away at the mention of a hypodermic needle although she has not had an injection since her birth.

Although Reena did not visit Shyam Babu's house again, she preserved a striking psychic connection with Shyam Babu and his family even when it was in Tilitila. Stevenson (1975a, p. 101) reports that children reputed to have past life memories are sometimes credited in India with extraordinary powers, but he has found no evidence to substantiate this concept. Nonetheless, on three occasions described below Reena told about events relating to Shyam Babu and his family which she had no apparent means of knowing. Two of these events took place in Tilitila. The only other instance in which Reena exhibited ESP also bore some relation to her contact with Shyam Babu.

When about 4 years old Reena said, "Mother, I don't feel like eating because there is some problem in my house." Later the same day she said, "Shyam Babu has been blessed with a son. Tell my mother-in-law to send *laddu* [a kind of sweet] to distribute. Let us celebrate and distribute sweets."

Reena's mother went to Kailash Kumari and inquired if it was true that Shyam Babu's wife had had a son. Kailash Kumari did not know, as Shyam Babu's wife was in Tilitila, but asked Shyam Babu when he returned from work. He said that he had not yet heard any news. As Kailash Kumari and Reena's mother knew, his wife was expecting a child but was in Tilitila. Some days later Shyam Babu received a letter announcing the birth of a son on the day on which Reena had announced the birth. Urmila, Shyam Babu's second wife, said that the birth had been very difficult as the cord was wrapped around the baby's neck.

On another occasion Reena said, "My husband's elder brother died." Three days later Shyam Babu learned, according to Reena's parents, that his cousin, whom he called "elder brother," had died in Tilitila on the day Reena made this statement (Shyam Babu had forgotten this incident).

Reena continued to speak from the point of view of Gompti Devi up until she was about 7 years old, even when in Lucknow. When in Lucknow she named three gods whose pictures she said were in the temple where she was cremated. This statement has not been confirmed. When Reena was about 7, Shyam Babu withdrew from the family, feeling that the attachment of a growing girl for a remarried man as her husband was not to be prolonged.

In February 1985, when Reena was 8 and a half years old (and back in Agra), she asked her mother what an operation was and how a person was made unconscious and said, "My husband has had an operation." Reena's family then learned through the office that Shyam Babu had become seriously ill when he was on leave at Tilitila. He had been hospitalized in Etawah and then transferred to Agra where the operation was performed,

after which he was unconscious for 2 months. Reena announced that he had had an operation before her father had learned this news. Reena went with her family to visit him in the hospital.

Reena's parents reported that on one occasion she had shown extrasensory perception of an event in her own family: In 1979 she predicted that her father, Mr. Kulshreshtha, would be promoted, as he was in 1980. The promotion affected her relationship to Shyam Babu's family as her father was transferred to Lucknow.

Reena was 11 and 12 years old when I investigated and reinvestigated the case and was no longer talking from the point of view of being Shyam Babu's wife. She would not allow me to interview her, although she sometimes answered questions put to her by her parents during the course of our interviews. She continues to show precocity in the housewifely tasks of cooking, selectively shopping for vegetables and other items, sewing and knitting. These skills were markedly developed from the time she was 5. Her mother noted that she could follow directions to knit complicated patterns in sweaters from that age, earlier than her sisters.

Her father remarked that she was never like a child, and she still is more adult than childlike. Her parents report that she is a particularly punctual and methodical person with an excellent memory, who studies before she allows herself to read for pleasure and prefers adult company to that of children. She is well liked at school where she is known as a peacemaker who calms people down when they fight. Reena was then in the sixth grade, in which she was doing well.

Independently we were told by Gompti Devi's husband and mother-in-law that Gompti Devi had these qualities of being a peacemaker, and was very fond of knitting and sewing. Gompti Devi had received an eighth grade education.

When I returned in January 1989, I learned that Reena still related to Shyam Babu as her past-life husband. On December 25th, he was among 400 guests invited to a dinner the Kulshreshthas held in honor of the birth of Mr. Kulshreshtha's first grandson. Reena was eating dinner when Shyam Babu arrived, but on seeing him, she stopped and retired, as a proper Hindu wife should do in her husband's presence.

Evaluation of the Paranormal Features of the Case. Reena made 10 verified statements or acts before meeting Shyam Babu and 15 afterward. Reena correctly recognized three people and two locations related to the previous personality. All of her statements and recognitions were correct, except her statement about the gods at the temple where she was cremated. However, she gave no indication of having recognized Gompti Devi's son. If Reena had been taken to Tilitila during the period when she strongly identified herself as Shyam Babu's wife, her apparent memory of Gompti Devi's life might have received a more thorough check.

This case does not fulfill the criteria of having no contact between the

subject and the previous personality's family. Aside from Reena's apparent foreknowledge of the day and difficulty of the birth of Urmila's son, the death of Shyam Babu's cousin, and Shyam Babu's operation, the information contained in the statements Reena made was either within the scope of her parent's knowledge or potentially so. Reena's father had been told the cause of death of Shyam Babu's wife, although Reena's mother only recalls being told that she had died leaving small children behind, which caused Mrs. Kulshreshtha to feel sorry for Shyam Babu's family.

Mr. Kulshreshtha and Mr. Yadev did not have a great deal of contact as they worked in separate buildings across the road from each other. Neither Mr. nor Mrs. Kulshreshtha had met Shyam Babu's first wife, but other people in the Telecommunications office doubtless had and knew where they lived.

The striking features of the case are Reena's intense identification of herself as a married woman, her description of her death in a previous life, her search for a likeness of her husband at an early age, her phobia of injections and the cremation ground and her apparent foreknowledge of events related to Shyam Babu's family. Their is no apparent motive for her to identify herself as the wife of a lower caste colleague of her father.

Case 2: Ashok Kumar Shakya of Ritaur

The informants for this case in Ritaur were Ashok Kumar Shakya, his mother and father Mr. and Mrs. S. B. Shakya, and his brother Awadesh. In Bandha the informants were the late Kishen Behari's eldest son Laxmi Narain Jatev, Kishen Behari's widow Savitri Jatev, Kishen Behari's brother Bhateshwar Dayal Jatev, Kishen Behari's father's younger brother Shyam Lal, the latter's wife Gian Shri, Kishen Behari's mother Teeja Jatev, and the head man of Bandha, Udal Singh.

Ashok Kumar is the third and youngest son of Shyam Babu Shakya and Chandra Wati of the village of Ritaur, District of Etawah, in Uttar Pradesh. Ritaur has a population of approximately 5,000. According to his parents, he was born at home on August 16, 1982. Ashok Kumar's brother Awadesh is 11 years his senior and his brother Sarvan is 9 years his senior. They have no sisters. His father, S. B. Shakya, has a high school education and taught school before joining the army. He was unsuccessful in a competition and returned to farm his ancestral land. The Shakyas are of the Kshatriya caste.

At the time of our first investigation he had just turned 5, and then, as at the time of my second investigation, was still talking from the point of view of being a married man and the father of five children. When I visited him in January 1989, his father reported that he was saying less as a result of being teased for being a *chamar* or untouchable.

When Ashok Kumar was still unable to talk, he would sometimes mime limping. As he grew more verbal, which he did quickly, he once became annoyed at his mother and said, "I will not stay with you. I will go to my

own house. There I have all my family." When asked the name of his village, at first he answered by trying to walk towards it, limping; then he said "Bandha" and then that he was from the village of Bandha. His mother noted that he spoke very clearly in an adult fashion from an early age, and had only recently, at the age of 5, started speaking falteringly in the language of a child of his age.

Over time, Ashok Kumar said he had a wife and five children and was most concerned about whether they had enough to eat. He continually asked his parents to take him to see them. He would often say of things he saw at his parents' house, "My wife doesn't have this. Go and give it to her." He frequently would ask his mother to put aside her work so they could talk about his family. Table 2 lists Ashok Kumar's statements, recognitions and related behavior.

When the police were mentioned, Ashok Kumar said he was afraid of the police and repeatedly said the chief of police had beaten him with a stick after he had been in a fight near the fields. "If I happen to meet him I can recognize him and will beat him now," Ashok Kumar told his mother. Ashok Kumar told his father, "Let's go to the police station—you, me and Awadesh—and we will beat the policeman who is in charge."

Ashok Kumar continued to mime limping and frequently told his parents, "I came limping, limping to your house." He told us, "When I died, with great difficulty I found the house of my mummy [Chandra Wati] and she has walls of mud like this and I held onto those walls to walk and then only I entered the house of my mummy. . . . I started from there [Bandha, at death] and reached here at birth." In 1988 he added, "I came over here limping, limping. I found one door was closed. I found another door was closed. Then I found this door was open and I entered."

After Ashok Kumar had persisted in asking to go to his family in Bandha, his parents came to conclude that their son was remembering a past life. They thought he was from a good family because he used proper and polite terms of address for relatives, terms not used by his parents. Ashok Kumar's mother was familiar with the phenomenon of children claiming to be someone reborn because a girl, now about 29 years old, had identified herself as the reincarnation of Chandra Wati's sister who had died at the age of 5. However, Ashok Kumar's parents were annoyed at his continued demands to be taken to his family and tried to make him forget by, as his father said, "beating him and scolding him very badly." However, this did not have the desired effect. Ashok Kumar would be annoyed and would not eat for as much as 2 to 3 days.

On January 2, 1987 Ashok Kumar had not eaten for the whole day. When his brother Awadesh returned from school at 4:00 p.m., Ashok Kumar insisted, "I will only eat if you take me to my village. Let's start out from the road. There will be a railroad crossing, then there will be a canal bridge and near that is a small pond. Just near there I have built my own room and my wife is staying there. Take me to my home."

Awadesh and his parents thought Ashok Kumar was referring to a town named Bandha they knew of at some distance from Ritaur. Awadesh and Ashok Kumar set out that day and were joined by two boys, Kuldeep and Bablu. They carried Ashok Kumar on a bicycle but instead of pointing out the road to the town of Bandha, Ashok Kumar pointed out the route he thought they should take across the fields. As they got closer to a village Ashok Kumar got off the bicycle saying, "My village is there," and led the way.

The village of approximately 250 people that Ashok Kumar took them to (indeed called Bandha) is about 4 km from Ritaur this back way across the fields. To get to Bandha by road, one must go from Ritaur to Ekdil, from there to Etawah, and then on the road north which takes one over the railway crossing, and across the canal bridge, as Ashok Kumar had said. The last 2 km to Bandha are impassable except on foot. This road route is a total of 18 km.

No member of Ashok Kumar's family had ever been to this village of Bandha before. Until Ashok Kumar arrived at Bandha, none of the people we interviewed there had heard anything about him. The villagers of Bandha were aware of the larger village of Ritaur, but those we interviewed had no links with it. The closest market center to Bandha is Etawah, whereas the closest market center to Ritaur is Ekdil. Word that Ashok Kumar spoke of a past life had reached Ekdil, where an associate of Stevenson's had noted the case.

Outside the village, Awadesh asked a woman taking goats to the field, "Is there any man who died here? Maybe murdered, maybe hanged by bad people?" The woman said, "No," and they walked on. Ashok Kumar told his brother, "She is my mother." Awadesh scolded him saying, "You should not call everyone your mother." In the village Ashok Kumar went straight to the house of the late Kishen Behari Yadev and said, "This is my house."

A large crowd had gathered, and the village head man, Udal Singh, came up and took charge. Wanting to check the truth of Ashok Kumar's statement, he said to Ashok Kumar, "No, this is not your house," and took him around the village suggesting other houses, some much more substantial, were his. Again Ashok Kumar stopped in front of Kishen Behari's house and said, "This is my house. I constructed this house." Udal Singh called Kishen Behari's widow, Savitri, and said to her, "Come here. Probably your dead child has taken birth."

Ashok Kumar went up to Savitri and laughed, and she took him on her lap. He kept staring at her. She thought he was perhaps one of her two children who had died after her husband, but Awadesh said, "It's not your child. He keeps saying, 'I have five children and a wife,' so maybe your husband has taken birth." Someone in the crowd asked Ashok Kumar, "Who is she?" and he answered, "She is my wife." She then touched his feet and he did not object. This was considered an indication that he saw her as his wife.

TAB
Summary of statements and recognitions

Item	Informants	Ve
1. He mimed limping.	Shyam Babu Shakya, Ashok Kumar's father; Chandra Wati Shakya, Ashok Kumar's mother	Gian S Beha fath brot Not ve Savi Kish wido Teej Kish
2. He said he had his own house and family.	Chandra Wati	Savitri
3. He said he was from Bandha.	Chandra Wati	Savitri
4. He said he had a wife and five children.	Awadesh Shakya, Ashok Kumar's eldest brother	Laxmi Kish elde
5. He persistently asked his parents to give food to his wife as she didn't have enough.	Chandra Wati	Savitr
6. He said he was afraid of the police as the chief of police had beaten him after he was in a fight.	Chandra Wati Shyam Babu Shakya Awadesh Shakya	Laxm Gia

TABLE 2
nitions and behavior of Ashok Kumar Shakya

Verification	Comments
Gian Sri, Kishen Behari Yadev's father's younger brother's wife	Ashok Kumar did this when he could first walk, before he could talk. Gian Sri said Kishen Behari could not stretch his legs in his final illness (08/15/87).
Not verified by Savitri Jadev, Kishen Behari's widow, and Teeja Jatev, Kishen Behari's	Savitri Jadev and Teeja Jadev did not think anything was wrong with Kishen Behari's legs (01/08/89).
Savitri Jadev	Ashok Kumar said this when annoyed at his mother, when about $2\frac{1}{2}$ years old.
Savitri Jadev	When first asked the name of his village, Ashok Kumar tried limping to it; later he said, "Bandha," and then that he was from Bandha. He said he had come limping from Bandha to his mother's house.
Laxmi Narain, Kishen Behari's eldest son	Kishen Behari Jadev had five children at the time of his death. Afterwards, the two youngest children died. Ashok Kumar seems to be unaware of these deaths. Ashok Kumar told me he had five sons. This is incorrect. The youngest of Kishen Behari's children was a girl.
Savitri Jadev	
Laxmi Narain, Gian Sri	Ashok Kumar wanted his father and elder brother to go with him to beat the chief of police whom he said he could recognize.

7. He refused to eat when scolded for asking to be taken to Bandha.	Chandra Wati Shyam Babu Shakya	
8. He described features on the way to Bandha, such as a railroad crossing.	Awadesh Shakya	Observ
9. A canal bridge.	Awadesh Shakya	Observ
10. A small pond.	Awadesh Shakya	Observ
11. He pointed out the way to Bandha.	Awadesh Shakya	Awade
12. He recognized the village when it was within sight.	Awadesh Shakya	
13. He said he had built his own home where his wife lived.	Awadesh Shakya	Savitri
14. He identified Kishen Behari Jadev's mother as his mother.	Awadesh Shakya	Teeja J
15. He recognized his house.	Awadesh Shakya Udal Singh Laxmi Narain Jadev	Udal S man
16. He recognized Savitri Jadev as his wife.	Savitri Jadev	

	He would refuse to eat for "two or three days."
Observed by author	This is en route by road.
Observed by author	This is en route by road.
Observed by author	This is en route by road.
Awadesh Shakya	Ashok Kumar's parents thought he was referring to another Bandha, and did not know of the existence of the other. However, the two village boys, Kuldeep and Bablu, who accompanied Ashok Kumar and his brother, had heard of it (but never been there). Although Bandha is only 4 km. from Ritaur, it is on a different road system and none of Ashok Kumar's family were aware of its location or had been there previously.
Savitri Jadev	
Teeja Jadev	Ashok Kumar identified a lady Awadesh Shakya spoke to outside the village as his mother. Awadesh later verified that she was the mother of Kishen Behari Jadev.
Udal Singh, head man of Bandha	Udal Singh tried to persuade Ashok Kumar that other houses were his but Ashok Kumar again went to Kishen Behari's house (after being taken on a tour of the village) and said he had constructed it, which was true.
	Udal Singh said Ashok Kumar was her child reborn but Awadesh said he spoke of having a wife and five children. When asked who Savitri was, he said she was his wife.

(*continued*)

TABLE

Item	Informants	
17. He recognized his eldest son.	Laxmi Narain Jadev	Lax J
18. He called the eldest son "Rakesh."	Laxmi Narain Jadev	Not
19. He recognized Bhateshwar Dayal and called him by name.	Awadesh Shakya	Bah D F
20. When taken from Bandha, Ashok Kumar resisted.	Laxmi Narain Jadev	
21. He recognized a road he had made.	Chandra Wati Shakya	Ver C
22. He recognized the place where he had been sick.	Chandra Wati Shakya	Ver C
23. He used to take baths in the canal with his wife.	Chandra Wati Shakya	Sav
24. He expected his wife to treat his mother as a mother-in-law.	Chandra Wati Shakya	Sav
25. He recognized his *mama* (mother's brother).	Awadesh Shakya	Bh
26. He recognized Mathura Prasad.	Bhateshwar Dayal	

ABLE 2 (*continued*)

Verification	Comments
Laxmi Narain Jadev	When Ashok Kumar asked for his eldest son, anyone coming forward could be construed to be identifying himself as such.
Not correct	Seven months later Ashok Kumar still gave the incorrect name "Rakesh," for Laxmi Narain. By 01/08/89 he was calling him by the correct name.
Bahateshwar Dayal, Kishen Behari's brother	
Verified by N. K. Chadha	
Verified by N. K. Chadha	I failed to ask if Kishen Behari had been sick first by the pond.
Savitri Jadev	Ashok Kumar not only mentioned this to his mother as they passed the canal, but invited his wife to go with him.
Savitri Jadev	Ashok Kumar asked Savitri to make food for his mother and brothers, and told his mother to take her back and she will cook for her, forgetting caste differences which mean the Shakyas do not take food from the Jadevs, as untouchables.
Bhateshwar Dayal	Kishen Behari's *mama* slapped Ashok Kumar's knee in greeting at Bandha. At Ritaur he said that was his *mama,* and when checked, they found that Kishen Behari was close to this man and called him *mama,* although he was a village *mama* (or mother's brother) rather than an actual one.
	Ashok Kumar's reported words were that he had seen this man cutting grass on his first trip to Bandha. If Ashok Kumar gave his name, we have not recorded

27. He recognized his brother-in-law.	Shyam Babu Shakya
28. He recognized his sister's husband's brother.	Bhateshwar Dayal
29. Ashok Kumar was distressed that his mother does not give more jaggery to "my brother."	Chandra Wati Shakya
30. He identified area where he was beaten by five people.	Ashok Kumar
31. He asked that they bring a *dothi* [cloth] for his wife, and later says he cannot take her home until they do.	Ashok Kumar
32. He identified spot where he had buried some money.	Shyam Babu Shakya

	this. Thus what was assumed to be a recognition could have been merely a correct observation.
	When the brother-in-law visited him, Ashok Kumar said he had given his goat back, but did not name the brother-in-law. Kishen Behari had returned the goat lent by his sister and brother-in-law, when he was ill. He then fell ill again and died.
	Recognition took place after Ashok Kumar was asked if he remembered returning the goat to his house. Thus mention of something Kishen Behari had done triggered Ashok Kumar's memory, although it is possible that Ashok Kumar learned of the goat incident after going to Bandha.
Verified by N. K. Chadha	As this was said after we left Bandha, it was not verified by the people from Bandha.
	As Ashok Kumar's father notes, his main attraction in for his wife.
Unverified	Ashok Kumar's parents asked that no verification be made as they suspect that in burying the money Kishen Behari had disturbed a discarnate being who is responsible for his death, and they fear it may attack Ashok Kumar as well. By 01/08/89 Kishen Behari's relatives have heard of this statement, but doubt its veracity, saying Kishen Behari had no money to bury.

Ashok Kumar called for his eldest son, who came, and was recognized by him, but when asked his name he said, "Rakesh." In fact Kishen Behari's eldest son's name is Laxmi Narain. Ashok Kumar persisted after three subsequent visits in calling him by the wrong name. The name Rakesh has no special significance to Savitri's family.

Kishen Behari's mother heard what was happening and returned from the fields where she had taken the goats; she was the woman that Ashok Kumar had told his brother was his mother as they approached Bandha. Someone asked Ashok Kumar who she was and he said, "My mother," but not in her hearing. She took Ashok Kumar on her lap and asked, "Am I your mother?" He did not say anything, but she said that he answered with his eyes that she was. In fact he had already recognized her.

On this first trip to Bandha Ashok Kumar is said to have recognized Kishen Behari's *chacha* [father's younger brother] Shyam Lal and Kishen Behari's younger brother Bhateshwar Dayal whom he called by name. When it was time to leave, Ashok Kumar told Awadesh, "You go. I will stay here." When they took him with them, Ashok Kumar cried. The relatives of the late Kishen Behari Jatev (as well as Ashok Kumar's relatives) were convinced that Ashok Kumar Shakya was Kishen Behari Jatev reborn.

Kishen Behari Jatev had in fact died in the month of Phaghan (February 12–March 12) in about 1981 when about 45 years old, we learned from interviewing his brother, wife, son, mother and *chachi* [father's younger brother's wife]. He had been a laborer without land who had worked for other farmers. He was a member of the lowest or *chamar* caste formerly considered outside the caste system or "untouchable." Once Kishen Behari had become involved in a fight over who owned some land he had been hired to work and was subsequently caught by the chief of police, who beat him.

Kishen Behari was described as a hard-working man who had been quite unhappy being a laborer only able to earn enough money for food for the day. Shortly before he fell ill he had built a small mud house for himself and his wife and five children. He had fallen ill, grew better, then worse and after an illness of 15 days, died with one leg paralyzed from the illness. Three or 4 days after his death, Kishen Behari's brother Bhateshwar Dayal reported that he appeared to him in a dream saying, "Why are you weeping? I have come to you."

On March 26, 1987 Ashok Kumar made a second trip to Bandha, in the company of his mother and two brothers. As they approached the village, Ashok Kumar pointed out where he had been beaten by the police, the road he had worked on, the canal where he and his wife took baths after slipping out of the village, and the pond near which he had fallen ill with vomiting and diarrhea. Once at Savitri's house, Ashok Kumar told her to prepare food for his mother and brothers, and suggested that his mother take his wife home as her daughter-in-law. However, both Savitri and Chandra Wati

know the Shakyas will not eat food cooked at the home of such low-caste people. Ashok Kumar spoke intimately to Savitri as a husband to a wife, saying, "Stop the mother over here and we will go to take a bath in the canal as we went earlier in the night." Savitri responded, "Stop these things. Don't talk like this," but later asked him, "Won't you take me back with you?" to which Ashok Kumar replied, "Not this time. Next time when I bring clothes for you I will take you." As Ashok Kumar left he stopped at Bhateshwar Dayal's house. There a man slapped Ashok Kumar's knee in affection, asking, "Don't you recognize me?" At that time Ashok Kumar did not respond, but when he returned to Ritaur Ashok Kumar said, "He was my *mama* [mother's brother]." Later when Kishen Behari's brother came to Bandha to visit Ashok Kumar, he confirmed that he and Kishen Behari called this man *mama,* although he was a classificatory or village mother's brother rather than an actual one. The witnesses felt that Ashok Kumar could not have learned this identity while at Bhateshwar Dayal's, although I would not rule out this possibility. This *mama* and Kishen Behari had been particularly close.

Between January and mid-August 1987, Bhateshwar Dayal and Laxmi Narain and various other relatives of Kishen Behari visited Ashok Kumar in Ritaur three times. Ashok Kumar said to Mathur Prasad, a friend of Kishen Behari's who came with Bhateshwar Dayal, "When I came to my house the first time you were cutting grass for the cattle." This was indeed true. He did not recognize Kishen Behari's sister's husband's brother until Bhateshwar Dayal prompted him saying, "Do you remember you took a goat to his house?" Ashok Kumar said, "Yes. Now I remember you." Again, one cannot confidently rule out normal means of Ashok Kumar arriving at this information.

On one of these visits, after the Shakyas had given some brown sugar candy to Bhateshwar Dayal, Ashok Kumar came crying to his mother saying, "You have so much jaggery here and you gave so little to my brother."

After going to Bandha, Ashok Kumar once beat his mother to try to get her to give millet to his family. Once when asked to eat Ashok Kumar said to his father, "Give *rasaya* [a dish made of cane sugar and rice] to my son and then I will eat." They told him they would send *rasaya* and then he ate. Another time he told his father, "Give *bajara* [millet] to my son because he is feeling cold." Ashok Kumar's father was struck by this statement because, "A child his age would not know that the composition of *bajara* is hot."

We took Ashok Kumar and his mother and brother Awadesh to Bandha on August 18, for what was Ashok Kumar's third trip, and observed his familiarity with Savitri and Kishen Behari's relatives. As we walked to the village, Ashok Kumar pointed out where he had worked and where he had been beaten and where he had become ill. As we returned I asked him if that was from the beating. Ashok Kumar said, "I got sick and I vomited and got a fever. I went to the doctor and I used up all my money and I was still sick. I

borrowed money and went to the doctor but I got worse and I died. Then I was limping, limping. My knee was broken from the sickness."

Kishen Behari's relatives seemed reluctant to answer my question about whether there was any association between the police beating and his death. However, some were clear that Kishen Behari's knee and leg were not affected by his fatal illness. This description fitted the information we had gathered in Bandha previously, in Ashok Kumar's absence, but by this time Ashok Kumar could well have heard a description of Kishen Behari's death.

On return from his third trip to Bandha, Ashok Kumar told his mother that he had buried some money near the pond at Bandha and he fell ill over there. From this his parents suspected that he had disturbed an evil spirit, by which they meant a discarnate soul who lurks around the pond, and that this had caused Kishen Behari's illness and death. The father asked that no verification be made of the buried money because he is afraid the evil spirit will pounce on Ashok Kumar and "I will lose my child."

When I returned in the summer of 1988, I learned that Ashok Kumar had been invited to the wedding of Kishen Behari's eldest son. He went in the company of Awadesh, and refused to return home, so Awadesh left him in Bandha over night, he and his mother fetching Ashok Kumar back the following day. He has not apparently made any further statements that were identified as being information that Kishen Behari knew and Ashok Kumar could not be expected to, although the conviction of Kishen Behari's relatives that Ashok Kumar is Kishen Behari is by now so complete that they would not necessarily note new revelations made by him.

Evaluation of the Paranormal Features of the Case. Ashok Kumar made 12 verified statements before going to Bandha or en route and 12 after arriving. He recognized eight people and correctly identified four locations. However, he gave the wrong name for Laxmi Narain, and persisted for some time in thinking he was named Rakesh. His statement to me that all his children are sons is also incorrect. In fact the youngest child of Kishen Behari was a girl who died, as did her next elder brother, after Kishen Behari's death. Ashok Kumar is apparently not aware that two of Kishen Behari's children have died.

To Westerners it seems extraordinary that the density of villages in this part of India could mean that people in one village would not know of the existence of another one 4 km away. However, I have found no one who does not concur that this was the case. If true, then Ashok Kumar had no normal means of knowing about a man from Bandha with a wife and five children who had been beaten by the police and died, and no motive for identifying with such a person.

Case 3: Toran Singh, Alias Titu, of the Village Bad

The informants for this case at Bad were Toran Singh, his father Mahavir Singh, his mother Shanti Devi, his brother Ashok Kumar Singh, and Nardev

Singh (a friend of Suresh Verme). In Agra, the informants were Suresh Verme's wife Uma Verme; his brothers Mahesh Verme, Raja Babu Verme, Rajvir Babu Verme, and Om Kar Singh; his father Chanda Babu Singh Bharity; and his mother Burfi Devi Singh.

Toran Singh, called Titu, is the youngest of the six children of Mahavir Prasad Verme Singh and Shanti Devi of the village of Bad (population about 1,000), which is 13.5 km from Agra. Titu's eldest brother, Ashok Kumar, is about 13 years his elder; next is Titu's other brother, Raj Kumar, about 10 years his senior. Titu's eldest sister, Asha, is about 8 years his senior; the second sister, Kunta, about 6 years his senior, and the third sister, Guloo, was said to be somewhere between 1 to 3 years his senior. There do not appear to be any records of the exact birthdates.

Titu's father and his family are of the Vaishya caste and own considerable agricultural land around Bad which they farm. However, Mahavir Singh goes every school day to Agra where he teaches chemistry in grades 11 and 12 in Hubbulal Inter-College. Titu lives with his family in a substantial single story traditional cement house.

Titu's mother was ill the last trimester of her pregnancy with Titu and was admitted to the Military Hospital in Agra about a week before his birth under the name of a friend of the family's who was a member of the military personnel and therefore eligible to use this hospital. The only registration of a birth corresponding to the name of this friend and Titu's mother gives December 11, 1982, as the date of birth. It is possible that Titu's birth was not registered, and/or that the December 11, 1982 date corresponds to the birth of the friend's child. Titu's parents thought he was 4 and a half rather than 3 and a half in 1987, although Titu's father gave his birthdate as December 10, 1983, the first time we met before the hospital search.

According to Shanti Devi, Titu began talking when he was a year and a half, earlier than the rest of her children. Shortly thereafter Titu told her, "Tell my grandfather to look after my children and my wife. I am having my meals here and I am worried about them." When his mother asked, "Who are you?" Titu said, "I am from Agra. I don't know how I came here."

At an early age Titu also began saying, "Mummy, please don't go out in these clothes. I feel embarrassed by them. My wife had beautiful saris." Titu made a number of other complaints. He said, "Your house is dirty. I will not stay. My house is very big," and "My sisters-in-law are educated," and "My brothers had beautiful shirts which you have not seen." When he was expected to walk or go on a bus, Titu would say, "I used to go by car. I will not go on foot or in a bus."

When Titu was very young, he went with his family to a wedding in Agra. As they traveled to Agra, Titu said several times, "I have a shop in Sadar Bazaar," although they did not go near this district of Agra. His parents paid no attention to this remark at the time.

As Titu grew older he would cry almost every day, wanting to "go home." He commonly referred, as he continues to do, to his parents as "Guloo's

mother and father," rather than calling them his own. He frequently asked to go see, "My brother Raja Babu and my sister Susheela," particularly when scolded. Titu complained to his father, "You go every day to Agra but you don't bring any news of my family."

One day in April, 1987, Titu was crying very bitterly as his father once again left for Agra without him. A friend of Titu's eldest brother took him on his lap, and Titu said, in his brother's hearing, "My father doesn't take me. Can you take me there? I have a shop of transistor radios and I was a big smuggler and *goonda* [someone who uses force to get his way]. I am the owner of Suresh Radio."

After this, Titu's eldest brother and his friend sought out the Suresh Radio shop, which turned out to be in Sadar Bazaar in Agra. They had never been to the shop before. They told Uma Verme, the widow of the owner, what Titu had been saying. They learned that Suresh Verme, the owner of Suresh Radio (and a noted smuggler on the black market) had been shot dead August 28, 1983 in his car. He was about 30 years old.

Uma Verme related this to Suresh's family, and shortly thereafter they set out to visit this child. At first they went to the Bad which is near Mathura. They could not find any child meeting Titu's description, and then learned that there was another village called Bad on the other side of Agra. A party consisting of Uma Verme, Burfi Devi (Suresh's mother), Suresh's father (Chanda Babu Singh Bharity), and three of Suresh's four brothers (Rajvir Babu Verme, Mahesh Verme, and Raja Babu Verme) arrived in Bad early one morning in April, 1987.

When Titu saw the party approach, he was very excited. He recognized Uma Verme, Suresh's father and mother and two of the three brothers. He correctly described a trip he had taken to Dolpur with Uma and the children whom he called by their nicknames, Mono and Tono, and the *chatt* and *kulfi* they had eaten. Titu asked why his children had not been brought. When queried Titu correctly described how he [Suresh Verme] had been killed, saying, "While I was near my house, three people stopped me. One shot me and then they ran off. I did not see their faces." When asked where he was shot, Titu said, "They came from the left side and after shooting ran away." Titu described Suresh's home and some of its unique features, such as its shape, the placement of lamps, and a room "which remains locked."

Titu accompanied the Vermes as they went to the road and noted that they had not brought his car. "This is not my car. My car was white," he said. He played the tape deck in the car, although he had not previously seen one, and insisted on driving the car, which he did with Raja Babu's help, working the brake, gas and clutch pedals. When the party left, Titu wanted to go with them and threw his shoes at his mother Shanti Devi saying, "I am not yours. You are not my mother." In all of this excitement, Titu did not greet Suresh's brother Mahesh Verme, although neither did Titu deliberately slight him. Nonetheless, Mahesh Verme was hurt at not being acknowledged. Table 3 describes Titu's statements, recognitions and behavior.

Later that day Raja Babu Verme returned with two sisters of the late Suresh Verme. When Titu saw Susheela Devi, he said, "Susheela *Gigi,* Susheela *Gigi.*" [*Gigi* means "sister."] Asked which was his elder sister, Titu said neither was. In fact Suresh's eldest sister is Munni Rani, who was not present.

Taken that afternoon to Suresh's brothers' radio and TV shop, Titu insisted it was not his, although Raja Babu tried to mislead him by claiming it was Suresh Radio. He was then taken by car to Suresh Radio, which is about 100 yards away. Titu said, "This is my shop." Inside Titu said, "This showcase was not here; who got it constructed?" Indeed the showcase he was indicating had been built and installed after the death of Suresh.

Titu identified a large, garlanded photo of Suresh on the wall as himself. He also identified the cash drawer (which looks like any of a number of drawers behind the counter in the shop), and recognized the manager of the shop by name.

Titu was then taken to the home of Chanda Babu Singh Bharity, Suresh's father. He said it was not his house [*kothi*]. This was interpreted by Mahesh to mean Titu did not recognize the house, while other members of Suresh's family interpreted this statement, I think correctly, to mean that it was not Suresh's home. Suresh Verme and Uma Verme had lived in their own modern house [*kothi*] which was the one Titu had described to Uma Verme earlier in the day and to which he apparently expected to be taken.

At Chanda Singh Bharity's home, Titu told Suresh's mother, "I am just passing through with these people who do not have a T.V., a car, a video. I will run away to you." When Titu's father, Mahavir Singh, tried to take him home to Bad, Titu hugged Suresh's father, and fought Mahavir Singh and tore his shirt. Chanda Singh said, "Son, go. I will come see you."

Suresh's relatives noted that day that Titu has a small round birthmark that looks like a bullet entry wound, at the site on the right temple where Suresh was shot (see Figure 1). They conjectured that several small birthmarks on the back of Titu's skull might be the bullet exit site. Suresh's mother and wife noted that Titu also has another birthmark on the crown of the head that corresponds to one which Suresh Verme had at birth (according to his mother) and at death (according to his wife).

According to Suresh Verme's postmortem report, which we examined at the hospital where he was declared dead, the bullet that took his life entered on the right temple at the site corresponding to Titu's circular birthmark. The postmortem report said that the bullet exited behind Suresh's right ear. After noting this, I returned to Titu and examined behind his right ear and found that Titu's skull is pushed out at the site indicated as the bullet exit site (see Figure 2). Titu's parents had noted this deformity of the skull, but had not associated it with Suresh's death. Titu had not mentioned the mode of death of Suresh until asked by Rajvir Babu Verme at their first meeting. This is noteworthy, as 77% ($p < .05$) of the subjects in solved cases in India mention the previous personality's mode of death, and 98% ($p < .05$) when

Summary of statements and recogn

Item	Informants	
1. He said he had a wife and children.	Shanti Devi Singh, Titu's mother	Uma Ver
2. He said he was from Agra.	Shanti Devi	Chan Sur
3. He said his house was big.	Mahavir Singh, Titu's father Shanti Devi	Obser
4. He is embarrassed by his mother's clothes.	Shanti Devi	Obse
5. He says his wife has beautiful saris.	Mahavir Singh	Obse
6. He says his sisters-in-law are educated.	Shanti Devi	Chan
7. He says his brothers have beautiful shirts.	Mahavir Singh	Obse

TABLE 3
recognitions and behavior of Toran Singh, Alias Titu

Verification	Comments
Uma Verme, Suresh Verme's widow Chanda Babu Bharity, Suresh Verme's father	Shanti Devi said Titu was about a year and a half.
Observed by author	He also said, "This house is dirty, I don't know how I came here." Titu's parents' house is not dirty but a large cement village or country style house where cooking is done on a floor hearth. Suresh's parental home has three stories and modern amenities, e.g. TV, and a cooler. Suresh Verme's own home is modern. Note that there is no socioeconomic difference between Titu and Suresh's families. Both fathers were lecturers. Suresh's father notes that Titu's family has considerable agricultural land and is related to the royal family.
Observed by author	Shanti Devi was wearing older cotton saris three of the four times I saw her.
Observed by author	The three times I saw Uma Verme she was wearing very nice chiffon style saris appropriate for a wealthy business woman.
Chanda Babu Singh Bharity	Mahesh Verme's wife has two post high school degrees, first class. I did not inquire about the education of the other sisters-in-law.
Observed by author	Raja Babu particularly, but also Mahesh and Rajvir Verme wore stylish synthetic shirts, while Titu's brothers wore plain cotton ones.

8. He said he had a sister named Susheela Devi and 9. a brother named Raja Babu.	Shanti Devi	Char
10. He said he would not go by bus or on foot.	Mahavir Singh	Mah
11. He said he had a shop in Sadar Bazaar.	Mahavir Singh	Uma
12. He cried daily to go to his family.	Shanti Devi A. K. Singh, Titu's eldest brother	
13. He said, "I have a shop of transistor radios."	A. K. Singh	Uma Ve
14. He said he was a big smuggler and a *goonda* (someone who gets things by force).	A. K. Singh	Info
15. He said he was the owner of Suresh Radio.	A. K. Singh	Uma

Chanda Babu Singh Bharity	Titu asked to see them often, saying he would tell his sister Susheela or brother Raja Babu, when he was scolded. (Titu gave an example of this behavior when we first visited him, telling the taxi driver he would tell Raja Babu the driver would not let him in the car, saying, "and he will set you straight," but this is after meeting Suresh's family.)
Mahesh Verme	Mahesh Verme indirectly said it was like Suresh to refuse to go by foot. I did not specifically ask whether Suresh had an aversion to going by these means, but as a prosperous man with a foreign car, that is likely.
Uma Verme	Titu first said this when very small when he was taken to Agra for a wedding, although they did not pass near the Sadar Bazaar. He repeated this statement several times when very young. Suresh Radio is in Sadar Bazaar. He said to his father, "You go daily to Agra but you don't bring any news of my family."
Uma Verme, Suresh Verme's widow	
Informants in Agra	While Suresh's family did not mention smuggling, understandably, other residents of Agra confirmed that Suresh was noted for dealing on the black market.
Uma Verme	

(*continued*)

Item	Informants	
16. He recognized Burfi Devi as his mother.	Burfi Devi, Suresh's mother	Cha
17. He gave the nicknames of his children.	Mahesh Verme Suresh's third brother. Rajvir Verme, Suresh's second brother.	Uma
18. He recognized Chanda Babu Singh Bharity.	Chanda Babu Singh Bharity	Cha
19. He recognized Uma, Suresh's wife.	Uma Verme Mahesh Verme Chanda Babu Singh Bharity Burfi Devi	Uma
20. He described a trip he had taken to Dolpur with Uma and the children.	Chanda Babu Singh Bharity	Uma
21. He said they had eaten *chatt* and *kulfi* on that trip.	Chanda Babu Singh Bharity	Uma
22. Titu asked if the children were at home or studying at school.	Shanti Devi	
23. He described his house, giving details of the shape, and the lights.	Uma Verme	Uma

TABLE 3 (*continued*)

Verification	Comments
Chanda Babu Singh Bharity	Suresh's parents said Titu hugged her, called her "Mataji [dear Mother]," sat on her lap, and they both cried. Rajvir Verme said his mother wept, but was not sure Titu had. Mahesh Verme, the brother who was not greeted, denied that Titu had "properly" recognized Suresh's mother.
Uma Verme	Titu had asked, "Why didn't you bring my children?" Asked if he had any, he said, "Mono and Tono," the nicknames of Suresh's sons, Sachin Singh and Amit Singh.
Chanda Babu Singh Bharity	Shanti Devi recalled that both Titu and Chanda Babu Singh Bharity wept. Titu hugged him and called him "Papaji [dear Father]."
Uma Verme	Titu was asked, "Who is she?" by Suresh's father.
Uma Verme	Rajvir Verme recalled that Titu had said they went to Dolpur because his sister was living there (correct). I have not yet asked if anyone else heard this.
Uma Verme	The query contains no new evidence. At the time of Suresh's death they were preschool age.
Uma Verme	Uma called this "confidential things." The lights were custom made.

24. He said a room in the house was kept locked.	Mahesh Verme	Mahes
25. Titu recognized Rajvir Babu.	Rajvir Singh Verme, Suresh' second brother	Chand Bhar
26. Titu recognized Raja Babu.	Mahesh Verme	Raja B
27. He said he was shot.	Rajvir Babu Verme Uma Verme	Postm
28. He said he was shot from the right.	Mahesh Verme	Postm
29. He says they have not brought his car.	Uma Verme	Uma V
30. He said his car was white.	Uma Verme	Uma V
31. He insists he can drive.	Chanda Babu Singh Bharity	Chand
32. He plays the tape deck in the car.	Mahesh Verme	Mahav
33. He asks to see his sister in Delhi.	Rajvir Verme Shanti Devi Chanda Singh Bharity	Rajvir
34. He recognizes Suresh's sister Susheela.	Chanda Babu Singh Bharity	

Mahesh Verme	One room was kept locked with scrap material inside. He used the word *kothi* for his house.
Chanda Singh Bharity Bharity	
Raja Babu Verme	Titu called him by the name Suresh used, "Raghubhaya."
Postmortem report	Titu had not mentioned the mode of death before he was asked. He then described Suresh murder in detail, some of which has never been verified.
Postmortem report	Once Mahesh said left, but he said right two other times.
Uma Verme	Suresh Verme had a Fiat. They came in a Maruthi.
Uma Verme	The Fiat was white. This is the car in which he was murdered. They insist the Maruthi was his, but Titu insists it is not.
Chanda Babu Singh	Titu insisted on trying, working the gas, clutch, and brake petals and steering, and drove it slightly with Raja Babu's help. Raja Babu noted Titu's and Suresh's common passion for cars.
Mahavir Singh	Titu had never seen a tape-deck or tape recorder before, but worked it on his own.
Rajvir Verme	Titu was then told his sister who lives in Delhi was currently in Agra and he told them to tell her to come see him.
	He said, "Susheela *Gigi* [sister]." His own he does not call by this kin term but by name only.
	The informant was not a witness to this, and I failed to check this with the first-hand witnesses of this item.

(*continued*)

Item	Informants	
35. He refers to his parents as "Guloo's father," and "Guloo's mother."	Mahavir Singh	
36. He notes "his" eldest sister is not present.	Chanda Babu Singh Bharity	Cha
37. He insisted on "going home."	Raja Babu Verme	
38. He recognizes Suresh Radio.	Raja Babu Verme	Raj
39. He identifies a TV.	Mahesh Verme	Ma
40. He identifies a showcase made after Suresh's death as not there previously.	Uma Verme	Un
41. He identifies a photograph of Suresh as himself.	Uma Verme Raja Babu Verme	Un

TABLE 3 (*continued*)

Verification	Comments
	He referred to Suresh's parents as his own. Titu used these appellations before meeting Suresh's relatives. Titu used the same method to refer to and address his siblings. After meeting Suresh's family, Titu wanted to go home with them. He threw his shoes at his mother, saying, "You are not my mother."
Chanda Babu Singh Bharity	This occurred later the same day when Suresh's two younger sisters came to visit and Titu's mother asked him which was the eldest. Suresh's father is a second hand witness to this. Confirmation from the primary witnesses has not yet been sought.
	There is some confusion over whether Titu meant going to Suresh's own home or Suresh's parents' home.
Raja Babu Verme	Raja Babu took Titu first to his own radio/TV shop and claimed it was Suresh Radio. Titu was adamant it was not. When taken to Suresh Radio he said it was his.
Mahavir Singh	Mahesh asked this as a test, confident that Titu would not have seen one. His father confirmed that he had not. Mahesh said Titu had to rack his brain to come up with the name.
Uma Verme	Titu asked who had it made.
Uma Verme	The prominence of the photograph in Suresh Radio might suggest its identity.

42. He identified the cash drawer.	Uma Verme Mr. Raju, manager of Suresh Radio Raja Babu Verme	Uma Verm
43. He insisted on taking a transistor radio home.	Raja Babu Verme	
44. He said Suresh's parents' home is not his.	Chanda Babu Singh Bharity	Chanda Ba
45. He recognized one of Suresh's sons.	Chanda Babu Singh Bharity	Chanda Ba

Verme

When asked, "What is this?" Titu answered correctly. The drawer looks like all the other drawers behind the counter.

His choice of the most expensive was construed as showing his continued knowledge of these matters. Titu had not seen such an item before, according to his father. This could have been a chance choice, or based on what was most attractive of the radios to any young child, however.

nda Babu Singh Bharity

Mahesh Verme interpreted this statement to mean that Titu did not recognize Suresh's parental home. Suresh's parents interpret it to mean it is not Suresh's own home. Given that Titu had described Suresh's home earlier that day, it is likely that he expected to be taken there. Chanda Babu Singh Bharity and Titu recognized the parental home. Suresh's mother heard him say he had a different home. Suresh was the only son to have a separate house [*kothi*]. Titu's attachment to Suresh's parents was demonstrated by his telling Chanda Babu Singh Bharity that he was his only father, and resisting being taken home by his own father, whose shirt be tore. Titu told Suresh's mother, "I am just passing through with these people who have no TV, car, video. I will come back to you."

nda Babu Singh Bharity

Suresh's two children were assembled with a group of other children to see if he would recognize them. This was a month and a half after the first meeting, so it is possible that Titu had seen a picture of them. He said, "You have not said *namastay* [greeted] me," to the elder son.

(*continued*)

TABLE 3 (c

Item	Informants	Ver
46. He said what happened to the money he had with him at the time he was murdered.	Chanda Babu Singh Bharity	Uma Verme money)
47. He said there are twelve Ashok trees at "his" home.	Mahavir Singh	Mahavir Sin
48. He recognized an old friend of Suresh's, Ashok Kumar.	Raja Babu Verme	Raja Babu
49. He said one of the bullets hit the steering wheel.	In my presence	Not confirm

LE 3 (*continued*)

Verification	Comments
Verme (verification of ney)	Titu said a policeman took the 15,000 rupees from the trunk of the car. This has not been verified. Whether Suresh was still conscious when the police arrived is not clear.
vir Singh	Titu demanded that his parents take him there. I accompanied him a second time but failed to count the number of Ashok trees.
Babu Verme	This friend had been out of town until 1987, when he came to see Titu. Titu asked what happened to the fans he had installed in his car. Raja Babu Verme recalled that Suresh had done so. This occurred when Titu was riding in a taxi with me, of the Ambassador make. Titu apparently thought this was Ashok Kumar's car, which was an Ambassador.
confirmed	Rajvir Verme checked the car for bullets after the murder, and said the steering wheel was not hit. Uma heard two shots, however.

50.	He said he went to Mahesh's wedding in Kanpur by car.	In my presence	Mahesh V
51.	He slapped stool in Suresh Radio upon entering and leaving.	In my presence	Raja Babu
52.	He went swiftly by himself to the second floor of the shop and commended workman.	In my presence	
53.	He said there was a pole on the roof of his house.	In my presence	Uma Ver
54.	He said he had buried a gold belt under the tallest Ashok tree at "his" house.	In my presence	Unverifie

hesh Verme	This was in response to Mahesh's questioning in the summer of 1987. Titu could have learned this normally by then.
a Babu Singh	This "macho" gesture was characteristic of Suresh, according to Raja Babu Singh.
	This was the first time Titu had gone upstairs in Suresh Radio. He did so spontaneously, without seeing anyone else do so, as if he knew what he was doing. The existence of a second floor was not obvious.
na Verme	This had held a TV antenna. This was on his second trip to Suresh's house.
verified	Uma Verme did not think this likely enough to check. Titu sized up which tree it would be shrewdly.



Fig. 1. Birthmark on the skull of Titu which corresponds to the bullet entry site as described in Suresh Verme's postmortem report.

the mode of death was violent (Cook, Pasricha, Samararatne, U Win Maung, & Stevenson, 1983).

Suresh's family and Titu's family are not related but of the same caste. The name of the father of the accused murderer is the same as Titu's father. Both families are from the same general area and caste. This caused the Verme family to suspect (illogically) that Titu's family had fabricated the case to save their relative from conviction. Mahesh Verme, the brother to whom Titu did not speak at the initial meeting, was particularly suspicious. To date Titu had passed the tests Mahesh and his family have set up. For example, when Suresh's sons first returned home from the boarding school they attend in Dehra Dun (after the meeting between the Vermes and Titu),



Fig. 2. Birthmark on the skull of Titu which corresponds to the bullet exit site as described in Suresh Verme's postmortem report.

they were placed amidst a group of other children in Chanda Singh Bharity's home, and Titu was brought there. Titu went to Suresh's eldest son and said, "Why did you not say *namastay* [the polite and correct greeting] to me?" The family felt satisfied that Titu had recognized him.

During the course of our investigation, when we took Titu to Mahesh's shop Titu called him by name, which he could easily have learned to do by normal means. When a pleased and startled Mahesh asked Titu where his (Mahesh's) wedding had been ("Lucknow, Kanpur, Mathura?"), Titu correctly answered, "Kanpur." Asked whether he had gone Titu said he had. Asked how he had gone, Titu said, "By car." However, as with the recognition of Suresh's son, it is impossible to rule out the possibility that Titu could have this information through normal means.

Titu had insisted that his parents take him to Suresh's house (*kothi*), which Uma Verme is currently renting out. The tenants allowed him to come inside, where Titu described having had a particular cabinet made. He also insisted that he had buried a gold belt under a particular tree, a state-

ment which has not been verified (see Table 3). In January 1989, I took Titu to this house in the company of Uma Verme and her sons. Again Titu claimed he had buried a gold belt under a particular tree which he pointed out. He also went on the roof and commented that there used to be a pole there (now absent), which Uma verified. However, the other statements he made incorporated information he has learned through normal means since meeting the Verme family.

The Vermes note the similarity of temperament of Titu and Suresh: both are highly active, intrepid and hot-tempered individuals. I observed these qualities in Titu, who beat a boy as hard as he could with a sugar cane frond because he was annoyed at the crowd that had gathered when I wanted to photograph him. When we took Titu to Suresh Radio, Titu gave a stool inside the shop a resounding smack as he entered, a very "macho" gesture. Hearing music from upstairs, he went directly to the back of the shop and up the back stairs to a room above the shop where a worker was repairing a tape recorder, and said in the manner of a proprietor, "He is doing good work." Going back downstairs he brushed aside an offer to help him down the steep stairs and as we left, again gave the stool a resounding slap. Querying Suresh's brothers later, we were told this was a common gesture of Suresh's.

Later that day, Titu grew furious when it was time for him and his father to leave the taxi in which we had brought them to Suresh Radio and resume their travels on Mahavir Singh's motor scooter. Titu threw something at his father and tried to pull away from his grip as hard as he could. Another day at his home, Titu told the bangle seller whom his mother had called to fit bangles on my wrist, "I will shoot you if you charge them. I will kick you out of the courtyard."

Suresh's father said that Suresh was not afraid to fight. In 1975 eight *goonda* or "hit men" took Suresh and put him in their car. He kicked one and jumped through the window into the river, swam across and came out the other side, thus escaping. Within the year before his murder, Suresh went to recover two cars presumably stolen by the same man who had previously stolen his car (the man later accused of Suresh's murder). Suresh was fired upon but jumped from the car and caught one of the gunmen by the neck.

On my return trips in 1988 and 1989, Titu was still intensely identifying himself as Suresh. For example, two days before I returned to Agra in July 1988, Titu had insisted that his parents take him to the home of Chanda Babu Singh Bharity, Suresh's father. When they arrived Titu discovered that Chanda Babu Singh Bharity was sick, and gave orders for a doctor to be fetched and medicine administered.

When I returned in January 1989, Titu's father expressed concern about possible trouble if Titu persists in thinking he is entitled to Suresh's property as he grows older. I tried to reassure him by pointing out that Stevenson has found that children with apparent past-life memories seem to forget them by the time they are 7 or 8. Titu fairly shouted, "*I will not forget!*" Titu was

presumably 6 at the time. Although, as noted above, his statements may now incorporate information he has acquired since the two families have met, Suresh's family continues to be amazed at the knowledge Titu displays of Suresh's affairs.

Evaluation of the Paranormal Features of the Case. Titu made 15 verified statements or acts before meeting the Vermes, and 31 since (although some may contain information he has learned normally). One of these 31 statements is apparently incorrect: Titu said a second bullet hit the steering wheel. While Uma Verme heard two shots, Suresh Verme's eldest brother says he carefully examined the car after his brother's death, searching for the fatal bullet, and did not notice any sign of the steering wheel having been hit. Titu has correctly identified 10 people and four locations. Items 40, 46, 49 and 52 in Table 3 have not been verified.

The most discrepant piece of information in this case is the date of birth of Titu and the date of death of Suresh. If Titu was born December 11, 1982, the date given in the hospital register for the birth of a son of Titu's father's military friend, then he was born 8 months and 17 days before Suresh Verme was murdered. While there are cases on record of *Prakash Pravesh,* or the entry of the soul of a deceased person into the body of someone just dead (Stevenson, 1974), and of *Prakaya Pravesh,* or the entry of a soul into someone still alive (Stevenson & Pasricha, 1979), the entry of Suresh into Titu when Titu was a small child would not explain the existence of the mark Titu bore from birth which corresponds to the entry and exit of the fatal bullet, unless one posited some sort of complex preknowledge or foreshadowing of Suresh's murder and Suresh's entry into Titu, or chance coincidence. If Titu was born in December 1983, as his father told me, he was born 4 months after the death of Suresh.[3] Unaware of the uncertainty about the interval, Titu and Suresh's families and the Indian press have assumed that this is a simple case of reincarnation.

Prior to their meeting in April 1987 the two families had not known each other, as evidenced by the Verme party going initially to the wrong Bad. However, we cannot rule out the possibility of Titu's parents hearing about the murder. Nardev Singh, a man from the village of Bad, was a friend of Suresh's. Titu's mother thought Suresh might have known some advocates who are related to them. While Titu's father did not recall hearing of Suresh's murder, he commonly reads the local newspapers. I checked one of the papers he often reads and found it carried stories about Suresh's murder for 3 days running after Suresh's death. However, the papers did not include a list of Suresh's next of kin, and only included the information contained in items 2, 11, 13, 15 and 27 of Table 3. It is highly unlikely that the slight acquaintances of Suresh's who lived in his village knew the rest of the information Titu gave. Moreover, cryptomnesia would not explain the specificity of the correspondence of the two birthmarks, noted at Titu's birth, to the entry and exit sites of the bullet that claimed Suresh's life.

Discussion

I have presented the data from 3 cases in some detail to assist the reader to make his or her own evaluation of the nature of the evidence. I draw on the experience of studying the additional cases in assessing the evidence for reincarnation or alternate interpretations of cases. Table 4 compares the 10 cases under discussion with the larger body of cases in India studied by Stevenson on a number of different features. The directions in my smaller sample cannot be expected to be as accurate as in a larger sample. Eventually the cases I have studied will be included in the files at the Division of Personality Studies and used for further analysis.

The question is whether the cases represent evidence that something paranormal is taking place or whether the cases are the result of conscious deceit (fraud), or unconscious self-deception and/or cultural construction. Infrequent cases of deception and self-deception have been reported by Stevenson, Pasricha and Samararatne (1988).

The Accuracy of the Information: The Evidence for Conscious Deceit

Before undertaking this investigation in India, I was prepared to find that some, perhaps all, of the cases I would investigate would be hoaxes perpetrated for any number of reasons by the participants, such as a desire of the child and/or its family to identify with a higher caste. This was my first experience in a caste society. The investigations did not substantiate these suppositions.

As Table 4 shows, in 3 of the 10 cases studied the subject was born into humbler circumstances (called Demotion in Table 4) or lower caste than the previous personality. Three of the cases showed no substantial caste or socioeconomic difference (called No Change in Table 4), while in 4 of the cases the child was born in a higher caste than the previous personality (called Promotion in Table 4). In Stevenson's Indian sample for which the relevant analysis has been made, one-third of the cases in which there was promotion or demotion recall worse material conditions, while two-thirds recall better conditions (1987, p. 215). Analysis of social status change for the larger body of cases from India will be useful, as well as its relationship to whether the previous personality was known or unknown.

In one of the cases in which the child was from a humbler caste, I entertained some question about motive because discrepant accounts of one important event suggested that two informants were misrepresenting the event, or one very elderly informant had incorrectly remembered it. In December 1989 I was able to gather further data on this complex case. I am now confident that this is not a case of conscious deceit, but a case in which there is unconscious construction on a larger scale than in the other cases I have studied. I hope to do justice to the complexity of the case in a separate report.[4]

TABLE 4
Comparisons of features of cases of the reincarnation type in Stevenson's sample from India and in Mills' replication study

	Sex of Subject	Percent Solved Cases
Mills	60% male $N = 10$	100% $N = 10$
Stevenson	64% male $N = 271$[1]	77% $N = 266$[1]

	Related	Acquainted	Unknown
Mills	0% $N = 10$	50% $N = 10$	50% $N = 10$
Stevenson	16% $N = 183$[1]	41% $N = 183$[1]	43% $N = 183$[1]

	Social Status Comparison		
	Promotion	Demotion	No Change
Mills	40% $N = 10$	30% $N = 10$	30% $N = 10$
Stevenson	28.6% $N = 42$[2]	45.2% $N = 42$[2]	26.2% $N = 42$[2]

	Violent Mode of Death (Solved Cases)	Recalls Mode of Death (Solved Cases)	Phobia Related to Death
Mills	70% $N = 10$	60% $N = 10$	20% $N = 10$
Stevenson	53% $N = 164$[1]	77% $N = 172$[1]	26% $N = 91$[1]

[1] (Cook, Pasricha, Samararatne, U Win Maung, & Stevenson, 1983).
[2] (Pasricha, 1978).

Consistency and Accuracy of Statements. In the other cases, I noted some minor discrepancies in the different eyewitness accounts of meetings and recognitions depending on what the person had happened to actually hear. I also noted that one informant attributed a statement to a subject which incorporated information learned only after meeting the previous personality's family, and some tendency to accept as evidence statements made after an obvious information flow had occurred. However, I found no indication that the witnesses had fabricated the information itself.

Indeed, like Yuille and Cutshall (1986), I found that cross-referencing numerous independent accounts indicated the testimony was generally consistent and accurate. Like Freeman, Romney and Freeman (1987), I found that informants who had witnessed a single meeting were better able

to provide a clear picture of that single event than people who had witnessed numerous meetings, whose reportage tended to blend information about the discrete meetings into a composite description. With the exception noted above, the various accounts were consistent rather than contradictory.

I found that minor inaccuracies sometimes occurred in estimations of the child's age when he or she said particular things, particularly if there had been a considerable lapse of time since the events took place. Table 1 records some of the differences in estimates of the age at which Reena said or did certain things. The inability to pinpoint the correct chronology is particularly significant in the (relatively rare) instances when parents are not sure if an event took place before or after the case was solved, at which time the child and his or her family learned additional information about the previous personality. The implicit assumption that the cases are examples of reincarnation raises the question of unconscious self-deception.

The Evidence for Unconscious Self-Deception

The category of unconscious self-deception, as I see it, includes several alternative explanations: imposition or adoption of an alternate personality in response to serious pathology in the family, analogous to Multiple Personality Disorder; the adoption of an alternate identity without serious pathology; or misdiagnosis of normal fantasy on the part of the child in conformity with the culturally accepted category of reincarnation. When the previous personality was unknown to the child and his or her family before the case was "solved," these latter two explanations rest on the assumption that the discovery of someone that fits the subject's description is a question of coincidence and cultural construction.

Unconscious Construction Hypothesis I: Adoption of an Alternate Personality in Response to Complex Family Dynamics. Krippner (1987) has noted the similarities of some Brazilian subjects in cases said to be of the reincarnation type with North American persons suffering from dissociative tendencies. In Brazil, where the concept of reincarnation has been incorporated into spiritism, intrusive or alternate personalities are diagnosed by some practitioners as past-life personalities which the individual has not accepted or incorporated. (This differs from the cases, also reported in Brazil, in which children appear to remember previous lives without manifesting any pathology.) One may ask if cases reputed to be of reincarnation are, in fact, instances of the adoption of an alternate personality for reasons analogous to the etiology of Multiple Personality Disorder (MPD). Diagnosis of cases of this latter phenomena have been increasing in Western countries over the past half century (cf. Coons, Bowman, & Milstein, 1988; Greaves, 1980). Kenny (1986) sees MPD as a metaphor for American culture, analogous to cases diagnosed as spirit possession in other cultures (Kenny, 1981).

In cases of Multiple Personality Disorder the individual at times manifests one or more separate and quite different personalities, about which the main

or presenting personality has no conscious memory. A precipitating factor in the etiology of Multiple Personality Disorder appears to be a splitting of the personality in response to childhood abuse (*DSM-III-R,* 1986). In some instances the split in personality begins in childhood, and may be enacted as an imaginary companion who has the ability to deal with distressing situations in a way the primary personality cannot (Congdon, Hain, & Stevenson, 1961; Hilgard, 1977).

None of the cases of children said to have past-life memories which I investigated appeared to fit within the category of Multiple Personality Disorder. I found no evidence of pathology on the part of the subject or their families. Despite the anomaly of the subject's conviction that he or she was and still is someone else and, in some instances, his or her precocity, all the subjects seemed to be normal, integrated individuals. There was no evidence that they had adopted the conviction that they belonged to another family because they were covertly or overtly rejected by their parents or other family members, or had formed a defensive personality to cope with disturbing material or abuse as in Multiple Personality Disorder.

Indeed, one of the most salient features of the cases was the consistency of the apparent past-life and present-life personality. The children did not manifest two separate personalities. Although recollections of apparent past lives sometimes caused some of the children to become pensive, they consistently manifested a single personality without amnesia for any segments of that personality. The distinctive features of the personality typically were manifest before the case was solved, and the child and his or her family had an information about the nature of the previous personality. In the 3 cases I have examined in which the subject has grown past the stage of consciously identifying with a particular deceased individual, the child's personality remains consistent with that exhibited earlier.

However, further questioning of the parents indicated that they tended to give preference to their child with past-life memories because of the distress the child experienced in believing that they belonged simultaneously in two different locations and with two different families. This raises the hypothesis that children may construct a previous-life identity in order to gain special attention, in the absence of serious pathology.

Unconscious Construction Hypothesis II: Construction of a Previous Life to Gain Attention. The hypothesis that children unconsciously develop what are interpreted as past-life memories seems to me to be counterindicated by four factors: (1) it presumes that a very young child is aware that indicating a past-life identity would give it positive attention; (2) it presumes that a child gets only positive reinforcement for claiming to remember previous lives; (3) it presumes that the distress the child feels at separation from the apparent past-life family is feigned; and (4) it does not account for the child's apparently accurate knowledge of people and places about which the child has no normal means of knowing. Like Hypothesis I, it again presumes that

the child is not getting adequate attention. I found no indication that the children were motivated by a need for compensatory attention.

I found that there was considerable variation in whether the child's case had received notoriety, and in fact brought the child public attention. Reena's case was never made public or published in any journals. Ashok Kumar has had other enquiries about his case but I am not aware that it has even been described in the Indian Press. Titu's case has been reported in at least three magazines in India, and has entered the public domain in Agra. Uma Verme reported that an Indian film company is considering making it into a movie. The reader will have to decide for him or herself whether Titu's identification is based on such press coverage.

If a young child thought that claiming to remember a previous life would gain additional solicitude from his or her parents, I doubt that a child would find it worth the trouble to try to maintain an alternate identity on the basis of the parents' response. The parents of the subjects I investigated could not be accused of desiring their child to have past-life memories or encouraging their expression. In all 10 cases, the families found it distressing to have a child claim to belong to another family and cry to be taken to that family. They wanted their child to relate to *them* as the parents. In addition, some of the parents were upset at finding they had a child who spoke from what was apparently a remembered past life because they thought children with past-life memories have died prematurely of violent causes and returned quickly to finish the unfinished business of the truncated life, after which they will again die.[5]

In 8 out of the 10 cases, the fear of losing the child to premature death or to the relatives of the past incarnation prompted the parents to take measures to make the child forget and/or cease speaking from the point of view of a past life (Reena and Titu were the exceptions). These measures included scolding, beating or cuffing the child, turning the child counterclockwise on a grinding stone in the hope of making the child forget, and having a pandit or priest recite mantras "to erase the past-life memories from the child's brain." While the parents hoped these measures would be effective and felt some relief in performing them, most parents found them initially ineffectual in causing the desired amnesia. In the cases in which the child is now over 9 years old, parents found that the child's memories faded when he or she became about 7 years old (and sometimes attributed this relief to the suppression measures administered much earlier).

Unconscious Construction Hypothesis III: The Phenomenon of Children Who Appear to Remember Previous Lives as Artifact of Cultural Construction of Natural Childhood Fantasy. If the phenomenon is not, as I conclude, the artifact of the great or minor pathological imposition of another personality, one may ask if it is the result of parents' interpretation of their child's natural fantasies as past-life recollections. Watkins and Watkins (1986) report that adults under hypnosis can adopt a convincing personality separate

from their usual presenting personality. Stevenson (1987) notes that hypnotically induced "past-life regressions" can often be demonstrated to be the result of fantasy because they do not accord with established historic fact. This indicates that the intensity and conviction with which a child claims to be someone else does not indicate that this is necessarily the case.

This raises the question of whether parents create the phenomenon by labeling the child's statements and behavior as an example of reincarnation. Having provided the child with the mental rubric of past-life recall, does the child elaborate more details, and come, with the parents, to believe implicitly in the fantasy creation, which the parents unconsciuosly bolster by acceptance of it as a valid past-life recollection? Psychologists (Festinger, 1957) and anthropologists (Fiske & Shweder, 1986; Shweder, 1980) have made telling studies of the impact of cultural expectation on the evaluation of ambiguous phenomena. Anthropologists and psychiatrists (cf. Angel & Thoits, 1987; Hughes, 1985; Kleinman, 1980; Obeyesekere, 1981; Torrey, 1986; Waxler, 1979, *inter alia*) have pointed out that non-Western peoples use different explanatory models which affect diagnosis and prognosis of symptomatology. This raises the question of whether, or to what extent, cases of the reincarnation type are a culture-bound syndrome.

There is no doubt that cultural interpretation played an important part in the development of the various stages of the cases I studied. These stages are the initial diagnosis of the case, the reaction to the case, and the search for and identification of a corresponding previous personality, the "recognitions" of people and places from the previous personality's setting, and the interpretation of further statements by the child.

Diagnosis: Typically, after an initial period when the young child's statements were given little importance, the child's continued revelations were interpreted by the parents as relating to a past life. A prior belief in reincarnation certainly facilitated the parents' interpretation of their child's anomalous statements in terms of reincarnation. For example, Reena's mother is unlikely to have interpreted Reena's enunciation of the word "groom" and lying down and holding her breath as an attempt to communicate about a previous life in the absence of believing previous life memories to be possible.

Reaction to the case: Even when the parents were distressed to think that their child was remembering a past life, and tried to stop the child from speaking in these terms, this interpretation provided a framework for interpreting further action and statements. In some cases I investigated (although none of the 3 presented here), the parents did a very careful job of eliciting further information from the child so that they could trace the previous personality, motivated by a desire to satisfy the child with some information that would assuage its crying to go to the former home as well as by curiosity. In these situations the parents often began to assume aspects of the projected previous personality. Even when the parents tried to ignore the child's claim to belong elsewhere, their assumption that their child was

talking about a past life manifests in their verbiage. For example, parents made no distinction in pronouns in referring to the child or the presumed previous personality, making statements like, "He remembers his home and brothers."

It is likely that providing the conceptual framework of reincarnation encourages the child to continue to manifest more apparent past-life recollections or identity (and that not providing such a framework inhibits the continuation of this phenomenon in cultures which do not believe in reincarnation).

Solving of the case: In a culture which did not employ the category of past-life recall, little effort would be made to solve such cases. If Reena was a Rachel in Kansas, her mother would have been unlikely to recall the man her 3-year-old said was her husband. If Titu was Tom in Chicago, his brother would be unlikely to seek out the radio shop Tom claimed to own. In North America an Ashok Kumar would be unlikely to get his brother to set off to find the town or village the 5-year-old said he was from.

Recognitions: The interpretation of the "recognitions" is an area where the importance of culturally constituted meanings is most evident. I did not witness any of the initial "recognitions," but it became apparent in hearing them described, that the participants were seldom concerned with, or exacting about, standards of evidence for paranormality. It is difficult to rule out the possibility that the child was given subtle (or even not so subtle) hints about who was supposed to be whom. In one instance (see p. 155), Ashok Kumar was explicitly prompted to recognize someone he did not initially. The definition of recognition used may vary. In India, Reena's retiring and covering her head with a cloth upon meeting Gompti Devi's mother-in-law was accepted as clear evidence of recognition. In North America it would not. In other words there are no universal cross-cultural signs of recognition. However, I do not mean to imply that all "recognitions" are worthless as evidence of paranormal phenomena. For example, there do not appear to have been any initial clues provided for Ashok Kumar's initial spontaneous recognition of Kishen Behari's mother.

Interpretation of further statements by the child: Once the case has been solved, information gained through normal means may be interpreted as further validation of paranormal knowledge by the participants. I have included the description Ashok Kumar gave of the cause of death as we left Bandha on his third visit, as an example of such a statement. Ashok Kumar had not described the mode of death before going to Bandha. The information corresponded to what we were told there. While it is possible that being in the place where the events took place stimulated his memory, one cannot rule out the possibility that Ashok Kumar had incorporated information he or his relatives had learned and retold in his hearing. Further, his mother had come to believe that Ashok Kumar's depiction of limping to his new home meant that the previous personality had died with an impaired leg. This presumption was confirmed by one informant but denied by others.

Ashok Kumar's mother gave numerous examples of her acceptance of her son as a reincarnation case, saying to him as we approached Bandha, "Tell your wife to give us water when we arrive," and so on. This does not, of course, detract from the evidence provided by the body of statements that were made before Ashok Kumar went to Bandha.

The strongest evidence for a paranormal process occurs in those cases in which the child and his family had no knowledge of the previous personality before they met. Half of the cases I studied fit into that category. However, it is often difficult to rule out the possibility that the subject or his or her family could have learned something about the previous personality and then forgotten that they knew it. As Table 4 shows, the 10 cases I studied do not represent the full variation of contact in Stevenson's larger Indian sample. None of the 10 cases included subjects who were related to the previous personality. The 3 cases described demonstrate a considerable range in the possibility of the child having learned some information through normal means about the previous personality. The case of Reena represents the greatest amount of contact; her parents were acquainted with the husband of the previous personality. I have coded the case of Titu as unknown, although there was contact between an acquaintance of Suresh and Titu's father. In the case of Ashok Kumar there was no prior contact.[6]

However, even in Reena's case, neither the colleague relationship between Shyam Babu Yadev and Kripa Shanker Kulshreshtha which occasioned the latter's awareness that Shyam Babu's wife had died, nor their living in the same general neighborhood accounts for the child, from the time she was first able to communicate, indicating that she had a husband and had died, or the intensity of her phobia of the cremation ground and of hypodermic needles. Shyam Babu's alacrity in remarrying 3 months after Gompti Devi's death contravenes the usual Hindu 1-year mourning period, and indicates his willingness to forget his past loss. Neither he nor his second wife could legitimately be suspected of willingly transmitting the information to Reena. The Kulshreshtha family had nothing to gain by establishing a link between their daughter and a dark complexioned wife of a backward caste colleague of her father's.

On a continuum from most to least contact, Titu's case falls towards the end of no contact. The two families did not know of each other, although Titu's father may have read of the murder or heard about it from an acquaintance of Suresh's who lives in Titu's village and forgotten it. Nonetheless it is difficult to explain why Titu would identify as the owner of Suresh Radio on the basis of these possible sources of communication. If a motive could be found, it would not explain the correspondence of Titu's birthmarks to bullet entry and exit site on the Suresh.

It has been suggested that in these instances it is mere coincidence that a person meeting the child's description actually exists. However, it exceeds the bounds of credibility to imagine that it is mere coincidence that there existed a man in a village of Bandha with a wife and five children who had

been beaten by the police, as Ashok Kumar had said before going to the village; and that Ashok Kumar would insist on going to that village, be able to lead the way and once there recognize Kishen Behari's house and mother. In this case as in others, the spontaneity and familiarity with which the subject relates to the relatives of the previous personality belies prompting or molding of the child's behavior to fit any preconceived mold.

If some paranormal means of attaining the knowledge seems indicated, one must ask whether extrasensory perception offers a more compelling explanation than the reincarnation hypothesis. Reena's demonstration of extrasensory perception about four events suggests this alternative paranormal hypothesis.

There is evidence that Western children (as well as adults) sometimes seem to know and articulate others' thoughts without having been told them (Rhine, 1961). Children exhibit this property most often with a parent, that is, someone he or she knows intimately. Spontaneous telepathic impressions in adults are also typically between relatives (Stevenson, 1970). In Reena's case her parents knew something about the existence of a former wife of Shyam Babu Yadev. In Titu's case his father may have read or heard of the murder of Suresh Verme. However, in both these cases the information does not seem important enough or salient enough to the parent to explain the child's attachment to this particular person. It seems unlikely that the child would pick up the information from the unknown deceased individual's relatives. In Ashok Kumar's case the extrasensory perception hypothesis would rest on the presumption that Ashok Kumar was picking up on the thoughts of Kishen Behari's relatives in Bandha, whom he and his parents did not know existed.

Further, if some children can accurately pick up information contained in other's minds it would not account for the child's striking identification with one particular person. The ESP hypothesis would seem more credible if these children could accurately relate facts about a number of individuals unknown to them.[7] Three factors counterindicate the extrasensory perception interpretation. First, the specificity of information given by children in cases of the reincarnation type exceeds that in spontaneous childhood ESP. Second, in all the cases the target person with whom the child seems to be in extrasensory contact is a deceased previous personality. Third, extrasensory perception *per se* does not typically entail strong identification with or as the target person. The phenomena suggest that the consciousness of the deceased person at the time of his or her death has become partially accessible to the child.

Conclusion

My examination of 10 cases of children who identified themselves as a deceased individual in India, 3 of which are described above, indicates that an independent investigator, using Stevenson's methods of investigation, finds comparable results. Some aspects of some of these cases cannot be

explained by normal means. I found no evidence that the cases I studied are the result of fraud or fantasy or could be explained on the basis of projection or assumption of an alternate identity in response to complex family dynamics. While the cultural acceptance of the concept of reincarnation and the category of children remembering a past life influenced the parents' interpretation of the child's behavior, it cannot be credited with causing all aspects of its occurrence, such as the high degree of accuracy of the statements these children make about an actual deceased person when that person is unknown to them and their relatives. The alternate normal explanations rest on the presumption that the existence of a previous personality fitting the child's description is a product of coincidence. The consistency and similarity of the child's personality with the personality reported for the previous personality is also significant. In the cases where there are striking birthmarks on the subject which relate to wounds on the previous personality or phobias related to the mode of death, the possibility of coincidence diminishes even further.

Like Stevenson I conclude that while none of the cases I studied (or the 3 cases cited) offer incontrovertible proof of reincarnation or some related paranormal process, they are part of the growing body of cases for which normal explanations do not seem to do justice to the data. The implications of these cases for understanding human psychology are sufficiently major to warrant further careful studies of such cases. We should be beware of the tendency to discount the evidence these cases present because the concepts of paranormal phenomena in general and reincarnation in particular are not a part of the Western scientific cultural construction. This replication study indicates that there is enough data inexplicable by normal means to warrant further investigation of children who claim to remember previous lives, and to suggest that such cases offer evidence of the survival of some element of the human personality after death.

Further studies of cases in India, should, whenever possible, concentrate on cases which offer the most telling evidence about whether some paranormal feature is involved. These are cases in which the child and his family did not know the previous personality and cases which are as yet unsolved, or in which a written record has been made of the child's statements before verification of the existence of such a person is made.

Further studies are indicated to further refine Stevenson's work on the interaction of specific cultural beliefs and the parameters of cases. I would recommend studying imaginative childhood identities of Western children to assess the similarity of what is considered "natural fantasy" in Western children to the alternate identities of children said to remember past lives in cultures that believe in the concept of reincarnation.

Endnotes

[1] I am following Stevenson's usage of the term "previous personality" to refer to the deceased person of whom the child speaks.

[2] The subject recalls the murder of the previous personality. The alleged murderer and his family identified me and my assistants as undercover agents seeking information for the murder trial, and they threatened the child, his relatives, and the villagers with dire consequences if they should talk about the case. In addition, we were not able to meet the mother or father of the child, since they were (or were said to be) absent from the village on our repeated visits. For less dramatic reasons we were sometimes unable to find all the witnesses I wanted to interview in other cases as well.

[3] The questions raised by this case show the importance of obtaining records wherever possible of birth and death dates. Unfortunately, births and deaths often go unrecorded in India. The interval between the death of the previous personality and the birth of the subject in most cases studied by Stevenson is greater than 9 months, but there are a number of cases in which the subject was conceived before the previous personality's death (Stevenson, 1986, 1987). Further enquiries regarding the registration of Titu's birthdate have not yet settled the question, but indicate that the person under whose name Shanti Devi was admitted may be fictitious.

[4] In the one case (the one in which I found accounts to be seriously inconsistent), the child's parents were convinced of the validity of the case, whereas the previous personality's father (who had not witnessed any meetings) was not. His reservations were based on hearing that the subject had called both the previous personality's uncle and brothers as uncles, and a sense that the interval between his daughter's death and the birth of the subject (7 years) was too long. Other people attributed his lack of endorsement of the case to be the result of reluctance to believe that his daughter would return in the businessman's class, as he is a Brahmin.

[5] Stevenson (1974) reports a similar fear among the Tlingit that children who remember past lives will live a short life. I have found that the Beaver, Gitksan and Wet'suwet'en native children of British Columbia, Canada, with such past-life memories are prized and called "special child" and are typically born to close relatives who are solaced by having a deeply mourned relative return. In this context such children seldom bother their parents to take them to an unknown and different home and set of relatives, although all three tribes diagnose the crying or illness of preverbal children as caused by the baby's distress at not having some prized object of the previous personality, or missing some of his or her associates (Mills, 1988).

[6] In the case with the greatest prior contact of the 10 I investigated, the subject became a frequent visitor to the home of the previous personality when about 2 years old, and made statements about the previous personality after contact was established. In the 2 cases with the least amount of contact in my sample, the subject and his relatives were unaware of the existence of the previous personality, who lived in another village, and the subject has not visited the village or home of the previous personality, although the relatives of the previous personality have visited the child at his or her home.

[7] Stevenson (1987) reports that intermediate or additional past lives are recalled by subjects of cases of the reincarnation type infrequently, and are usually unverifiable. One of the subjects in my sample claimed to recall one, unverified intermediate life.

References

Angel, R., & Thoits, P. (1987). The impact of culture on the cognitive structure of illness. *Culture, Medicine, & Psychiatry, 2,* 465–494.

Barker, D. S., & Pasricha, S. (1979). Reincarnation cases in Fatehabad: A systematic survey of North India. *Journal of Asian and African Studies, 14,* 3–4, 231–240.

Congdon, M. H., Hain, J., & Stevenson, I. (1961). A case of multiple personality illustrating the transition from role-playing. *Journal of Nervous and Mental Disease, 132,* 497–527.

Cook, E. W., Pasricha, S., Samararatne, G., U Win Maung, & Stevenson, I. (1983). A review and analysis of "unsolved" cases of the reincarnation type: II. Comparison of features of solved and unsolved cases. *Journal of the American Society for Psychical Research, 77,* 115–135.

Coons, P., Bowman, E. S., & Milstein, V. (1988). Multiple personality disorder: A clinical investigation of 50 cases. *Journal of Nervous and Mental Disease, 176*(9), 519–527.

DSM-III-R. (1986). *Diagnostic and statistical manual of mental disorders* (3rd ed.) (revised). Washington, DC: American Psychiatric Association.

Festinger, L. (1957). *A theory of cognitive dissonance.* Stanford, CA: Stanford University Press.

Freeman, L., Romney, A. K., & Freeman, S. C. (1987). Cognitive structure and informant accuracy. *American Anthropologist, 89*(2), 310–325.

Fiske, D., & Shweder, R. (1986). *Metatheory in social science: Pluralisms and subjectivities.* Chicago: The University of Chicago Press.

Greaves, G. (1980). Multiple personality: 165 years after Mary Reynolds. *Journal of Nervous and Mental Disease, 168*(10), 577–596.

Hilgard, J. (1977). *Personality and hypnosis: A study of imaginative involvement.* Chicago: University of Chicago Press.

Hughes, C. (1985). Culture-bound or construct-bound? The syndromes and *DSM-III.* In R. Simons & C. Hughes (Eds.), *The culture-bound syndromes: Folk illnesses of psychiatric and anthropological interest* (pp. 3–24). Boston: D. Reidel Publishing Co.

Keller, H. (1954). *The story of my life.* New York: Doubleday & Co.

Kenny, M. (1981). Multiple personality and spirit possession. *Psychiatry, 44,* 337–358.

Kenny, M. (1986). *The passion of Ansel Bourne.* Washington DC: Smithsonian Institution Press.

Kleinman, A. (1980). *Patients and healers in the context of culture: An exploration of the borderland between anthropology, medicine, and psychiatry.* Berkeley: University of California Press.

Krippner, S. (1987). Cross-cultural approaches to multiple personality disorder: Practices in Brazilian spiritism. *Ethos, 15*(3), 273–295.

Mills, A. (1982). *The Beaver Indian prophet dance and related movements among North American Indian tribes.* Unpublished Ph.D. Dissertation, Harvard University, Cambridge, MA.

Mills, A. (1986). The meaningful universe: Intersecting forces in Beaver Indian cosmology. *Culture, 6*(2), 81–91.

Mills, A. (1988). A comparison of Wet'suwet'en cases of the reincarnation type with Gitksan and Beaver. *Journal of Anthropological Research, 44,* 385–415.

Mills, A. (1989). A preliminary investigation of reincarnation among the Beaver and Gitksan Indians. *Anthropologica, 30,* 23–59.

Obeyesekere, G. (1981). *Medusa's hair: An essay on personal symbols and religious experience.* Chicago: University of Chicago Press.

Pasricha, S. (1978). *An investigation into reported cases of persons who claim to have reincarnated.* Unpublished Ph.D. Thesis. National Institute of Mental Health and Neuro-Sciences, Bangalore, India.

Pasricha, S. (1983). New information favoring a paranormal interpretation of the case of Rakesh Gaur. *European Journal of Parapsychology, 5,* 77–85.

Pasricha, S., & Barker, D. S. (1981). A case of the reincarnation type in India: The case of Rakesh Gaur. *European Journal of Parapsychology, 3,* 381–408.

Pasricha, S., & Stevenson, I. (1979). A partly independent replication of investigations of cases suggestive of reincarnation. *European Journal of Parapsychology, 3,* 51–65.

Pasricha, S., & Stevenson, I. (1987). Indian cases of the reincarnation type two generations apart. *Journal of the Society for Psychical Research, 54*(809), 239–246.

Rhine, L. (1961). *Hidden channels of the mind.* New York: William Sloane Associates.

Shweder, R. (Ed.). (1980). *Fallible judgment in behavioral research.* New Directions for Methodology of Social and Behavioral Science No. 4. San Francisco: Jossey-Bass, Inc.

Stevenson, I. (1966). Cultural patterns in cases suggestive of reincarnation among the Tlingit Indians of southeastern Alaska. *Journal of the American Society for Psychical Research, 60,* 229–243.

Stevenson, I. (1970). *Telepathic impressions.* Charlottesville: University of Virginia Press.

Stevenson, I. (1974). *Twenty cases suggestive of reincarnation.* Charlottesville: University Press of Virginia. (First published in *Proceedings of the American Society for Psychical Research, 26,* 1–362, 1966.)

Stevenson, I. (1975a). *Cases of the reincarnation type. Vol. I. Ten cases in India.* Charlottesville: University Press of Virginia.

Stevenson, I. (1975b). The belief and cases related to reincarnation among the Haida. *Journal of Anthropological Research, 31*(4), 364–375. (Reprinted with revisions in *Journal of the American Society for Physical Research, 71,* 177–189, 1977.)

Stevenson, I. (1977a). *Cases of the reincarnation type. Vol. II. Ten cases in Sri Lanka.* Charlottesville: University Press of Virginia.

Stevenson, I. (1977b). The explanatory value of the idea of reincarnation. *Journal of Nervous and Mental Disease, 164*(5), 305–326.

Stevenson, I. (1980). *Cases of the reincarnation type. Vol. III. Twelve cases in Lebanon and Turkey.* Charlottesville: University Press of Virginia.

Stevenson, I. (1983a). *Cases of the reincarnation type. Vol. IV. Twelve cases in Thailand and Burma.* Charlottesville: University Press of Virginia.

Stevenson, I. (1983b). American children who claim to remember past lives. *Journal of Nervous and Mental Disease, 171*(12), 742–748.

Stevenson, I. (1985). The belief in reincarnation among the Igbo of Nigeria. *Journal of Asian and African Studies, 20*(1/2), 13–30.

Stevenson, I. (1986). Characteristics of cases of the reincarnation type among the Igbo of Nigeria. *Journal of Asian & African Studies, 21*(3/4), 204–216.

Stevenson, I. (1987). *Children who remember previous lives: A question of reincarnation.* Charlottesville: University Press of Virginia.

Stevenson, I., & Pasricha, S. (1979). A partly independent replication of investigations of cases suggestive of reincarnation. *European Journal of Parapsychology 3*(1), 51–65.

Stevenson, I., Pasricha, S., & Samararatne, G. (1988). Deception and self-deception in cases of the reincarnation type: Seven illustrative cases in Asia. *Journal of the American Society for Psychical Research, 82*(1), 1–31.

Stevenson, I., & Samararatne, G. (1988). Three new cases of the reincarnation type in Sri Lanka with written records made before verification. *Journal of Scientific Exploration, 2*(2), 217–238.

Torrey, E. F. (1986). *Witchdoctors and psychiatrists: The common roots of psychotherapy and its future.* New York: Harper & Row.

Watkins, J., & Watkins, H. (1986). Hypnosis, multiple personality, and ego states as altered states of consciousness. In B. B. Wolman & M. Ullman (Eds.), *Handbook of states of consciousness* (pp. 133–158). New York: Van Nostrand Reinhold Co.

Waxler, N. (1979). Is outcome for schizophrenia better in nonindustrial societies? *Journal of Nervous and Mental Disease, 167,* 144–158.

Yuille, J., & Cutshall, J. (1986). A case study of eyewitness memory of a crime. *Journal of Applied Psychology, 71*(2), 291–301.

Journal of Scientific Exploration, Vol. 3, No. 2, pp. 185–200, 1989
Pergamon Press plc. Printed in the USA.

0892–3310/89 $3.00+.00
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Searching for "Signatures" in Anomalous Human–Machine Interaction Data: A Neural Network Approach*

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Abstract—An artificial neural network was used to explore whether unique "signatures" could be found in data collected in experiments studying the effect of intention on the statistical behavior of random number generators. Results showed that a network trained with a back-propagation technique was able to learn to associate 32 different individuals with the data they generated, then successfully transfer that knowledge to new data. It is recommended that similar experiments studying anomalous human–machine interactions should attempt to identify person-specific patterns in data in addition to measuring the magnitude of effects; parallel processing analysis techniques are also recommended.

Introduction

One of the most conspicuous and frustrating aspects of the study of human behavior is the fact that people are different. This distinctiveness allows us to identify people based on properties such as fingerprints, handwriting, voice, gait, DNA, personality, and so on (Weisburd, 1988). The importance of individual differences has long been noted in psychological experiments (Barlow & Hersen, 1984), thus it should not be surprising to find that such differences have also been reported in parapsychological experiments (Babu, 1987; Berger, 1988; Jahn & Dunne, 1986, 1987; Jahn, Dunne, & Nelson, 1987; McConnell, 1989). The present study investigated the hypothesis of individual differences, called "signatures," in human–machine interaction data collected by the Princeton Engineering Anomalies Research (PEAR) laboratory (Nelson, Dunne, & Jahn, 1984, 1986).

In the PEAR studies, individuals attempted to influence the output statistics of electronic random number generators (RNG) solely via mental intention. In a typical RNG experiment conducted at PEAR, an RNG is set to produce a series of 200 truly random bits at the press of a button; this is called one *trial.* A person watches a digital display that shows how many times the random samples matched an alternating "target" bit over the course of 200 generated bits. By chance, one would expect an average of 100

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* A version of this paper was presented at the 7th Annual Meeting of the Society for Scientific Exploration, Cornell University, Ithaca, NY, June 2–4, 1988.

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such matches, and under control conditions the distribution of trial scores closely matches the theoretically expected binomial distribution (Nelson, Dunne, & Jahn, 1986). When an individual is asked to aim for high numbers, he or she mentally tries to cause the RNG to produce trial scores greater than 100. In a low aim condition, trial scores less than 100 are intended; and in a control condition, no mental intention is applied. One *run* consists of 50 aim high, 50 aim low, and 50 control trials. One *series* consists of 50 such runs, which takes about five hours of data collection to complete.

Aggregate experimental results to date reveal statistically significant correspondences between the intentional "aim" and the shift of the RNG output statistics (Jahn & Dunne, 1986, 1987; Jahn, Dunne, & Nelson, 1987). Meta-analysis of over 600 similar RNG experiments conducted by some 67 other investigators indicates that the anomalous correlation is not due to methodological shortcomings or undetected artifacts in the PEAR RNG (Radin & Nelson, 1987; Radin & Nelson, in press).

One intriguing observation about this data (beyond the mere existence of an anomalous correlation) is that individuals seem to perform in consistently unique patterns. Nelson, Dunne and Jahn (1986) report that data produced in one run often bears resemblance to data produced in other runs, and such similarities appear to be unique to the individuals who produced the data. However, other than providing face validity based upon graphical representation of the data (Jahn & Dunne, 1987), some rudimentary statistical analyses (Babu, 1987), and corroborating observations in similar types of experiments (Berger, 1988; McConnell, 1989), a "signature" effect has not been rigorously demonstrated. If such an effect were confirmed, it would suggest that experiments on human consciousness would provide more useful and revealing information with single-subject designs rather than conventional multisubject designs (cf. Barlow & Hersen, 1984).

To explore the idea of person-specific signatures in the PEAR RNG data, I used a powerful computational technique that is proving to be exceptionally adept at discovering weak patterns in noisy data. As described below in more detail, the general term for this approach is *neural network analysis,* and the specific training procedure used in this study is called *back-propagation* (Jones & Hoskins, 1987; Rumelhart, Hinton, & Williams, 1986). The study involved training a network to associate given data with given individuals, then observing whether the trained network could successfully identify persons based upon data that the network had not "seen" before.

Neural Networks

New computational techniques and models, variously called neural networks, parallel distributed processing, connectionism, and so on, are attracting wide interest within the disciplines of artificial intelligence, the cognitive sciences, and the neurosciences. These models, analogous to biological neural networks, are rapidly advancing the theory and development

of self-organizing, adaptive machines as well as solving previously intractable problems in artificial intelligence (Materna, 1987; Shriver, 1988).

Neural networks are a form of parallel processing based upon research about how the brain encodes and processes information. The power of these networks rests upon the finding that when numerous elementary processing units are richly interconnected under the right conditions, they can automatically learn to associate arbitrarily complex inputs with arbitrarily complex outputs. Properly configured, these networks can also implement self-organizing associative memories, automatically derive statistical descriptions of spatial and spatiotemporal data, and autonomously acquire knowledge by observation.

An essential idea underlying neural networks may be illustrated by analogy with a bee hive. A hive is a complex, dynamic community with intelligent organization and structure, created and supported by individually simple creatures. Instead of being controlled by a central, guiding intelligence, a hive seems to be maintained by the hundreds of thousands of interactions among bees. For another analogy, consider the collections of elementary cells that "cooperate" to form complex organic structures called organs.

In engineering terms, a neural network may be described as a "parallel dynamic system with the topology of a directed graph [which] can carry out information processing by means of its state response to continuous or initial input" (Materna, 1987). Information processing involves interactions among large numbers of artificial neurons. These neurons, called nodes or units, have four main components, as illustrated in Figure 1:

input connections, through which the unit receives activation from other units, a *summation function* that combines various input activations into a single activation, an

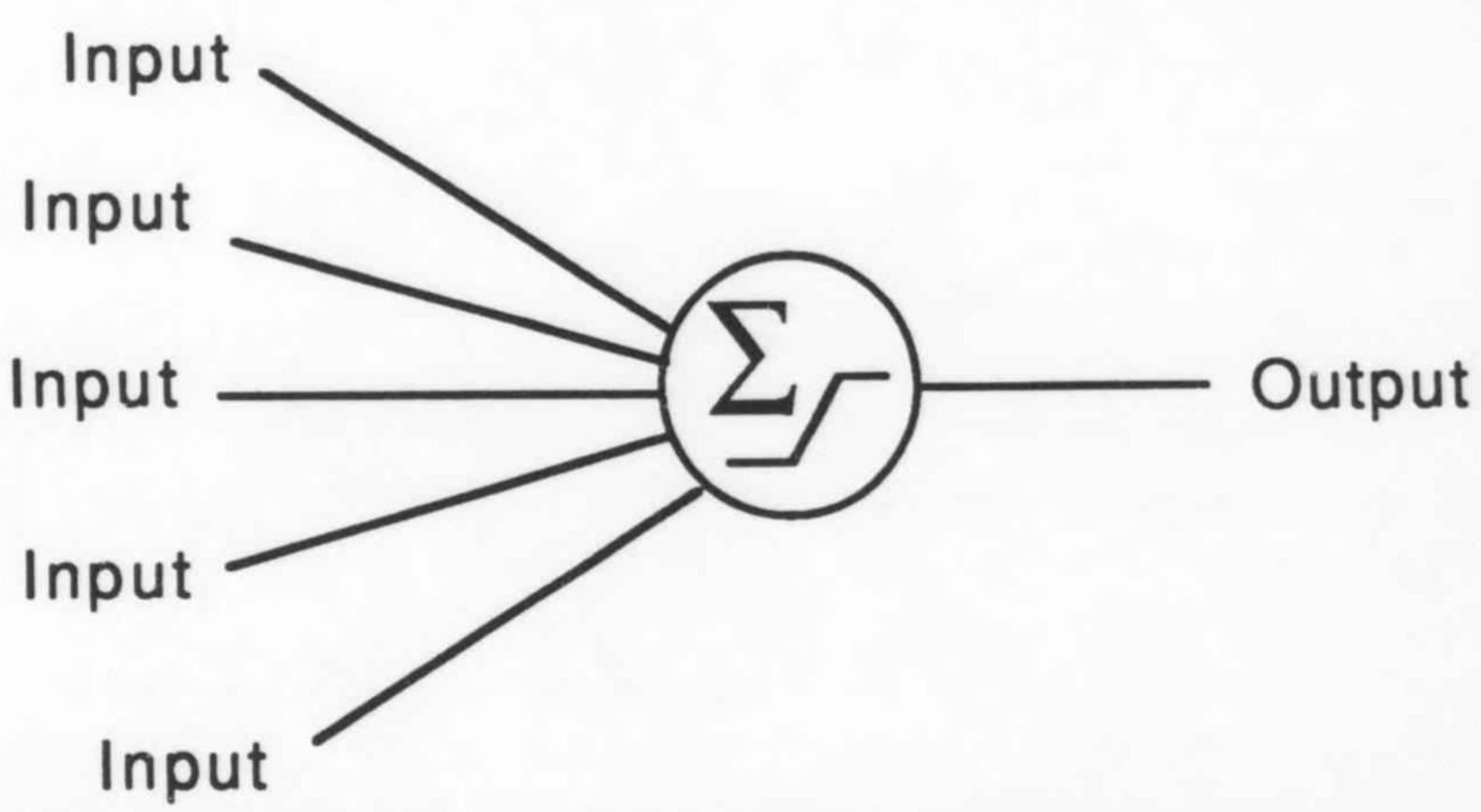


Fig. 1. Example of a typical node in a simulated neural network. A node may have an arbitrary number of input connections, and any number of output connections (only one output is shown).

output function that converts summation of input activation into output activation, and

output connections by which a unit's output activation arrives as input activation at other units in the system (Jones & Hoskins, 1987).

Such networks have been successfully taught to automatically recognize human faces, read text, make medical diagnoses, balance objects, and so on, without conventional algorithmic programming (Materna, 1987; Shriver, 1988; Widrow & Winter, 1988). Because a more complete description of the techniques and applications of neural networks is beyond the scope of this paper, I will proceed by concentrating on the present implementation.[1]

Method

The Data

Data used in this study were originally collected at the PEAR laboratory as part of their research on human–machine interactions with truly random event generators.[2] The dataset consists of 87 series of data ("series" as defined above), produced by 33 different individuals over approximately a nine-year period. The data are in the form of run scores (average scores obtained over 50 successive trials). A typical series is represented in the form of 150 lines of data (one run score per line, and one set of 50 lines for each of the tripolar intentions).

Other types of information were available from computer archive files, including such items as whether the run was in "volitional" or "instructed" mode, whether the RNG was in an "automatic" or "manual" condition, and so on (Nelson, Dunne, & Jahn, 1984), but only run scores, intentional aim direction, and operator identity numbers were used in the present analysis.

Data Preparation

I chose a straightforward method of presenting data to a network, one that required only six numbers to characterize an individual's performance over one series. This had the advantage of simplicity, which was desirable in this exploratory study, but the disadvantage of compressing nearly a million bits of temporally collected data per person into only a few static summary statistics.

Because the main purpose of this study was to see whether a network could learn to identify an operator based solely upon his or her data, I actually needed *two* datasets associated with each operator—one would be used to train the network and the other would be used to see whether the trained network could transfer its knowledge to new data. Thus, each series

(a total of 50 runs) was split in half, using the first half (25 runs in each of the three aim conditions) as the *training set* and the second half (25 runs) as the *transfer set*. This half-split method was used, rather than creating training and transfer sets out of separate series, partially because only 20 individuals had produced two or more series, but more importantly, because I speculated that consistent human performance would be more evident within a given series rather than between different series.[3]

Individual run scores were transformed into standard normal deviates against chance expectation (i.e., Z scores), then for each series the following six data items were generated to produce the *training set:* (1) an overall (Stouffer) Z score for the first 25 runs under high aim intention, (2) the average Z^2 of those 25 high aim runs,[4] (3) a Stouffer Z for the first 25 runs under low aim intention, (4) the average Z^2 of those 25 runs, (5) the Stouffer Z for the first 25 control intention runs, and (6) the average Z^2 of those runs. For the *transfer set,* the same six data items were determined, except using data for runs 26–50.

This procedure produced 87 items in the training set and 87 items in the transfer set, representing data for 33 operators. To further simplify the interpretation of the training-transfer test, I used only an operator's first series, and only the first 32 operators (for reasons described below). This resulted in two datasets, each consisting of 32 lines of data.

Control Datasets

If the transfer test showed that say, 50% of the operators were correctly identified, the "signatures" results would be self-evident. But, if say, only 2–3% were identified, as expected given the very small magnitude effects reported by the PEAR lab, then a statistical assessment would be necessary. Therefore, two control datasets were generated to compare against the transfer test results. First, a *random* dataset was generated by simulating the PEAR experimental protocol with a pseudorandom number generator (PRNG). The random dataset was created in five steps: (a) the PRNG was used to generate one trial of 200 random bits, (b) this was repeated 50 times to generate one run, (c) a Z score was determined from this run, (d) this was repeated 25 times to simulate a half-series, and (e) steps a–d were repeated 32 times to simulate the 32 series used from the PEAR dataset.

Then a *scrambled* dataset was generated by using the original data, but with operator numbers chosen uniformly at random, with replacement, over the range 1–32. Note that I could not create a suitable scrambled dataset by simply shifting operator codes by one, because this would guarantee that at least half of the operators would be identified in that "scrambled" data.[5] The UNIX System V™ 48-bit multiplicative congruential PRNG, called *drand*48, was used to provide pseudorandom numbers in the control study. This generator has passed extensive first-order and higher-order randomness tests (Radin, 1985; Roberts, 1982).

Description of Network

The program used to implement the network was originally written in Fortran, later recoded into C, then adapted and revised by the author for the present application.[6] A Silicon Graphics IRIS 4D™ workstation was used to run the program.

The network used for this study was based upon a three-layer model—input, hidden, and output—as illustrated in Figure 2. There were six input nodes, corresponding to the above six values associated with each operator; between 10 and 30 "hidden" nodes (so-called because they are not directly accessible to the outside world), depending on factors such as how fast the network was to learn, how complex the inputs were, and so on; and 5 output nodes, encoding 32 operator identities as binary codes.

For the present study, values applied to the six input nodes consisted of the Stouffer Z scores and average Z^2 associated with each operator's data, as mentioned above. The desired network output was the unique binary code associated with each operator. As is customary in such networks, the interconnecting links between the input and hidden, and hidden and output nodes were initially set to random values (typically using a uniform random range between $\pm$ 1.0).

Parallel Processing in the Network

The following events occur in one simulated parallel processing cycle: (a) The first line of the 32 line training dataset is read by the program, which applies the six data values for the first operator to the input nodes. These

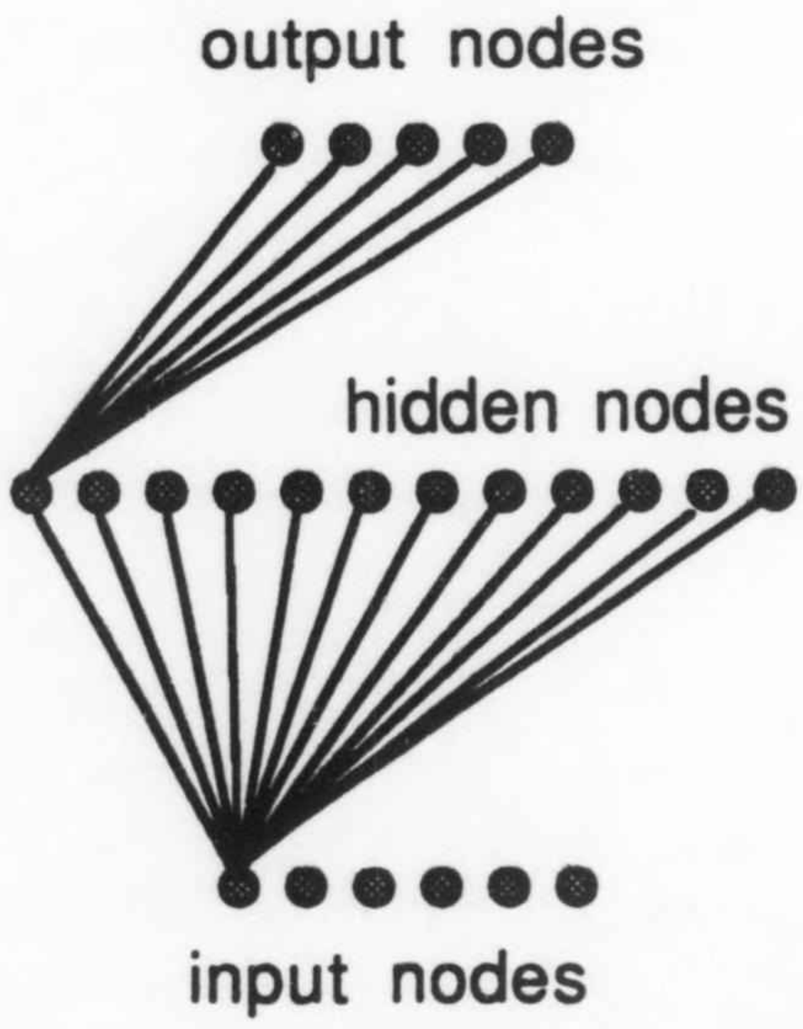


Fig. 2. Structure of the neural network used in this study. Links from the first input to first hidden node, and first hidden to output node are shown to illustrate the connectivity of the network. The actual network was fully interconnected between input and hidden, and hidden and output layers. Here we see 12 hidden nodes; the networks tested used 10, 16, and 30 nodes.

values cause the input nodes to spread activation out along their links towards the hidden layer in proportion to each link's strength or weight. (b) The hidden nodes sum the activation received from the input nodes, depending on the value of the connecting links, then, in accordance with an activation function they send activation towards the output nodes. (c) The output nodes sum the activation sent from the hidden nodes, ending the "feed-forward" phase of this cycle.

Now a "teacher signal" comes into play: (d) An arbitrary but unique 5-bit code (e.g., "00111" identifies operator number 7) associated with the input data is compared against the actual continuous-valued results residing at the output nodes, generated from step (c). (e) The difference between the observed activation from (c) and the desired "signal" from (d) is now propagated *backwards* through the network, changing the values of the interconnecting links so as to minimize that error on the next pass if the same input values were applied (thus the name of the learning rule, *back propagation,* see the Appendix for the basic equations).[7] This ends one parallel processing cycle.

Now, (f) the same process is applied for the remaining 31 operators' data: First a feed-forward phase, followed by back propagation of the error. Applying these 32 lines of input to the network is called one *pass.* With the present network and form of the data, it typically takes between 1,000 to 3,000 such passes to train the network to perfectly associate the observed data with the desired operator codes. (Some readers may find it surprising that a network can learn to perfectly associate random-looking input data with arbitrary output codes; this is one of the interesting properties of trainable neural networks.)

It is important to note that an untrained network always starts with random interconnection weights between nodes. The hidden nodes act as a kind of mathematical space in which to compute the problem of associating inputs with outputs, thus if we begin with say, 20 hidden nodes, we have a topological flexibility roughly equivalent to a 20-dimensional space. With a space this large, there are a vast number of "solutions" to the problem, and it is likely that a new solution will be found each time the network is trained from scratch. In other words, training the network once will not guarantee the "best" solution, only an acceptable solution (i.e., the network does not know that we want to transfer its knowledge to other data; it just solves the association problem). Because I was interested in exploring the possibility of knowledge transfer, the process described above in steps (a)–(f) was performed repeatedly, forming a *distribution* of transfer results against which to compare the random and scrambled dataset results.

Transfer Test

The transfer test consisted of 5 steps:

(a) The network was trained (from a random starting state) on the 32-line data file until the error between input and output values was less than 0.05

per output node at the end of a pass. From experience this was determined to take between 1,000 and 3,000 passes.

(b) The trained network was tested against the transfer dataset by sending each of the 32 items in the transfer dataset through the net in one feed-forward pass, then comparing the values obtained at the output nodes against the desired values. The observed value at an output node was considered to be 0 if the activation was less than 0.5, otherwise it was considered to be a 1.[8] The number of correct bit-matches was then used as a measure of success for the transfer test. For example, if all 5 bits of an operator code number were identified correctly after passing that operator's data through the network, the data-operator relationship learned by the network during the training phase would have transferred perfectly (in informational terms, we could think of the transfer test as having "transmitted" 5 bits of information). If 4 bits were correctly identified, this would constitute an 80% match (transmitted 4 bits of information), and so on.

(c) The same process was conducted for the random dataset and the scrambled dataset, producing for each of the three tests the number of perfectly correct matches (5/5 bits correct) out of 32 operators, 4 out of 5 correct matches (out of 32 operators), and 3 out of 5 (out of 32 operators). Thus, the score for a perfect transfer test would be 32 (all operators correctly identified with 5 out of 5 bits correct).

(d) Steps a–c were repeated 100 or more times to form a distribution of results for the transfer, random, and scrambled tests.

(e) The means of the distributions obtained in step d were compared with a *t*-test.[9] The null hypothesis is that there are no consistent patterns within the data, so there is nothing that can be transferred, and thus there should be no differences among the transfer, random, and scrambled dataset distribution means. The alternative hypothesis is that there is something consistent in the data that is associated with each operator; that these associations can be learned; and that these can be detected in independent data produced by those same operators. These effects would manifest in the present case by shifting the transfer distribution mean positive with respect to the random and scrambled distribution means, and the random and scrambled means should not differ significantly from one another. Thus, three *t*-tests were planned in advance: Transfer vs. Random, (TR) Transfer vs. Scrambled (TS), and Random vs. Scrambled (RS).

Results

In considering the results, it is important to note that the values at the output nodes of these networks resemble Bernoulli trials with $p = 0.5$. For example, we would expect to find approximately one operator correctly identified by chance (say, one "hit") out of 32, or approximately 5 hits out of 32 where 4 out of 5 bits were correctly identified, and so on. Actually, the

chance expected value at the (binary transformed) output nodes also depends on the initial interconnection weights in the network, on the form of the activation and learning rules, and on the input values. With these caveats in mind, by rough approximation we would expect to see about one operator completely identified by chance (i.e., all five code bits correct), and one completely missed (i.e., all five bits missed).

Table 1 shows results of tests using three network configurations. Each of the simulations took about 6 hours to complete on a Silicon Graphics IRIS 4-D workstation.[10]

Discussion

If the signatures hypothesis is true, it would manifest in this study by making the number of correctly identified operators greater in the transfer condition than in either the random or scrambled conditions. We would expect to find significant differences between the transfer vs. random and transfer vs. scrambled conditions, and a nonsignificant difference for the random vs. scrambled condition. This is what the results show (Table 1). The two histograms in Figure 3 display the distributions for the "4/5 bits identified" results.

Another way of illustrating transfer in this study is by examining the difference between means of perfectly identified (5/5 bits) and perfectly *unidentified* (0/5 bits) operators for each of the three conditions. Under the signatures hypothesis, we would expect to find more cases of 5/5 code bits identified than 0/5 code bits identified in the transfer condition, but not in the random or scrambled conditions. Because the 5/5 and 0/5 means within the three conditions are not fully independent, the statistics shown in Table 2 are based on *t*-tests for differences between correlated pairs of means. Figure 4 shows the separation between the distributions for the training-transfer test.

Given these results, one may wonder—under the assumption that within-person performance is reasonably consistent—whether repeatedly presenting a network with multiple examples of the same operator's data (i.e., from different experiments) would improve the transfer rate. Table 3 shows test results for correctly identified operators (5/5 code bits correct) in a 20 hidden node network trained on three independent datasets for each of nine people. (Nine persons in the PEAR database had completed three separate series.)

Comparing results in Table 3 with those in Table 1 suggests that there may be an advantage in presenting networks with repeated, independent views of the same operators' data. More research is needed to determine ways of training networks to recognize this data, as well as to select optimum statistical parameters to use as inputs. In addition, even though the transferred information in the present study was statistically significant, the ab-

TABLE 1
Means, standard deviations, and *t*-tests for transfer, random, and scrambled tests, using actual and random training-transfer data; all results are based upon $N = 100$ training-transfer repetitions

	10 Hidden Nodes[a]					
Bit matches (#/5)	0	1	2	3	4	5
Transfer						
Mean	0.61	3.96	9.07	10.88	6.02[b]	1.46[c]
SD	0.69	1.78	2.49	2.68	2.12	1.13
Random						
Mean	1.13	5.38	10.17	9.39	4.91	1.02
SD	1.00	1.97	2.53	2.60	2.11	0.91
Scrambled						
Mean	0.93	4.91	10.20	10.02	5.04	0.90
SD	0.96	2.22	2.34	2.65	1.88	0.81
	16 Hidden Nodes[d]					
Bit matches (#/5)	0	1	2	3	4	5
Transfer						
Mean	0.74	3.79	8.86	11.28	6.19	1.14
SD	0.74	1.51	2.40	2.52	1.91	0.92
Random						
Mean	0.95	4.86	10.08	10.20	5.03	0.88
SD	1.01	2.29	2.48	2.81	2.09	0.90
Scrambled						
Mean	1.12	4.88	9.76	10.17	5.05	1.02
SD	1.05	2.03	2.66	2.45	2.04	0.96
	30 Hidden Nodes[d]					
Bit matches (#/5)	0	1	2	3	4	5
Transfer						
Mean	0.94	3.52	8.28	11.62	6.52	1.12
SD	0.82	1.62	2.27	2.54	1.70	1.00
Random						
Mean	0.87	5.01	10.10	10.23	4.78	1.01
SD	0.92	1.87	2.61	2.98	2.05	1.02
Scrambled						
Mean	0.98	5.07	9.96	10.07	4.89	1.03
SD	0.94	2.21	2.58	2.63	2.37	1.06
	t-tests					
10 Hidden nodes						
t(T-R)[e]	−4.26	−5.32	−3.08	**3.97**	**3.69**	**3.02**
t(T-S)	−2.69	−3.32	−3.29	**2.27**	**3.44**	**4.01**
t(R-S)	1.44	1.58	−0.09	−1.69	−0.46	0.98
16 Hidden nodes						
t(T-R)	−1.67	−3.88	−3.52	**2.85**	**4.08**	**2.01**
t(T-S)	−2.94	−4.29	−2.50	**3.14**	**4.06**	0.90
t(R-S)	−1.16	−0.07	0.88	0.08	−0.07	−1.06
30 Hidden nodes						
t(T-R)	0.57	−5.99	−5.24	**3.53**	**6.50**	0.77
t(T-S)	−0.32	−5.63	−4.86	**4.22**	**5.56**	0.61
t(R-S)	−0.83	−0.21	0.38	0.40	−0.35	−0.14

[a] Trained 4,000 passes.
[b] The network identified 4 out of 5 operator code bits for an average of 6.02 operators out of 32.
[c] The network identified all 5 operator code bits for an average of 1.46 operators out of 32.
[d] Trained 2,000 passes.
[e] All *t*-tests for differences between independent means, 198 degrees of freedom. Significant results, one-tailed, are highlighted in bold for emphasis.

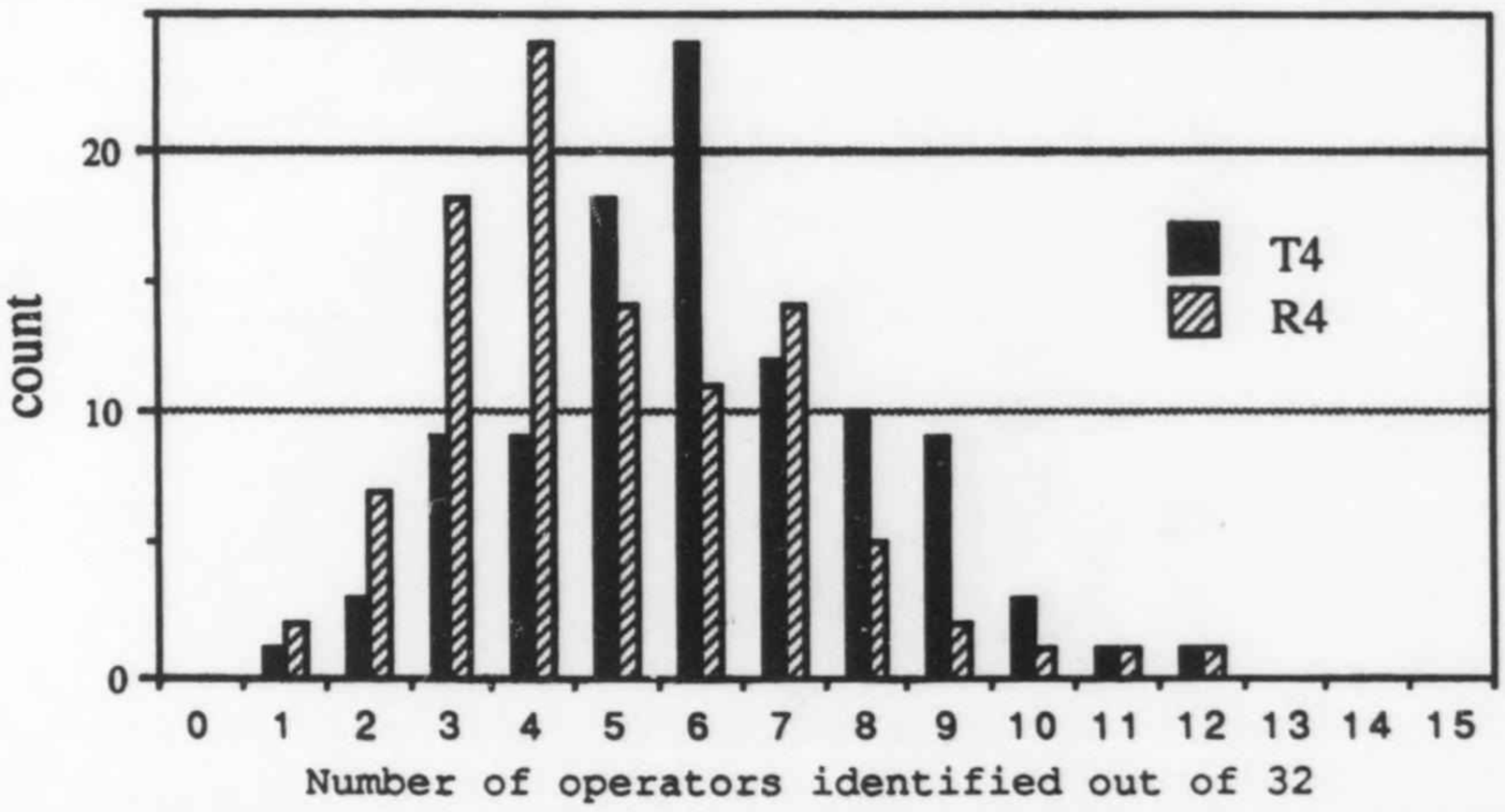


Fig. 3. Histogram for the number of times that four out of five operator code bits were correctly identified, out of a total of 32 operators, using a 10 hidden node network. T4 refers to the training-transfer test and R4 refers to the training-random test. Thus, in 100 independent repetitions of the training-transfer test, the mean number of operators in which 80% of the operator code was correctly identified was 6.02, whereas the equivalent mean in the random test was 4.91. Compare these figures with 5.0, which is the number expected by chance assuming that the output nodes are Bernoulli trials with p(hit) = .5.

solute magnitude was miniscule. Obviously, if the original "signal" (i.e., influence on an RNG output) were more robust, then the neural network would be more likely to recognize a potential signature. Thus, research is also needed on ways of statistically increasing the magnitude of these anomalous influences.

Conclusion

This study suggests that a neural network may learn to associate data produced by a random number generator with the identity of individuals who attempted to "mentally influence" the output statistics of the generator. Results of tests with different network configurations suggest that it may

TABLE 2
Paired *t*-tests (99 *df*) for differences between correlated means, for 5 vs. 0 correctly identified operator code bits, in the training-transfer (T), training-random (R), and training-scrambled (S) conditions; significant results are highlighted in bold

	Paired *t*-tests		
Hidden Nodes	T5-T0	R5-R0	S5-S0
10	**6.06**	−0.75	−0.24
16	**3.17**	−0.51	−0.64
30	1.35	1.03	0.35

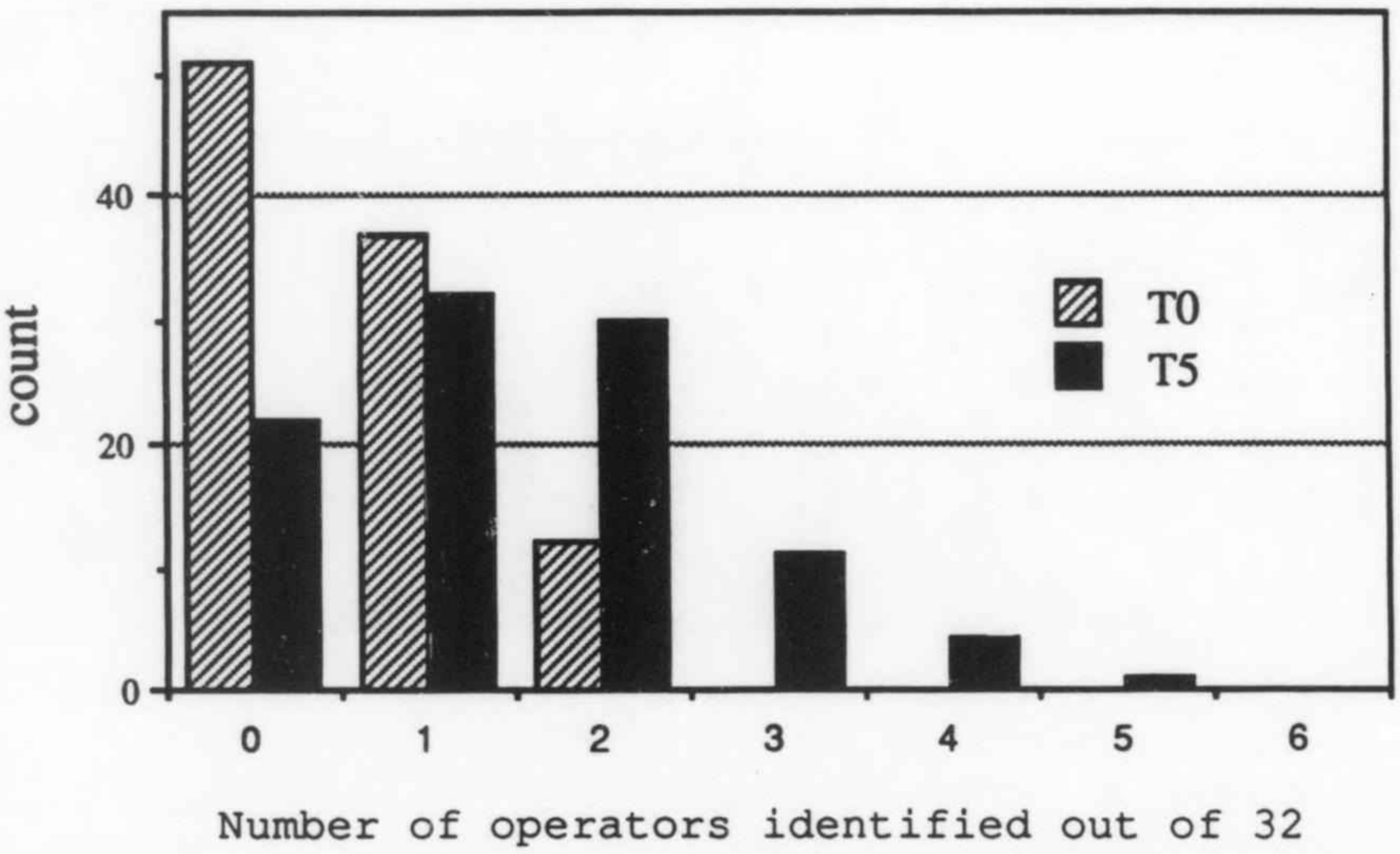


Fig. 4. Histogram for five and zero operator code bits correctly identified, out of a possible 32 operators, for the training-transfer (T0 & T5) condition, using a 10 hidden node network. In other words, in 100 training-transfer test repetitions, the mean number of times that zero operator code bits were identified was 0.61, whereas the mean number of times that all five operator code bits were identified was 1.4. Results shown in Table 2 show that this separation is seen only in the transfer datasets, and not in the random or scrambled datasets.

be possible to develop experimental protocols that are better suited for network analysis than protocols currently used to generate data in typical random event generator experiments.

For example, consider an experiment requiring an operator to attempt to simultaneously influence multiple RNGs. The multiple, parallel outputs of

TABLE 3

Means, standard deviations, and *t*-tests for transfer, random, and scrambled distributions; $N = 50$ training-transfer repetitions of a 20 hidden node network, trained for 2,000 passes; this network was presented with data from three independent series for each of nine operators, for a total of 27 lines of input;[11] significant tests are emphasized in bold

	5/5 Correct Matches
Transfer	
Mean	2.42
SD	1.09
Random	
Mean	1.24
SD	1.21
Scrambled	
Mean	1.64
SD	1.12
t(T-R)	**7.62**
t(T-S)	**5.13**
t(R-S)	−2.56

the RNGs would be fed into a network for analysis. With this form of parallel data, plus additional parameters such as direction of intention (e.g., high aim or low aim), feedback presentation style, age, gender, environmental variables, and so on, a network may be able to learn to associate operator identity with his or her data at a transfer rate approaching practical utility. Trial-by-trial parallel feedback displayed to operators could be more interesting than the typical display of numbers of hits, or linear graphs, and instead provide graphical representations of multidimensional phase relationships among the outputs of the RNGs.

Such displays would have the advantage of conveying more information to operators at a single glance, would allow more interesting forms of feedback (e.g., dynamically shifting coherent vs. chaotic shapes and colors), and would allow experimental protocols in which shift of a theoretical mean of a distribution would be secondary as compared to the relationships of means of independent binomial distributions. It may be that phase relationships are "easier" to influence than mean shifts because changes in phase do not require pushing a device against its normal operating probabilities, that is, different phase relationships among the outputs of independent random generators can be achieved without shifting the individual distribution means beyond chance expectation.

Endnotes

[1] For an introduction to the capabilities and theories of neural networks, see the special issue of *IEEE Computer, 21,* 1988.

[2] I am indebted to Robert Jahn, Roger Nelson, and Brenda Dunne for providing a copy of this dataset, which was retrieved from computer tape archives maintained by the PEAR laboratory.

[3] Note that under the null hypothesis, it should not matter when or by whom the data was collected, so the present method would offer no advantage in identifying "signatures."

[4] In other words, $V = (\Sigma\ Z^2/N)$, where $N = 25$.

[5] I will allow the interested reader to figure out why this is so, with the hint that successive operator codes in the training set are sequential binary numbers.

[6] The program allows a wide variety of parameters to be set, including variables related to how fast the network learns, how many nodes there are, the range for initial random weights used to interconnect the nodes, and so on. I am indebted to Stephen Hanson and Robert Masterson for their gracious assistance with this software. See the Appendix for the activation and learning rule equations.

[7] The back-propagation method used here is an extension of the well-known generalized delta rule (Rumelhart, Hinton, & Williams, 1986), allowing the use of non-euclidian error signals. Hanson & Burr (1987) have shown that this method is particularly effective with noisy data.

[8] In this network, output activation levels were continuous-valued numbers between 0 and 1.

[9] The variance in the transfer dataset comes from the randomness in the neural network's initial state, whereas the variance in the random and scrambled datasets come from two sources: randomness in the network and randomness in the pseudorandomly generated data. Thus, in statistical terms, the *t*-test is conditional on the transfer dataset.

[10] This computer runs at about 12.5 million instructions per second (MIPS), which suggests why neural network analyses have only recently become practical.

[11] It should be noted that the number of training passes, hidden nodes, training-transfer repetitions, and so on, were chosen by experience with these networks rather than by algorithmic or formal criteria. This is because the state-of-the-art of neural networks remains more of an art than a science.

References

Babu, S. (1987). Analysis of variance of REG data. In D. Weiner & R. D. Nelson (Eds.), *Research in parapsychology 1986* (pp. 1–5). Metuchen, NJ: Scarecrow Press.

Barlow, D. H., & Hersen, M. (1984). *Single case experimental designs: Strategies for studying behavior change* (2nd ed.). New York: Pergamon Press.

Berger, R. E. (1988). In search of "psychic signatures" in random data. In D. Weiner & R. Morris (Eds.), *Research in parapsychology 1987* (pp. 81–85). Metuchen, NJ: Scarecrow Press.

Hanson, S. J., & Burr, D. J. (1987). Minkowski-R back-propagation: Learning in connectionist models with non-euclidian error signals. To appear in *Proceedings of First IEEE Conference on Neural Networks.*

Jahn, R. G., & Dunne, B. J. (1986). On the quantum mechanics of consciousness, with application to anomalous phenomena. *Foundations of Physics, 16,* 721–772.

Jahn, R. G., & Dunne, B. J. (1987). *Margins of reality.* New York: Harcourt Brace Jovanovich.

Jahn, R. G., Dunne, B. J., & Nelson, R. D. (1987). Engineering anomalies research. *Journal of Scientific Exploration, 1,* 21–50.

Jones, W. P., & Hoskins, J. (1987, October). Back-propagation: A generalized delta learning rule. *Byte,* pp. 155–162.

Materna, T. (1987, June). Neural networks enter high speed marketplace. *Computer Technology Review,* pp. 1–30.

McConnell, R. A. (1989). Psychokinetic data structure. In L. Henckle & R. Berger (Eds.), *Research in parapsychology 1988* (pp. 16–19). Metuchen, NJ: Scarecrow Press.

Nelson, R. D., Dunne, B. J., & Jahn, R. G. (1984). *An REG experiment with large data base capability, III: Operator related anomalies* (Technical Note PEAR 84003). Princeton Engineering Anomalies Research, Princeton University, School of Engineering/Applied Science.

Nelson, R. D., Dunne, B. J., & Jahn, R. G. (1986). Operator-related anomalies in physical systems and information processes. *Journal of the Society for Psychical Research, 53,* 261–286.

Radin, D. I. (1985). Pseudorandom number generators in psi research. *Journal of Parapsychology, 49,* 303–328.

Radin, D. I., & Nelson, R. D. (1987). *Replication in random event generator experiments: A meta-analysis and quality assessment* (Technical Report HIP 87001). Human Information Processing Group, Department of Psychology, Princeton University.

Radin, D. I., & Nelson, R. D. (in press). Evidence for consciousness-related anomalies in random physical systems. *Foundations of Physics.*

Roberts, C. S. (1982, January 20). Implementing and testing new versions of a good 48-bit pseudo-random number generator (Bell Laboratories Technical Memorandum, publication no. TM-82-11353-1).

Rumelhart, D. E., Hinton, G. E., & Williams, R. J. (1986). Learning internal representations by error propagation. In D. E. Rumelhart & J. L. McClelland (Eds.), *Parallel distributed*

processing, Explorations in the microstructures of cognition, Volume 1: Foundations (pp. 318–362). Cambridge, MA: MIT Press.
Shriver, B. D. (1988). Artificial neural systems. *Computer, 21*(3), 8–10.
Weisburd, S. (1988). Fingerprinting DNA from a single hair. *Science News, 133,* p. 262.
Widrow, B., & Winter, R. (1988). Neural nets for adaptive filtering and adaptive pattern recognition. *Computer, 21*(3), 25–40.

Appendix

This semilinear function used to calculate activation in the forward pass is from Rumelhart, Hinton and Williams (1986, p. 329):

$$o_{(pj)} = \frac{1}{1 + e^{-\Sigma_i w_{(ji)} o_{(pi)}}},$$

where

o is the output activation,
p is a pointer referring to the hidden or output layer of nodes,
w are the interconnection weights from input to hidden, or hidden to output nodes,
i ranges over the number of input or hidden nodes, and
j ranges over the number of hidden or output nodes.

For the backwards pass, the back-propagation error (Δ) is computed for output nodes as:

$$\Delta_j = \mathrm{SGN}|t_j - o_j|^{(r-1)} * o_j * (1 - o_j),$$

where

SGN is the sign of $(t_j - o_j)$,
t is the teacher signal (the desired output),
o is the observed activation level at the output node,
and r is a real number (chosen as $r = 3$ for all network simulations reported here).

Now Δ for hidden nodes is calculated as:

$$\Delta_j = \sum_{k=1}^{\mathrm{Nout}} \Delta k * w_{(jk)} * h_j * (1 - h_j),$$

where

Nout is the number of output nodes,
Δ_k is the activation on an output node,
w is the interconnection weights between hidden and output nodes, and
h is the activation on hidden node j.

We then modify the weights in the network according to the rules:

$$\Delta_{ji}(t + 1) = \alpha * \Delta ji(t) + \epsilon * \Delta j * \mathrm{activation}_i,$$

and

$$w_{ji} = w_{ji} + \Delta_{ji},$$

where

α controls the "inertia" of learning in the network,
ϵ controls how fast the network learns,
t is the time or processing cycle number, and
activation_i is the amount of activation on node i.

Note that weights are updated after each presentation of an input/output pair, and the amount of change depends on how much the weights were changed on the previous cycle (and the value of α).

Journal of Scientific Exploration, Vol. 3, No. 2, pp. 201–212, 1989
Pergamon Press plc. Printed in the USA.

0892–3310/89 $3.00+.00
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A Case of Severe Birth Defects Possibly Due to Cursing

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Abstract—For centuries it was widely believed that a strong unpleasant shock to a pregnant woman could cause birth defects in her baby. Medical books and journals published numerous cases of this type up to the early decades of the present century. The idea of "maternal impression" gradually lost ground during the 18th and 19th centuries, mainly because it seemed to conflict with the facts of physiology. In cases of "maternal impression," the pregnant mother was usually reported to have viewed someone with a shocking deformity that her baby was said to reproduce. It has also been thought that cursing, verbally inflicted and without a visual stimulus, could produce birth defects. Three cases of this type, one published by a pediatrician in 1960, are briefly reviewed, and then a new case is reported. In both of the modern cases, the commonly recognized etiological factors in birth defects could not be identified.

Children who claim to remember previous lives are often born with birthmarks and birth defects that correspond to wounds or other marks on a person whose life the child later remembers. In many cases the evidence of such correspondence depends on the memories of informants who saw the deceased person's body; but in some 30 cases, medical documents, usually postmortem reports, have provided the stronger evidence of a contemporaneously written record of the wounds. I have reported a few cases of this type (Stevenson, 1966/1974) and am preparing to publish reports of a much larger number of cases with fuller documentation, including photographs of the birthmarks and birth defects. The birthmarks and birth defects occurring in these cases are not, for the most part, of the commonly recognized types; and it has been possible to exclude in most cases all the recognized

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A report of the case here presented will be included in a work now in progress that will describe a large number of cases suggestive of reincarnation the subjects of which had birthmarks and birth defects possibly deriving from previous lives they remembered. A much abbreviated report of the case has been published elsewhere (Stevenson, 1985). I am publishing the present report in the hope of stimulating discussion of this case (and similar other ones) and of their best interpretation.

I wish to thank Godwin Samararatne and Tissa Jayawardene for assistance as interpreters in the study of the case and for conducting some additional interviews. Ms. Emily W. Cook gave helpful suggestions for the improvement of the paper. The comments of four reviewers assisted me in adapting the case report for this journal.

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physical causes of birthmarks and birth defects, such as genetic factors and illness of the mother during her pregnancy.

In many cases of the type just mentioned the child's mother had seen the dead body of the person her child later claimed to have been. In others she had not seen the body, but had heard descriptions of its wounds. Under these circumstances it could be supposed that images in her mind of the dead person's wounds had somehow affected the body of her child and produced in it birthmarks or birth defects corresponding to the images in the mother's mind and thus also to the dead person's wounds. As I continued my investigations of these cases I learned that the hypothesis of maternal impression—to give the process I have just described its usual name in English—was a serious rival to other interpretations of these cases, including reincarnation.

The principal case reported in this paper illustrates the competition between the hypothesis of maternal impression and that of reincarnation, if we decide from the evidence that some paranormal process seems to have been involved. I hope to facilitate appraisal of the case report by first giving a brief account of the hypothesis of maternal impression and summaries of 3 published cases in which cursing provided the source of the possibly causative imagery in the mind of a pregnant woman who gave birth to a defective child.

The Concept of Maternal Impression as a Cause of Birth Defects

It was widely believed for centuries—by laypeople and physicians alike—that strong mental impressions in a pregnant woman could cause birth defects (or birthmarks) in the baby born of her pregnancy. Authors of reports of such cases frequently drew attention to close correspondences of site and appearance between some shocking deformity seen by the pregnant woman and the birth defect of her later-born child. For example, if the sight of a man with deformed feet had frightened a pregnant woman, her baby's congenitally deformed feet would be attributed to this fright (Montgomery, 1857, pp. 35–36). The medical literature of the 18th and 19th centuries contained numerous reports of cases of this kind.

Even in the 18th century voices of skepticism, such as that of the famous obstetrician William Hunter,[1] were heard. These, however, did not stop the publication of reports of such cases in medical journals. In 1890 Dabney reviewed and analyzed 90 cases of maternal impression, reports of which had been published between 1853 and 1886 (Dabney, 1890). Nevertheless, by that time the hypothesis of maternal impression was steadily losing popularity, and only sporadic reports of apparently exemplifying cases occurred in the early years of the 20th century. By the middle of this century, authorities on teratology discounted and even derided the concept (Barrow, 1971; Warkany, 1959, 1971). Warkany (1959, p. 89) pointed out that the hypoth-

esis of maternal impression lost credibility with advances in anatomy and physiology during the 19th century. "It was known," he wrote, "that the maternal and fetal circulations were separated. How could images be transmitted through the placenta?"

One possible answer to this question is that the influence might be transmitted through some paranormal process as yet not recognized, let alone understood. A careful study of the published reports of cases of maternal impression and the investigation of a few cases that have come under my direct observation have convinced me that the hypothesis of maternal impression deserves renewed attention. I do not expect any reader to agree with my judgment on this matter until he or she has studied the extensive review of reported cases that I have included in my mentioned forthcoming work. This will provide summaries of about 50 cases in which a pregnant woman, after seeing (or occasionally after hearing about) an *unusual* injury or deformity, gave birth to a baby with birthmarks or birth defects corresponding closely to the apparently stimulating injury or deformity that the woman had seen or learned about.

Cursing as a Generator of Maternal Impressions

In the standard case of a birth defect attributed to a maternal impression (as published in the 19th century and the first decades of this one), the mother had nearly always been directly exposed to the sight of some shockingly deformed person. However, a few cases have been reported in which the mother was said to have imagined (and caused) a congenital deformity in her child without any visual experience to guide her. In these cases the mother-to-be would only have heard a description of wounds or defects narrated by someone else who had seen them, such as her husband.

A subgroup of cases without direct visual stimulation of the woman's mental imagery is that occurring with a curse. When one person curses another, the cursing person evokes in the cursed one mental images of some unpleasant and even fatal event that is to happen.

The medical literature on cursing is sparse. There is now widespread skepticism in the West about the efficacy of cursing, and one is surprised to find an occasional educated Western person who believes in its power (Raine, 1977, p. 73). Reports of the effects of cursing, moreover, rarely mention that the curse had specified a particular penalty that the cursed person was to endure; he or she should suffer or die, but was usually not told how (Burrell, 1963; Mathis, 1964). However, I have found 3 published reports of cases in which the cursing person predicted birth defects in a child of the person cursed. I shall summarize them next.

Readers may think that the first 2 of these cases deserve only the status of legends because, although reports of them were published in the 19th century, their origins lay much farther back. This means, however, that the cursing occurred during a period when people believed in the power of cursing, and such a belief may be necessary for a curse to be effective.

The birth defect in both these cases was that of hereditary brachydactyly, which, by the time of the proband's life, had already afflicted in one case nine generations of the family (Kellie, 1808), in the other six generations (Mackinder, 1857). These cases occurred in different parts of England (Uxbridge and Gainsborough), but both were said to have begun, generations earlier, in the cursing of a pregnant woman by her husband and for the same offense. (Perhaps the families were distantly related and the same account became transmitted in two lines of descent.) In each case, the husband of the unfortunate woman had cultivated fruit trees with great solicitude, and, when the time came to pluck the fruit, he had strictly forbidden anyone else in his household to take the first fruit. The fruit nevertheless disappeared. The enraged man then cursed the thief. In the earlier of these two accounts the man "with dreadful rashness wished, that if she [his wife] was guilty, the child which she was then with might be born without fingers" (Kellie, 1808, p. 253). In the second case the angry man was said to have "cursed the thief, and prayed, for so heinous an offence, that the fingers which touched the apple might all be chopped off. His wife, *enceinte,* feared much . . . , but dared not confess the crime . . . a child was born; but, sad to tell, the fingers which its father had wished to be amputated had strangely forgotten to grow" (Mackinder, 1857, p. 846).[2]

The next case known to me occurred in Australia and in modern times (Turner, 1960). It is that of an infant with almost complete amelia that followed a cursing of the baby's mother by her mother. The former, a 16-year-old Australian girl, had become illegitimately pregnant in the hope of forcing her parents to allow her to marry a Maltese man of whom they strongly disapproved. The girl's mother, instead of consenting to the marriage, became angry, roundly cursed her daughter, and said that if she continued with the pregnancy the baby would be born "without arms and legs, and blind" (p. 502). (The mother first cursed her daughter during the 5th or 6th week of the pregnancy.) Several persons witnessed the cursing, and the mother repeated it every 2 or 3 weeks in letters to her daughter during the remainder of the pregnancy. The pregnancy ran to term, and the daughter was delivered of a gravely deformed male baby. Both the infant's legs were absent, and of the right arm only the proximal half of the upper part was present. The left arm was normal down to the hand, but it had only two fingers. The infant seemed otherwise normal and was probably not blind. It was cared for in the hospital of its birth for 6 months and then transferred to a babies' home, where it died at the age of 7 months.

Dr. Elizabeth Turner (a pediatrician), who reported this case, found no evidence that any of the commonly recognized etiological factors in birth defects had occurred in it. Since Turner published her report before excessive consumption of alcohol had been clearly identified as a factor in causing birth defects, I corresponded with her about this possibility. She assured me that alcohol could not have been a causative agent in the case. (She mentioned in her letter to me of October 27, 1978 that she had become

aware of the teratogenic effects of alcohol before other pediatricians had published papers bringing this factor in birth defects to widespread attention.) So far as she could tell, the stress of the cursing by the pregnant woman's mother was the only causative factor identified in the case. After briefly reviewing some evidence from pharmacological experiments bearing on the role of stress in causing reduction deformities of limbs, Turner concluded her report by expressing the "hope that it may stimulate others with experience of similar cases to document and record them" (p. 503).

Case Report

A research assistant of mine in Sri Lanka (Tissa Jayawardene) noticed in a newspaper a photograph of a male infant, S.P., who had been born (on August 13, 1980) without arms and with deformed legs. Knowing of my interest in unusual birth defects, he went to the village where the baby lived and photographed the baby himself, afterward sending me a photograph of the baby, who was then 4 months old (see Figure 1). When I was next in Sri Lanka (in October 1982), I went to the village of the baby's family, but learned that he had died (of "some urinary trouble") in April 1982, at the age of about 20 months. He was then just beginning to speak.

The photograph showed almost all that I could learn about the baby's birth defects. There was complete absence of the arms. A finger nubbin was visible at the left shoulder; I do not know whether there was one at the corresponding site of the right shoulder. Both legs were morphologically normal, but both feet were deformed and turned medially; plaster casts (visible in the photograph) had been applied in the hope of correcting the deformities. At the time of his death, the baby could crawl, but could not walk well because of his deformed feet.

I inquired of the child's father whether he knew of anyone in his family or circle of acquaintances who had lost his arms before dying.[3] It turned out that he did. The person in question was someone whom the father (with his brother) had murdered in February 1974. The father then narrated the following history, which I corroborated (in its essential features) from the baby's mother, its uncle, and other villagers, particularly members of the murdered man's family.

The murdered man, Y.S., was, at the time of his death, 25 years of age and married. He had been in his village what the Sinhalese call a "chandiya," by which they mean someone who is rough, tough, and given to bullying other people. He had a record of violent behavior, as had other members of his family. His older brother told me, *en passant,* that he (the informant) had himself killed three men; and their father had died when he had nervously dropped a bomb that he was preparing for use against his enemies in the village. Y.S.'s older brother also told me that Y.S. had been "ruthless," and he compared him to the German soldier Field Marshal Erich Rommel.



Fig. 1. S.P. at the age of 4 months. There is complete absence of both upper limbs. Both feet have the defect known as talipes equinovarus and plaster casts have been applied with a view to correcting the deformities.

A quarrel over Y.S.'s dog, which had entered the house of one of his adversaries and eaten a cooked curry, began with the womenfolk and spread to the men. The baby's father and uncle decided to finish with Y.S. They arranged somehow for him to be made drunk with alcohol and lured over to their side of the village. They then cut off his arms and legs with a sword. Other villagers, angry at Y.S., came, like the lesser senators at Caesar's murder, and inflicted additional wounds.

I obtained a copy of the postmortem examination of Y.S.'s body. With regard to both legs and the right arm, the report confirmed that the distal portions of these limbs were almost fully severed from their proximal parts. It described three deep wounds of the right arm. However, although it mentioned numerous other wounds including one of the left wrist, it did not mention any wound that nearly severed the distal part of the left arm. The

principal murderer and his brother, as well as four members of Y.S.'s family who had seen the body, all agreed that all the limbs had been nearly cut off so that the distal parts remained dangling. Discounting the testimony of the principal murderer and his brother, who were themselves drunk when they killed Y.S., and that of one of Y.S.'s relatives (who may compliantly have agreed with his mother), there remain the concordant statements on this detail of three other members of Y.S.'s family whom I happened to interview independently of each other. It is possible that, when the pathologist described the left arm, he slipped and wrote "right" when he should have written "left." It is also possible that my informants, remembering events of 8 and a half years earlier and aware of S.P.'s birth defects, harmonized their memories to accord with the birth defects.

The principal murderer (S.P.'s father) and his brother (who had helped him) were arrested, tried, and sentenced to 3 years in prison. The prison permitted the murderer to have frequent day-long passes when he would visit his wife, and they were therefore able to continue having children.

Y.S.'s death sorely affected his mother, and she believed that the punishment imposed by the terrestrial court was insufficient retribution for her son's murder. S.P.'s mother told me that Y.S.'s mother several times said to her publicly: "For killing my son, you will have a deformed child." (Even though the murderer's wife had not participated directly in the murder, the wrath of Y.S.'s mother fell on the entire family.) Y.S.'s sister corroborated to me that their mother had had the habit of cursing the murderer's family whenever she went by their house; but she did not recall the specific detail of her wishing the family to have a deformed child. Y.S.'s mother, whom I also interviewed, denied that she had made such a specific curse against the family. She said that she had merely called on the gods—Kataragama and Vishnu—to punish the murderer in some way. (I do not believe she would have admitted to me that she had cursed the mother, and I think that S.P.'s mother was speaking the truth about the nature of the curse.)

Both the murder itself and the subsequent curse troubled the murderer's wife. She recalled mentioning to her husband that Y.S. might be reborn as their son, and when she became pregnant she feared that her baby might be deformed. Then a daughter was born and was normal. The murderer's wife relaxed, thinking that the curse had somehow been neutralized. She and her husband were dismayed, therefore, but not entirely surprised, when her next pregnancy ended in the birth of the badly deformed male infant, S.P.

Excluding Known Causes of Birth Defects

None of the ordinarily recognized causes of birth defects are identified in this case. The parents were not related, at any rate closely; since they came from the same village they might have had some remote common ancestor.

I inquired about other birth defects in the family and was told there were none. (The several members of the family whom I saw—S.P.'s parents,

paternal uncle, and one sister—had no limb defects.) After my interviews I felt dissatisfied with the completeness of the family history I had obtained, and at my request Tissa Jayawardene returned to the village and inquired about every member of the two families of S.P.'s parents with regard to their having had birth defects. His informants were S.P.'s mother, one of his paternal aunts, and the latter's husband. He drew genealogies to assure completeness of the information. This survey included S.P.'s three siblings, all 20 of his cousins, all eight of his uncles and aunts, and three of his grandparents. Information could not be furnished about one grandparent, presumably because she had died when the informants were quite young. None of these persons suffered from any birth defect known to the informants. The only abnormality they recalled for any of these persons was "mental weakness" in one of S.P.'s cousins.

S.P.'s mother told me that she had enjoyed good health during her pregnancy with S.P., and that she had taken no drugs or alcohol. After my interview with S.P.'s mother, Godwin Samararatne (my senior assistant in Sri Lanka) had a further interview with her concerning the medical care she had received during her pregnancy with S.P. He learned the following details: When her pregnancy was at 5 months, she attended a clinic in a nearby town and was told her pregnancy was normal. She returned to the clinic at 6 months, was examined by the medical officer, and was again told the pregnancy was normal. She was given some tablets, probably vitamins. At the 8th month she again attended the clinic and was told the pregnancy was normal. She was examined this time by the head nurse, but not by the doctor, apparently because the pregnancy was still judged normal. Records of these visits were not obtainable, but we did obtain a copy of the record of S.P.'s delivery at a nearby hospital. The delivery was described as taking place normally at full term. The hospital report noted the absence of the upper limbs of the baby and talipes equinovarus of the feet. The baby was also noted to have a hydrocele.

Discussion

I shall first describe the interpretations of this case favored by the informants and then offer my own opinion.

The idea that some events happen by chance is a Western notion and a relatively recent one (in its widespread acceptance) even in the West. The majority of men and women have believed, and the majority of them still believe, that we can find causes for everything that happens to us, as individuals, if only we seek well enough. Moreover, causes are, ultimately, due to the conduct or misconduct of persons. Accordingly, my informants considered that some personal factor had entered into the causation of the birth defects in S.P.

All the informants were Theravadin Buddhists and believed in reincarnation. (Their everyday religion is syncretistic, not pure Buddhism, and it

permits appeals during life's crises to Hindu gods, such as Vishnu and Kataragama.) S.P.'s parents believed that S.P. was the murdered Y.S. reborn, with congenital deformities corresponding to the wounds on Y.S. On the other hand, Y.S.'s mother and older brother could not accept that Y.S., who had, after all, been the victim in the murder, could be reborn as a deformed child. Why should he suffer, they reasoned, for another's crime? They believed that S.P.'s birth defects were a punishment of his parents for the crime of murdering Y.S.

Although most Sinhalese people believe in maternal impressions, none of my informants mentioned a maternal impression as a possible cause of the birth defects. S.P.'s mother had not viewed Y.S.'s dead body (although she must have heard the descriptions of the wounds); nor was she pregnant at the time of the murder. These features are usually present in "standard" cases of maternal impression, and their absence in this case may have led the informants to set this interpretation aside.

However, the members of Y.S.'s family who believed that S.P.'s birth defects punished his family for the murder must also have believed that the cursing (whatever specific words were used) had been successful. Sorcery is widely practiced in Sri Lanka and its efficacy generally believed in. In sorcery the complainant hires a priest to invoke the supernatural powers of gods in order to punish—with injury, illness, or death—a person who has seriously offended him. The act of sorcery is a kind of vicarious cursing. It appears to be much commoner than face-to-face cursing, because Obeyesekere (1975, p. 16) found that only 10% of surveyed clients at three Sri Lanka sorcery shrines had engaged in personal confrontation with their adversaries. Only 4% (included in the mentioned 10%) had engaged in physical or verbal abuse, which might, we could suppose, have included a direct cursing.

In offering my own opinion of the case I must first disclaim any intention to suggest that we can draw a firm conclusion from this single case. My only purpose in presenting it is to bring to readers' attention the possibility that images in a pregnant woman's mind may influence the form of her baby's body.

We now know a great deal more about the causes of birth defects, in medical terms, than was known 100 or even 50 years ago. Genetic factors, excessive alcohol and certain drugs taken by a pregnant woman, and some illnesses, especially rubella (German measles), occurring during pregnancy have all been clearly identified as factors in birth defects. Older maternal age also predisposes to the occurrence of some birth defects, particularly Down syndrome. All these factors should be considered and excluded before we entertain other possibilities. Having done that, however, we are entitled to consider other explanations. All the known causes of birth defects together explain only 30–35% of them (Wilson, 1973). There remain 65–70% in which physicians must acknowledge that they have no explanation. I believe that in Turner's case and in the one reported here we can exclude the known

causes of birth defects. For these cases we can, therefore, consider other possible causative factors.

Although not excluding chance as firmly as my informants did, I believe that there was *some* causal connection between the wounds on Y.S. (which were highly unusual) and the birth defects of S.P. (which were also unusual[4] and corresponded with satisfactory closeness to Y.S.'s wounds).

Bodily changes that correspond to mental images may occur through psychosomatic processes as in cases of stigmatism (Thurston, 1952) and the reproduction of wounds during the revival of memories of traumatic experiences (Moody, 1948). However, the placental connections between mother and embryo include no nervous pathways and permit the passage of few proteins from mother to embryo. It is therefore difficult to understand how the mother's thoughts could influence the embryo through normal processes.

A direct psychokinetic effect of the cursing woman on the embryo is theoretically possible, but lacks the support of a case parallel to the present one in which the mother did not know that her baby had been the object of a cursing. At least I do not know of any such case. Accordingly, in order to account for the correspondence between the curse and S.P.'s birth defects, I favor other paranormal explanations: a maternal impression and reincarnation.

S.P.'s mother was not pregnant at the time of Y.S.'s murder, and although she had probably not entirely forgotten the curse when she became pregnant with S.P., it seems to have sunk into the lower levels of her mind. It certainly did not preoccupy her in the manner usually described by women figuring in cases of maternal impressions. These considerations make me slightly favor the hypothesis that S.P. was Y.S. reborn. I need hardly add that, considered as an instance of reincarnation, the case is much weaker in evidence than the many cases in which the subject, when old enough to speak, made numerous verified statements about the previous life he then claimed to remember. S.P. died before he had begun to speak coherently, and we do not know whether he would have expressed any memories of a previous life if he had lived. I have investigated a few other cases (to be published) in which a birth defect was the only (or almost the only) item of evidence linking a subject with a particular deceased person.

If we seriously consider either maternal impression or reincarnation as an explanatory hypothesis for this case (and similar ones) we are bound to ask how images in the mind of one person (respectively, in this case, the pregnant mother-to-be or the murdered man) can influence the form of an embryo. This question leads to conjectures about an intermediate vehicle that somehow acts as a template for the communication of physical form from one body to another. I intend to discuss this possibility in the larger work from which I have extracted this case report. To do so here would carry me beyond my stated intention in presenting this case and also far beyond the warrant for such conjectures that a single case can provide.

Endnotes

[1] Authors skeptical about maternal impressions sometimes state that William Hunter conducted a prospective study of pregnant women who claimed they had been frightened but who nevertheless gave birth to normal babies. Charles Darwin (1868) stated that Hunter described this study and its negative results to his father, Dr. Robert Darwin. However, such an investigation was never published and probably was never carried out. Two authorities on William Hunter whom I consulted knew nothing about it. It remains true, however, that Hunter inveighed against the belief in maternal impressions in his lectures (Hall, 1785).

[2] In this case the husband (and father) did not aim his curse at the unborn baby as did the husband (and father) of the first case. However, one may suppose that both the women cursed had somewhat similar mental images after being cursed.

[3] I asked this question with the hypothesis of reincarnation in mind and from my experience with children having severe birth defects that corresponded to fatal wounds in a person whose life the child later remembered. As mentioned, full details of such cases will be published in a forthcoming book.

[4] Birch-Jensen (1949) stated that the incidence of amelia of the upper arm at birth was 1 in about 270,000. Frantz and O'Rahilly (1961) found that among 13 cases of amelia of the upper arm, 7 (54%) were bilateral. Combining these data we can estimate that the incidence of bilateral amelia of the upper arm is about 1 in 500,000 births. The condition is so unusual that it is not even mentioned in the usual inventories of the incidences of common congenital deformities. (Amelia did occur more commonly during the brief epidemic of thalidomide intoxication, but that drug was not in question in the present case.)

References

Barrow, M. V. (1971). A brief history of teratology to the early 20th century. *Teratology, 4,* 119–130.

Birch-Jensen, A. (1949). *Congenital deformities of the upper extremities.* Copenhagen: Andelsbogtrykkeriet i Odense and Det Danske Forlag.

Burrell, R. J. W. (1963). The possible bearing of curse death and other factors in Bantu culture on the etiology of myocardial infarction. In T. N. James & J. W. Keyes (Eds.), *The etiology of myocardial infarction* (pp. 95–100). Boston: Little, Brown.

Dabney, W. C. (1890). Maternal impressions. In J. M. Keating (Ed.), *Cyclopaedia of the diseases of children,* Vol. 1 (pp. 191–216). Philadelphia: J. B. Lippincott.

Darwin, C. (1868). *The variation of animals and plants under domestication.* 2 vols. New York: Orange Judd.

Frantz, C. H., & O'Rahilly, R. (1961). Congenital skeletal limb deficiencies. *Journal of Bone and Joint Surgery, 43-A,* 1202–1224.

Hall, C. (1785). *The medical family instructor: Containing a selection of interesting subjects, calculated for the information and preservation of mankind, together with the management of child-bed women, and children.* Shrewsbury: T. Wood.

Kellie, G. (1808). Case of defect in the fingers. *Edinburgh Medical and Surgical Journal, 4,* 252–253.

Mackinder, D. (1857). Deficiency of fingers transmitted through six generations. *British Medical Journal, ii,* 845–846.

Mathis, J. L. (1964). A sophisticated version of voodoo death: Report of a case. *Psychosomatic Medicine, 26,* 104–107.

Montgomery, W. F. (1857). *An exposition of the signs and symptoms of pregnancy.* Philadelphia: Blanchard and Lea.

Moody, R. L. (1948). Bodily changes during abreaction. *The Lancet, ii,* 934–935.
Obeyesekere, G. (1975). Sorcery, premeditated murder, and the canalization of aggression in Sri Lanka. *Ethnology, 14,* 1–23.
Raine, K. (1977). *The lion's mouth.* London: Hamish Hamilton.
Stevenson, I. (1974). *Twenty cases suggestive of reincarnation* (2nd ed.). Charlottesville: University Press of Virginia. (First published in 1966.)
Stevenson, I. (1985). Birth defects from cursing? A case report. *British Medical Journal, 290,* 1813.
Thurston, H. (1952). *The physical phenomena of mysticism.* London: Burns Oates.
Turner, E. K. (1960). Teratogenic effects on the human foetus through maternal emotional stress: Report of a case. *The Medical Journal of Australia, 47*(2), 502–503.
Warkany, J. (1959). Congenital malformations in the past. *Journal of Chronic Diseases, 10,* 84–96.
Warkany, J. (1971). *Congenital malformations: Notes and comments.* Chicago: Year Book Medical Publishers.
Wilson, J. G. (1973). *Environment and birth defects.* New York: Academic Press.

Journal of Scientific Exploration, Vol. 3, No. 2, pp. 213–216, 1989
Pergamon Press plc. Printed in the USA.

0892–3310/89 $3.00+.00
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LETTER TO THE EDITOR

Comments on Slanger's "Internal Clock"

The recent paper "Evidence for a short-period internal clock in humans" by Tom Slanger provides an excellent example of a very simple experiment where the experimenter is the operator, and the intriguing result may prove to be a particularly clear example of the "experimenter effect" (White, 1977). Slanger's analytical techniques are robust and the results are certainly persuasive. The possibility of subconscious rejection of data is openly acknowledged, and constitutes one possible explanation. An alternative is that the experimenter replicates a result that they find interesting by a process akin to remote viewing.

It is evident that multicellular organisms could develop extremely precise "internal clocks" which would reset in response to repeated environmental stimuli. The experiments reported by Slanger and his colleagues are most interesting to me both as a student of psi effects and as a naturalist interested in the awareness of time at the cellular level. The following previously unpublished work illustrated how little we understand about temporal effects in biosystems.

Exogenous stimuli such as repeated light-dark cycling trigger a wide variety of robust cyclic behaviors in single-celled motile microalgae which persist as "free running" rhythms long after the stimulus is removed. However, the internal cellular clock appears to be sensitive to a variety of secondary stimuli which combine in such subtle ways that a new culture of a clone of the same species will often behave dramatically differently to its precursor, for no obvious reason. Figure 1 illustrates the ability of the alga *Tetraselmis succia* to replicate rhythms initially developed by growth in 12-hour dark–12-hour light cycles after the light cycling was terminated. A 12-hour/ cycle is clearly evident, and it extends through two cell divisions.

The sensitivity of the time-keeping mechanism is illustrated in Figure 2, which shows a velocity and vector set obtained under conditions that were nominally identical. There is no obvious source of a four-hour stimulus in the lab environment, and no evident biological reason why four-hour cycling would be advantageous. It is this that is so interesting to the biologist: The cell seems to have responded to a very subtle change in the local environment by changing its time base. The change is so extreme that at first sight one would appear to be dealing with a different specie.

Any biological explanation of the phenomena which Tom Slanger describes must, as he has pointed out, account for the apparently unnecessary precision. The current evolutionary paradigm suggests that biological sys-

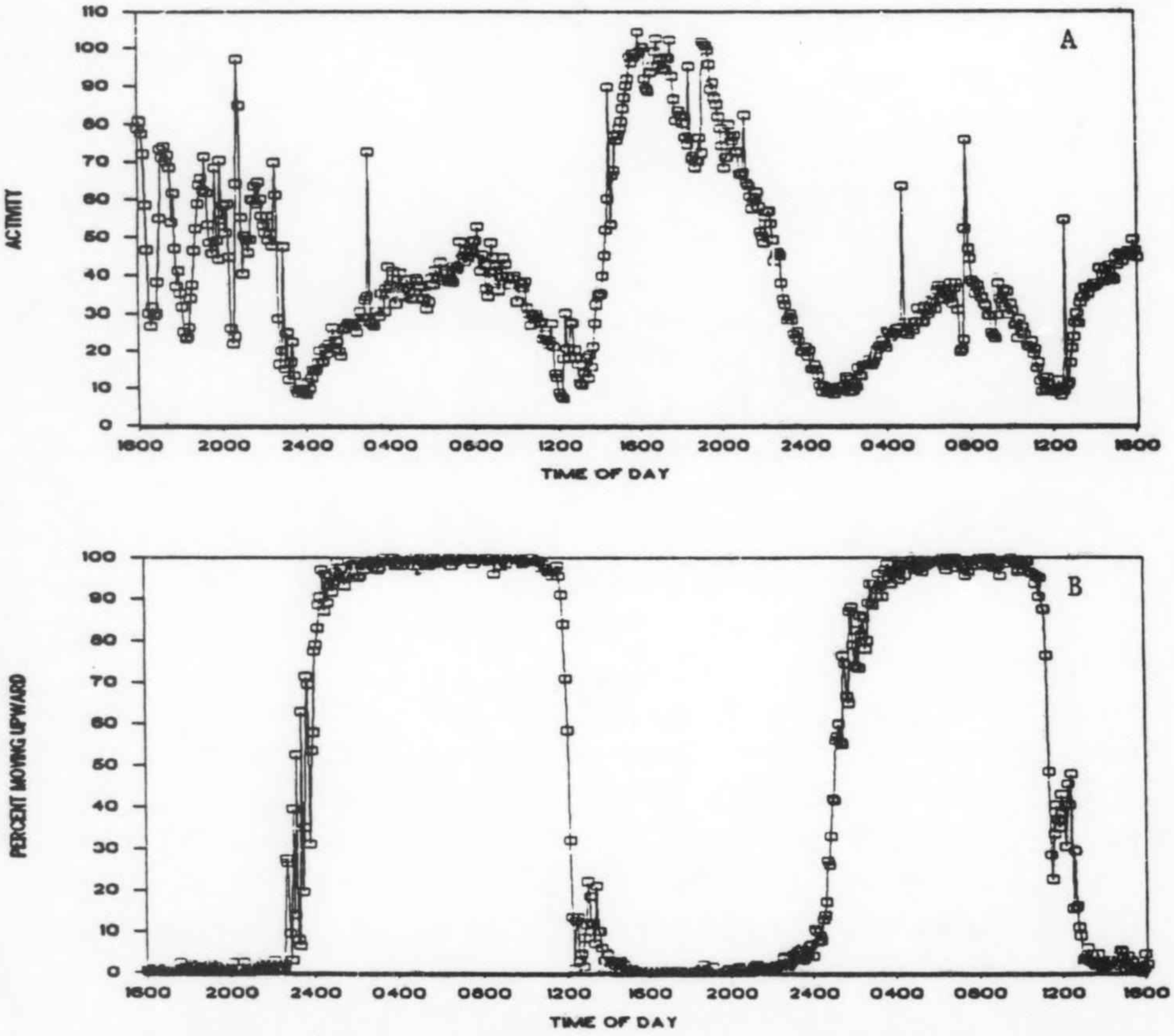


Fig. 1. Laser Doppler tracking of *Tetraselmis succia.* Single axis Doppler shifted He/Ne laser light scattered from the motile cells provides an analog of cell swimming speed (Activity, A) and motion, up or down (B). Data for records A and B are acquired simultaneously and overlaying A and B is appropriate. Although these cultures were initially grown in 12 on: 12 off light dark cycles, illumination throughout this experiment was constant.

tems, especially highly evolved ones, use internal devices whose tolerances contribute to the well-being of the whole. Why therefore should a highly evolved organism like *Homo sapiens* need to be sensitive to clock time to one part in 10^4?

The following suggestion correlates with my personal experience, and the general structure of the literature on the so-called "experimenter effect." (White, 1977). First, think of the act of looking at one's watch as a very simple classical experiment. The objective, apparatus, and method are all quite clear. Assume for the sake of discussion that the experimenter has a preferred form for the outcome; a subconscious preference for an "interesting" result would be quite sufficient. It is instructive to ask the personal question: If I sensed that I was observing an anomaly which was tractable (which could be the subject of repeated experiments by millions of people)

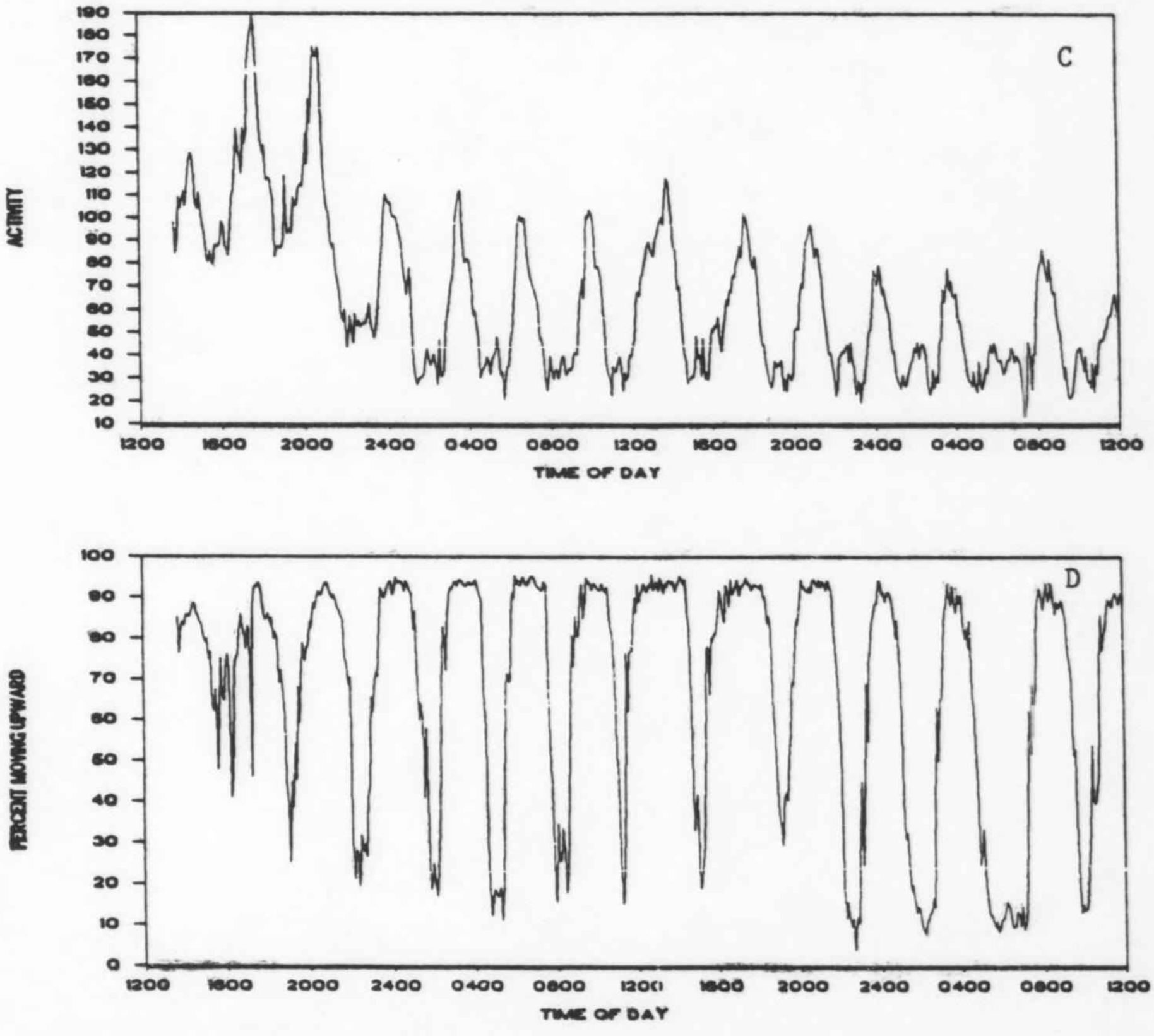


Fig. 2. Apparatus and method as in Figure 1. The culture was prepared from the same stock as A and C.

would I have a preference for a specific outcome? Surely everyone who has been drawn into science by the excitement of finding out more about life would have to admit to a preference for a stimulating result. This stimulus, derived from conscious or subconscious preference, may be one of the psychological factors that J. B. Rhine had in mind when he defined an experimenter "not simply, as would commonly be supposed, one who rules out all normal cues to the target and administers a randomized set of targets to the subject, but rather as one who can succeed in liberating the psi function under adequate testing conditions" (Rhine, 1961).

Needless to say, the suggestion that Slanger's intriguing result may be a direct manifestation of the experimenter effect has no value, in terms of an explanation. It is only a suggestion for a context. However, it is possible that the contextual map on which the phenomenon lies includes other psi phenomena, particularly the class known as remote viewing. Professional sailors used to be encouraged to train themselves to wake at precise times without the use of alarm clocks, and I have personally found that this skill is

quite readily acquired. Training generally involves visualizing a clock, whose hands have just reached the desired wake-up time, and associating that image with awakening. Many people find that they can do this with amazing consistency and precision, and it may be that the same supra-self functional in remote viewing is at work in the local environment, watching the clock, ready to inform the neurophysiological system when time reaches a point of interest.

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References

Rhine, J. B. (1961). New experimenters in parapsychology. *Parapsychology Bulletin, 58,* 1–4.
White, R. A. (1977). The influence of experimenter motivation, attitudes and methods of handling subjects on psi results. In B. B. Wolman (Ed.), *Handbook of parapsychology* (pp. 273–301). Jefferson, NC: McFarland.

Journal of Scientific Exploration, Vol. 3, No. 2, pp. 217–219, 1989
Pergamon Press plc. Printed in the USA.

0892–3310/89 $3.00+.00
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BOOK REVIEW

The Relativity Question, by Ian McCausland. Toronto: published by the author, Department of Electrical Engineering, University of Toronto, 1988, v + 111 pp. (paper).

In 1972, Herbert Dingle—a philosopher and acknowledged expert in relativity—published *Science at the Crossroads* (London: Martin Brian & O'Keeffe), a classic in the literature of scientific controversy. The book describes Dingle's attempt to have substantively addressed his claim that the formulation of the special theory of relativity is paradoxical.

According to the special theory, two clocks in uniform motion relative to one another keep (or perceive) time at different rates. But since there exists no preferred frame of reference against which to measure the speeds with which the clocks move, there is also no basis for deciding which of the clocks runs faster and which runs slower. Is that not paradoxical?

One obvious possible answer to Dingle's claim of paradox would be that neither of the two clocks *actually* runs faster than the other, it is just that each sees the other as running slower (or faster?). Some of the acknowledged experts in fact proffered that answer; but most did not, and some cited experimental evidence to show that the disparity in time-passing is physically real. Others again, despite having taught relativity to students, admitted to Dingle that they had not the insight into the theory to answer the "subtle point" he had raised. Most of those few who accepted Dingle's challenge—and also the editors of *Nature*—resorted to patent obfuscation: for instance John Ziman, who answered the question as to which clock runs faster thus: "the fastest working clock between any two events is one that travels between them by free fall." Never mind, apparently, that the *special* theory of relativity deals only with relative uniform motion, whereby gravitation and free fall and acceleration cannot be taken into consideration. (Einstein himself had committed this mistake when, in his original paper, he gave as illustration that a clock at the equator would run slower than one at the pole.)

Dingle died in 1978 without having received what seemed to him a satisfactory substantive answer to his question. Now Ian McCausland has taken up the story where Dingle's book left it, by commenting on the reviews that Dingle's book received and by relating his own attempts to have Dingle's Question receive a substantive answer. Both Dingle's book and McCausland's afford the opportunity to learn about little-recognized aspects of scientific activity; and the books should be required reading most particularly for those who attempt scientific exploration of anomalous phenomena.

Those who whiff "crank" at the hint of anti-Einstein or anti-relativity should be reassured: this is no attack on the *general* theory of relativity, in which time-dilation accompanies acceleration; nor is any claim being made as to what actually happens when two clocks are in uniform relative motion (if only because it is not taken for granted that there actually exists no physically preferred frame of reference). The Dingle Question is simply intended to show self-inconsistencies in the *formulation* of the *special* theory: the claim is simply that it is paradoxical to assert that two identical clocks, in a situation where there exists no basis for distinguishing the one from the other, can keep time at different rates, that time for those two clocks can actually pass at different rates.

In response, one has to say either, "Dingle is obviously right"; or—and much more commonly—one says, "Relativity is so complicated, recondite, subtle a matter that *I* can't possibly think about it; if the experts tell me that Dingle is wrong, and if their experiments seem to support them—or at least don't contradict them—then I have to believe them." And so "The Relativity Question" exemplifies the dilemma we all find ourselves in: matters of science and technology, matters indeed of life and death, are decided by the experts in language that seeks to exclude the laity; and we hesitate to push the experts to explain because we doubt our own ability to distinguish sense from nonsense when specialized technicalities are under discussion. Surely, however, one *can* discern it when a Ziman (see quote above) evades a question? Surely one *can* draw a conclusion when a President of the Royal Society (cited, with documentation, by Dingle) confesses lack of understanding of a subject that he teaches?

In this reviewer's opinion, this controversy illustrates several points that are germane to students of the anomalous:

1. When something works in science, it is used *and thereby implicitly accepted,* even if there is no physical basis for the mathematical formulation or if the physical basis ascribed to the mathematics is doubtful or even illogical. And further, the experts will deny that the physical interpretation is illogical or that any problem exists with it (unless and until some alternative view is in the offing).

This state of affairs runs counter, of course, to the popular view of science; but there are many examples of the refusal to see something wrong with an inadequate theory so long as no better alternative has been proposed: apart from the Dingle Question, note the acceptance over decades of the concept of the potential-independent electrochemical transfer-coefficient (Henry H. Bauer, 1968, *Journal of Electroanalytical Chemistry, 16,* 419–432); or, the acceptance by biochemists of the chemically meaningless concept of "energy-rich" bonds (Daniel E. Atkinson, 1988, *Science, 242,* 946–947); or, the ignoring of statistical fallacies in epidemiologic studies (Alvan R. Feinstein, 1988, *Science, 242,* 1257–1263). (I would be grateful for references to other instances of this, which one might call the ostrich phenomenon.)

2. Mainstream journals cannot cope well with unorthodoxy or controversy.

Even when they wish to be open to minority views—if only so as not to miss out on publishing a breakthrough—ultimately they must bow to the orthodoxy imposed by the processes of peer review. As a result, one periodically sees unorthodoxy published (though not without a struggle) only to find it quickly abandoned again or even attacked by the very periodical that first published it (whereupon the proponents of the unorthodoxy feel stabbed in the back, though they would also have been furious if they had not achieved publication in the first place). Nature's handling of the Dingle affair, well documented by McCausland and Dingle, is a case in point; earlier there had been erroneous denigration of sonar apparatus used in Loch Ness, and inept handling of remote-viewing studies; recently, the Benveniste affair. (Again, I would be grateful for references to other similar instances.)

3. Perhaps stimulated by frustration over these two types of response, protagonists of unorthodox views easily slip into making excessive claims. Thus Dingle sought to have authoritative bodies take formal part in his quest for an answer—when authority simply can have no proper *intellectual* role in science; and he sought to buttress that attempt by claiming that society finds itself in some great (albeit undefined) danger because of the acceptance by atomic physicists of the erroneous theory.

Finally, this controversy could help to teach humility by reminding us how very difficult indeed it is to advance intellectually, and that we all are prone to lapses that seem inexplicable to other reasonable people. Thus John Ziman's evasion of the Dingle Question seems incongruous since he has written arguably the best, authentic, accounts of science as an intellectual *and* social activity, in *Public Knowledge, The Force of Knowledge,* and *Reliable Knowledge* (all Cambridge University Press, respectively 1968, 1976 and 1978). If Ziman has such blind spots, then surely I—we all—have some too, and moreover of the very worst sort: ones we are incapable of knowing about.

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JOURNAL OF SCIENTIFIC EXPLORATION

A Publication of the Society for Scientific Exploration

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Author Index
Volume 3, 1989

PERGAMON PRESS
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JOURNAL OF SCIENTIFIC EXPLORATION

A Publication of the Society for Scientific Exploration

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Publishing, Subscription and Advertising Offices: Pergamon Press, Inc., Fairview Park, Elmsford, New York 10523, USA and Pergamon Press plc, Headington Hill Hall, Oxford OX3 0BW, England.

Published Two Per Annum. Annual institutional subscription rate (1990): US$100.00; *Two-year institutional subscription rate* (1990/91): US$190.00. *Professional subscription rate* (1990): US$40.00. Prices are subject to change without notice. Members of the Society of Scientific Exploration receive personal subscriptions as part of their dues; details of membership are available upon request. Notify 8 weeks in advance of address change with a copy of the subscription mailing label. *Back issues*: Back issues of all previously published volumes, in both hard copy and on microform, are available direct from Pergamon Press offices.

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The Item-Fee Code for this publication is: 0892-3310/89 $3.00 + .00

Printed in the U.S.A.

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Indexed/Abstracted in: *Chemical Abstracts, INSPEC Data, Geo Bib & Index*

Subscription Information
1990: Volume 10(12 issues)
Annual subscription (1990) **DM 1610.00**
Two-year rate (1990/91) **DM 3059.00**
ISSN: 0273-1177
(00644)

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Professional rate (1990)	DM 102.00

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Indexed/Abstracted in: *Current Contents, INSPEC, PASCAL-CNRS Database, World Aviation Directory*

Subscription Information

1989: Volume 37 (12 issues)
Annual subscription (1989) **DM 1315.00**
Two-year rate (1989/90) **DM 2498.50**
ISSN: 0032-0633

Advertising rate card available on request. Back issues and current subscriptions are also available in microform.
The German Mark (DM) prices shown include postage and insurance, and apply in Europe, Africa, Asia/Australasia (with the exception of Japan). For the rest of the world including Japan apply to the nearest Pergamon office. Prices and proposed publication dates are subject to change without prior notice.

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ISSN 0892–3310
(836)