Simon J. Sherwood and Chris A. Roe

A Review of Dream ESP Studies Conducted Since the Maimonides Dream ESP Programme

Abstract: *We review the dream ESP studies conducted since the end of the Maimonides research programme. Combined effect size estimates for both sets of studies (Maimonides r = 0.33, 95% C.I. 0.24 to 0.43; post-Maimonides r = 0.14, 95% C.I. 0.06 to 0.22) suggest that judges could correctly identify target materials more often than would be expected by chance using dream mentation. Maimonides studies were significantly more successful ($p < 0.05$) than post-Maimonides studies, which may be due to procedural differences, including that post-Maimonides receivers tended to sleep at home and were generally not deliberately awakened from REM sleep. Methodological shortcomings of some studies are discussed. Nevertheless, home dream ESP research has been successful and continues to be a less expensive and less labour-intensive alternative to sleep-laboratory-based research. We hope that interest in dream ESP research will be re-awakened.*

This paper aims to review studies of alleged dream extrasensory perception (ESP) conducted since the end of the Maimonides research programme and to compare and contrast their respective methodology and success.

As defined by Irwin (1999, p. 6), 'An *extrasensory experience* is one in which it appears that the experient's mind has acquired information directly, that is, seemingly without the mediation of the recognized human senses or the processes of logical inference'. ESP can be further classified: telepathy (information about the present obtained from another person); clairvoyance (information about present events or objects obtained from the environment); precognition (information about future events); retrocognition (information about past events).

Many spontaneous case reports of alleged ESP occur while the experients are in some kind of altered state of consciousness (ASC) (see Alvarado, 1998). Case

Correspondence:
Simon Sherwood, Division of Psychology, University College Northampton, Boughton Green Road, Northampton NN2 7AL, UK. *Email: Simon.Sherwood@northampton.ac.uk*

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collections suggest that a large proportion, as much as 65% (Rhine, 1981), of spontaneous cases of ESP have occurred during dreams. Clients undergoing psychological therapy have also experienced dream ESP (e.g., see Krippner, 1991; Van de Castle, 1977).

Dreaming is an obvious ASC for researchers to focus on (Ullman & Krippner with Vaughan, 1973; 1989) because it is naturally occurring and contains features considered to be important facilitators of ESP (see Braud & Braud, 1975; Honorton, 1977). However, it has the disadvantage of being very time consuming and requires expensive EEG–EOG monitoring equipment and sleep laboratory facilities if participants are to be deliberately awakened from REM to report their dreams, and so researchers turned to using the Ganzfeld[1] technique during the 1970s. This technique is less expensive, less labour intensive, and was believed to induce a state similar to the hypnagogic (HG) state, i.e., the state that is entered just as one is falling asleep, a state also considered to include psi-conducive features of the sleep state. Although the Ganzfeld has been the dominant paradigm for ESP research since then, and has provided some of the best evidence (e.g., Bem & Honorton, 1994; Bem *et al*., 2001 — but see Hyman, 1994; Milton & Wiseman, 1999), the extent to which it induces an ASC is not clear (Alvarado, 1998). In fact, in a recent study, Wackermann *et al*. (2000) concluded that '[C]ontrary to the common belief, the ganzfeld does not necessarily induce a true hypnagogic state, and will surely not do so in most ganzfeld settings' (p. 302).

The Maimonides Dream ESP Studies

Psychiatrist Montague Ullman established a dream laboratory at the Maimonides Medical Center, Brooklyn, in 1962 (Krippner, 1991). Before the laboratory closed in 1978 (Krippner, 1991; 1993; Ullman *et al*., 1973; 1989), his research team had conducted thirteen formal dream ESP studies and three groups of pilot sessions (see Table 1). Of the thirteen formal studies, eleven were designed to investigate telepathy and two precognition. The pilot sessions were designed to investigate clairvoyance, telepathy and precognition, respectively (see Table 1)

The Maimonides procedure was developed and improved over time and a number of different procedural variations were explored. Thus, the following is intended as only a general description of a trial designed to investigate telepathy.[2] The receiver was attached to EEG–EOG monitoring equipment and slept in a sound-attenuated room in the laboratory. Once he or she was asleep, a target was randomly selected from among a set of targets (typically art prints), selected on the basis of emotional intensity, vividness, colour and simplicity. The target, in a sealed envelope, was given to the sender, who was then locked inside another sound-attenuated room in the building (or, in some studies, a different building). The experimenter monitored the receiver's EEG–EOG throughout the night and,

[1] A sensory habituation method that encourages the internal focusing of attention and minimizes sensory distractions while the participant is physically relaxed.

[2] It is possible that clairvoyance and/or precognition could also have operated.

once the receiver had entered REM sleep, signalled the sender (via a buzzer) to open the target envelope and begin sending the target. At the end of the REM period, the experimenter awakened the receiver via an intercom and asked him or her to describe any dream(s). Responses throughout the night and in the morning were tape-recorded and later transcribed. The sender heard the receiver's dream report via a loudspeaker, which may have reinforced his or her subsequent sending strategy. The receiver then went back to sleep. This process was repeated for each REM period with the same target being sent each time. In the morning, the receiver reported any associations to the dream mentation and guessed what the target might be. Receivers typically viewed between eight and twelve pictures, one of which was the target, gave a confidence rating for each picture[3] and also placed them in rank order according to the correspondence with their dream mentation, associations and/or guesses. Complete dream transcripts and target sets were also sent to independent judges who made similar judgements. The ratings/rankings from the two or three blind judges were combined. A trial was a 'binary hit' if the target picture had been ranked in the top half of the target set and a 'binary miss' if ranked in the bottom half. Performance was then evaluated to determine whether it was significantly higher or lower than mean chance expectations (MCE).

During most of the telepathy studies (see Table 1, A–H) the receivers' dreams were monitored and recorded throughout the night and the same target was sent during each REM period (Child, 1985). However, during two studies known as the 'Sensory bombardment' and 'Grateful Dead' studies (L, M), the sending periods did not occur regularly throughout the night and did not necessarily coincide with the receivers' REM periods. In the study with A. Vaughan, I. Vaughan, Harris and Parise (study O), some trials involved sending a different target during each REM period.

Studies using the same receiver across all trials often used the same sender, too (B, D, E, F), but not always. Successful sender and receiver pairings from the two screening studies (A, C) were used in later studies. Some studies used more than one sender (A, C, G, O), either across a series of trials with the same receiver or different receivers. There was not always a single sender for each receiver either; for some of the sensory bombardment (L) trials there was a single sender for two receivers; for the Grateful Dead trials a concert audience of about 2,000 people acted as senders. During precognition and clairvoyance trials there was no sender. The distance between the sender and receiver also varied across the studies (e.g., A & B vs. L & M).

Some studies employed 'multisensory' targets rather than just static art prints: in the second study with Erwin (F), the sender was provided with objects related to the art prints and asked to act out aspects of the scenes; in the first study with Bessent (I), Bessent spent an hour the following morning looking at a picture and immersing himself in a multisensory environment that accompanied this; in the second Bessent study (J), the targets were slide sequences with accompanying

[3] In the early studies (A–C — see Table 1) confidence ratings for the rankings were given on a five-point scale but from the Posin study (D) onwards a 100-point scale was used.

soundtracks. Slide sequences with a soundtrack were also used in the sensory bombardment study (L). In the final Maimonides study (Honorton *et al*., 1975), films were used.

Maimonides dream ESP success

During his review, Child (1985) discovered that the only way the results could be analyzed across the Maimonides series was in terms of the number of binary hits and misses. For most studies, these data were available for both participants and independent blind judges but in some studies only blind judging was conducted (see Child, 1985, Table 1, studies F, I–K). Child used the data based upon judging of the whole dream transcripts (which included associations as well as the participants' guesses). Child (1985) concluded that:

> The outcome is clear. Several segments of the data, considered separately, yield significant evidence that dreams (and associations to them) tended to resemble the picture chosen randomly as target more than they resembled other pictures in the pool. (p. 1223).

A meta-analysis of 450 Maimonides ESP trials (based upon the blind judges' data) found the overall success rate to be 63% (MCE = 50%) with odds of 75 million to 1 against achieving such a result by chance (Radin, 1997, pp.71–2). This meta-analysis also found that the binary hit rate for 20 of the 25 sets of data analysed was above the MCE.

Statistical significance can provide an indication of the probability of obtaining such an outcome if the null hypothesis were true but it can not provide an indication of the magnitude of the effect. Whether or not a statistical test produces a significant outcome will depend upon the magnitude of the effect, the power of the test and the sample size. Conversion of a test statistic to a common effect size measure has the advantage over conventional significance testing in that it provides an indication of the magnitude of any effect and permits direct comparisons across studies with different sample sizes (Prentice & Miller, 1992). Thus, we have converted the test statistics for the judges' ratings/rankings (either z or t values) into an effect size measure[4] r (see Clark-Carter, 1997, pp. 550–1, 558) for the twelve formal studies[5] and three pilot studies listed in Table 1 of Child's (1985) review. A positive effect size indicates that performance was above chance expectations; a negative effect size indicates that performance was below chance. Cohen's (1977) rule of thumb suggests that r = 0.1 would be considered a small effect, r = 0.3 a medium effect and r = 0.5 or above a large effect.

For the fifteen sets of data, the effect size r[6] ranges from –0.22 to 1.10 (see Table 1). Interestingly, the studies with the largest effect sizes mostly involved

[4] The correlation coefficient r is one of the most commonly used effect size measures (Prentice & Miller, 1992).

[5] The Honorton *et al*. (1975) study was not included in Child's review and cannot be included here because complete statistical test results are not available.

[6] As with other correlation coefficient estimates, r should fall in the range –1 to +1. However, where z scores are large, it is possible for r to exceed this range.

	Study	Type of ESP	Trials	Test statistic	Effect size r
A	Ullman *et al*. (1966) study 1, first screening	Telepathy	12	z = 0.71	0.205
B	Ullman, *et al*. (1966) study 2, first Erwin study	Telepathy	7	z = 2.53	0.956
C	Ullman (1969), second screening	Telepathy	12	z = –0.25	–0.072
D	Ullman (1969), Posin study	Telepathy	8	z = 1.05	0.371
E	Ullman *et al*. (1973), Grayeb study	Telepathy	8	z = –0.63	–0.223
F	Ullman & Krippner (1969), second Erwin study	Telepathy	8	t = 4.93	0.881
G	Krippner & Ullman (1970), Van de Castle study	Telepathy	8	t = 2.81	0.728
H	Pilot sessions	Telepathy	67	z = 4.20	0.513
I	Krippner, *et al*. (1971), first Bessent study	Precognition	8	t = 2.81	0.728
J	Krippner *et al*. (1972), second Bessent study	Precognition	8	t = 2.27	0.651
K	Pilot sessions	Precognition	2	z = 0.67	0.474
L	Krippner *et al*. (1971), Sensory bombardment study	Telepathy	8	z = 3.11	1.100
M	Krippner *et al*. (1973), Grateful Dead study	Telepathy	12	z = 0.61	0.176
N	Pilot sessions	Clairvoyance	8	z = 0.98	0.346
O	Honorton *et al*. (1972), Vaughan, Harris, & Parise study	Telepathy	203	z = 0.63	0.044
	Honorton *et al*. (1975)	Telepathy	—	unknown	unknown

Table 1.

Results for the Maimonides dream ESP studies based upon the blind judges' data summarized by Child (1985)

gifted single participants who had been pre-selected (i.e., Erwin, Van de Castle, and Bessent) and two of the least successful Maimonides studies were the two screening studies (A, C) that identified successful senders and receivers for use in subsequent studies. The two precognitive studies and one pilot study (I–K) were very successful (effect size ranges from 0.47 to 0.73). The clairvoyance pilot sessions (N) were also successful but less so (r = 0.35). The most successful Maimonides dream ESP study (r = 1.10) was the sensory bombardment telepathy study (L); other studies that employed multisensory targets were also very successful (F, I, J) (r = 0.65 to 0.88).

Criticisms of the Maimonides studies

The main criticisms of the Maimonides studies are concerned with the lack of replication (see Hyman, 1986; Krippner, 1991; Parker, 1975, p. 90) and the number of statistical analyses, and by whom these were conducted (Child, 1985;

Parker, 1975, p. 89). Child (1985) encountered two main areas of difficulty when evaluating the Maimonides research findings: (1) the analysis had been passed to various consultants and the raw data were no longer available (this may explain some of the variation in data treatment and statistical analysis and inadequate description of analyses in some published reports); (2) in some earlier studies,

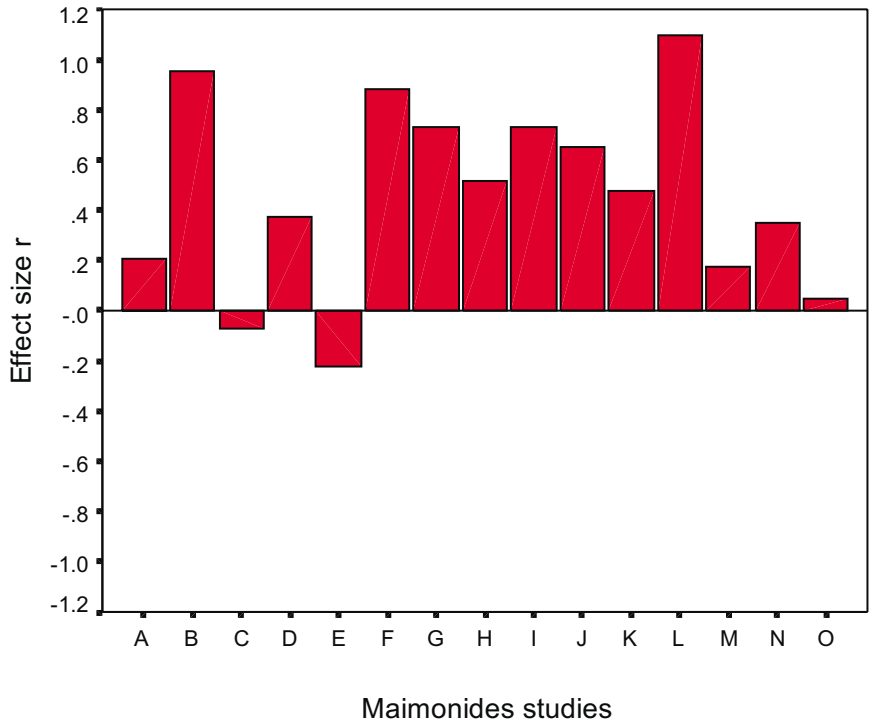

Figure 1.

Effect size r estimates based upon blind judges' data for the fifteen Maimonides data sets summarized by Child (1985)

the blind judges' judgements may not have been completely independent so that they might have derived clues to the target identity from other transcripts (Clemmer, 1986). However, this would not account for the successful results obtained from the participants' judgements or, in later studies, where transcripts were edited for potential cues and presented in random order (Krippner, 1991). Alcock (1981) criticized the studies for lacking a control group but the controls in such studies are the other non-target stimuli against which the transcript is also compared. Fraud has also been suggested as a possible explanation for the results (e.g., Clemmer, 1986) but no plausible mechanism for fraud has been put forward.

Attempted Replications of Maimonides Studies

This section addresses the issue of whether the Maimonides research has in fact been replicated. There have been two conceptual replications of individual performances within the Maimonides research programme. In terms of the effect sizes for blind judges, Erwin's performance in his first telepathy study was r = 0.96 compared with r = 0.88 in his second study; Bessent obtained an effect size of r = 0.73 in his first precognition study and r = 0.65 in his second.

During the 1960s and 1970s, there were six attempts,[7] by researchers at other laboratories, to replicate the Maimonides dream telepathy findings using EEG–EOG monitoring and deliberate awakening from REM sleep (Belvedere & Foulkes, 1971; Dement, 1974; Foulkes, *et al.,* 1972; Globus *et al*., 1968; Hall, 1967; Strauch, 1970), though none of these can be considered exact replication attempts. The Foulkes *et al*. (1972) study cannot be considered an independent replication attempt because some of the investigators had been involved in a previous Maimonides study.

Three of the replication attempts are difficult to evaluate due to the limited amount of detail available in the published reports (Dement, 1974; Globus *et al*., 1968; Strauch, 1970). The first of these was a seventeen-night study involving a pair of friends (Globus *et al*., 1968). The sender viewed, imagined and acted out the activity portrayed in the target pictures during the sending periods. Judgements were based upon a combination of hypnagogic, non-REM and REM mentation (Parker, 1975; Strauch, 1970), which is unlike the Maimonides procedure. Although no specific details of the outcome nor any statistical analyses were reported, Globus *et al*. (1968, p. 365) concluded that 'A consensus of judges was unable to correctly designate the "target picture" more often than would be expected by chance; thus, the null hypothesis was not rejected'.

Strauch (1970) conducted a study with twelve female participants who reported good dream recall and previous parapsychological experiences. Each participant spent three nights at the laboratory but only on the latter two nights did the experimenter/sender attempt to send a randomly selected picture. Participants were awakened from REM sleep and reported their dreams. However, six independent judges did not identify the target pictures better than MCE. It is not known how the judges (one of whom was the receiver) performed individually but it has been reported elsewhere that 'the judges differed widely in their ratings' (Strauch, 1970, p. 50).

Dement (1974, pp. 58–9) described some pilot dream telepathy trials conducted in 1970–71 but the study itself is unpublished and only limited information about the methodology and results is provided. Six-hundred students attending one of Dement's classes were asked simultaneously to send a slide of an object to six participants as they entered a REM period at a sleep laboratory over a mile away. As Dement acknowledged, this experiment was very problematic, not least because

[7] Rechtschaffen (1970) also described some unpublished pilot dream telepathy trials but most of these involved the use of hypnotic waking dreams. As the majority of these trials did not involve dreams reported during sleep, it is not appropriate to discuss this pilot work here.

the senders were shown a photo of the receiver and then asked to decide which target they should send. Although the judging procedure is not described, Dement reported that none of the targets was manifested in the receivers' dreams.

A study by Hall (1967) has been cited as a successful replication of the Maimonides studies (see Krippner, 1975).[8] There were six male participants in this study, the most successful of whom was Van de Castle (see Van de Castle, 1989). Hall (1967) was able to identify a connection between the dream mentation and the target in 56 out of 121 dream transcripts and this was confirmed in 29 cases by judgements made by a large group of undergraduates. Although Hall (1967, p. 47) concluded 'This result shows that it is possible to influence dreams telepathically even under artificial experimental circumstances'. This could only be replication in a conceptual sense as the judging and analysis method used was unique to this study. However, this study lacked adequate controls against sensory leakage and involved arbitrary selection of data for analysis (see Parker, 1975; Strauch, 1970) and so cannot here be considered a successful replication of the Maimonides studies.

Van de Castle (1971) also acted as experimenter in a non-laboratory dream telepathy study involving a group of youth-camp members. However, the limited amount of information available in the published summary of this study makes it difficult to evaluate fully. Nevertheless, it is clear that, before midnight, Van de Castle selected a colour magazine picture and gave it to a camp staff member. Throughout the night this member of staff periodically acted as the sender. In the morning the picture was placed upon a table, along with four decoys, and the campers were asked to rank the pictures. Ranks of one or two were deemed a hit and ranks of four or five, a miss. This resulted in a total of 95 hits and 55 misses ($p < 0.002$). One problem is that handling of the target picture by the experimenter and sender prior to the judging may have left marks upon it that gave clues to the target identity. For this reason it is always advisable to use a duplicate set of materials for judging.

Belvedere and Foulkes (1971) attempted a replication (albeit not an entirely independent attempt) of the Van de Castle Maimonides study (Krippner & Ullman, 1970). Van de Castle again served as receiver and, using dreams plus associations to make judgements, obtained three binary hits and five misses. Judge 1 also obtained three hits and five misses; Judge 2 obtained four hits and four misses. This contrasted with the eight hits obtained by Van de Castle and six by the blind judges in the original study. Belvedere and Foulkes (1971) postulated that it could either be that the Maimonides result was spurious or that there were differences between the two studies that interfered with any anomalous communication processes that might have been operating. Belvedere and Foulkes (1971) acknowledged that there were some procedural variations: (1) Van de Castle had requested that colour magazine pictures be used instead of art prints; (2) that he should be awakened during rather than at the end of the REM periods; (3) the trials were conducted over a two-week rather than a 44-week

[8] Krippner (1975) also cites an unpublished study by Ross (1972) as being a successful replication but no details are available.

period; (4) the target pools may not have been sufficiently heterogeneous and not all in colour, as requested (see Van de Castle, 1989); (5) the psychological climate was not as conducive as before and; (6) Van de Castle did not have as much choice in terms of available senders. Van de Castle (1989) felt very strongly that the conditions in the replication study were far from conducive and that it should be deemed neither a replication attempt nor a failure. However, the onus is on parapsychologists to identify what the psi-conducive and psi-inhibitory factors are and to ensure that studies are designed to maximize the former and minimize the latter; simply saying, after the fact, that the conditions were not right can too easily be seen as attempt to salvage a favoured but unsupported hypothesis.

Belvedere and Foulkes, along with members of the original research teams (Foulkes *et al*., 1972) attempted to replicate another Maimonides study, this time the sensory bombardment study (Krippner *et al*., 1971). The consensus judging of the three judges resulted in five binary hits and three misses; this compares with eight binary hits and no misses from the three judges in the original study. However, again this study cannot be considered an exact replication attempt. As Foulkes *et al*. (1972, p. 734) pointed out, 'Our experiment deviated from the original in a number of ways. . . . It is not clear which set or sets of factors may have contributed to the discrepancy in results between the two studies'.

These deviations included that, in the original study, the sender was located at Masters and Houston's laboratory, fourteen miles away from the receiver located at the Maimonides laboratory; in the replication attempt he was located in Belvedere and Foulkes' laboratory, approximately 2,000 miles away. In the original study, two receivers were tested at a time; on three of the four nights there was only one sender for each pair but on the other night there were two senders each sending a different target to a different receiver. In the replication attempt, there was only one receiver per night and Bessent was the only sender used. Also, in the original study, the judges did not get to see the audio–visual sequences during judging and were only given a list of the sequence titles.

In summary, none of the five studies that used EEG–EOG monitoring and deliberate awakening can be considered exact replication attempts because of their variations in procedure. Four of them cannot be considered successful conceptual replications either, in that performance was not significantly better than MCE.

The Post-Maimonides Dream ESP Studies

We have seen that there were few replication attempts during the life of the Maimonides dream laboratory. The prohibitive costs of maintaining a sleep laboratory may have discouraged other researchers from replicating the Maimonides work. However, some researchers have continued to investigate dream ESP, albeit using less expensive and less labour-intensive methods.

It is a quarter of a century since the Maimonides laboratory closed and since their last formal dream ESP study was conducted (Honorton *et al*., 1975). A search of the subsequent literature identified 22 formal reports of dream ESP studies (see Table 2). Unlike the Maimonides series, which focused mainly on

	Study	Type of ESP	Trials	Test Statistic	Effect Size r
1	Child *et al*. (1977) Experiment 1	Telepathy	8	t = 1.87 df = 7	0.58
2	Child *et al*. (1977) Experiment 2	Telepathy	5	t = 2.69 df = 4	0.80
—	Kanthamani et al. (1988) Preliminary	Clairvoyance	4	—	—
3	Kanthamani *et al*. (1988) Pilot	Clairvoyance	10	t = 0.75 df = 9	0.24
4	Kanthamani & Khilji (1990)	Clairvoyance	20	t = 1.79 df = 19	0.38
5	Kanthamani & Broughton (1992)	Clairvoyance	40 (20)	t = 3.52 df = 19	0.63
6	Braud (1977) Pilot	Telepathy	50	z = –1.90	–0.27
7	Braud (1977) Experiment 1	Telepathy	30	z = 1.29	0.16
	Braud (1977) Experiment 2	Telepathy	36		
—	McLaren & Sargent (1982)	Precognition	30	—	—
8	Sargent & Harley (1982)	Precognition	20	z = 0.30[a]	0.07
9	Harley (1989)	Clairvoyance	20	t = –2.45 df = 19	–0.49
10	Markwick & Beloff (1983)	Clairvoyance/ Telepathy	100	z = 1.87[a]	0.18
11	Markwick & Beloff (1988)	Clairvoyance/ Precognition	100	z = –0.39	–0.04
—	Hearne & Worsley (1977)	Telepathy	—	A = 1671 df = 7	—
—	Hearne (1981a)	Telepathy	2	—	—
12	Hearne (1981b)	Telepathy	—	$F_{(1,7)} = 0.00$	0.00
13	Hearne (1987)	Telepathy	8	z = –0.39[a]	–0.14
14	Hearne (1989)	Telepathy	10	z = 0.31	0.10
15	Dalton *et al*. (1999)	Clairvoyance	32	z = 3.58	0.63
16	Sherwood *et al*. (2000)	Clairvoyance	28	z = 1.44	0.27
17	Dalton *et al*. (2000)	Clairvoyance	16	z = 2.35[a]	0.59
18	Eppinger (2001)	Clairvoyance	50	z = –0.07	–0.01
19	Roe *et al*. (2002)	Clairvoyance	31	z = 0.80	0.14
20	Sherwood *et al*. (2002)	Precognition	12	z = –1.16	–0.34
21	Weiner & McCain (1981)	Clairvoyance	12	t = 2.30 df = 11	0.57

[a] z score based upon ratings calculated by the auhtors (Sherwood & Roe)

Table 2. Results for the post-Maimonides dream ESP studies (based mostly upon the combined judgements of participants and experimenters and/or senders).

telepathy, less than half of the post-Maimonides studies did so. The majority investigated clairvoyance, which is methodologically simpler in that it does not require a sender.

Braud (1977) studies

Among the first post-Maimonides studies were three telepathy studies conducted by Braud (1977) that differed from the Maimonides work in two basic ways; first, participants slept in their own homes, waking naturally and attempting to recall the content of their dreams; secondly, multiple participants were run on single trial nights. In the first study, 50 (mostly) 'friends and acquaintances' kept a dream diary for a specific date. Between 2:00 and 2:30 a.m. on that date, Braud sent a randomly selected target slide. Participants marked their dream impressions for the presence or absence of ten features. The target slides had been coded for the same binary features and Braud calculated the number of matches between the target and dream codings. Apparently, all 50 participants responded, but unfortunately only three of these correctly identified more than the MCE of five binary features. Participant majority votes resulted in only two matches with the target. When Braud restricted his sample to 10 'close friends' in the first of two confirmation studies, participants attempted to identify six different targets sent over three consecutive days. Three of the targets were sent at 10:00 p.m.; the remaining three targets were sent at 5:30 a.m. Braud (1977) did not report the performance for dream and hypnagogic (HG) mentation separately but only gave the overall mean majority vote score of 6.84, which was significantly greater than MCE. The second confirmation study used the same participants and procedure except that the sending times were changed to 10:30 p.m. and 6:00 a.m. Unfortunately, only seven respondents returned their protocols and, of these, three were incomplete. Participants who felt that they had not performed well might have decided not to return their data. This notwithstanding, the findings from the previous study were replicated and performance (mean score = 6.33) was again significantly better than MCE. Braud (1977) found that overall performance, for the two confirmation studies combined (mean score = 6.58), was significantly better than MCE. It was also apparent that HG performance (mean score = 7.33) was better than dream performance (mean score = 5.83) but not significantly so.

In summary, Braud's studies suggested that, although both HG and dream mentation might be conducive to telepathy, the HG state seems to be more conducive than the sleep state.[9]

Weiner and McCain (1981) study

Over 22 nights, 19 of McCain's friends recorded their dreams and coded them for the presence or absence of nine binary features (Weiner & McCain, 1981). Each night, Weiner randomly selected a target for each of two conditions: one was allocated to a single participant condition; the other was allocated to the remaining participants in the group condition. There were 12 individual and 22 sets of group dream reports. Performance in the individual condition was significantly

[9] It is also interesting to note that a content analysis of the transcripts from the first Maimonides study with Erwin as receiver revealed that hypnagogic and hypnopompic imagery, but not dream imagery, was significantly associated with the targets (White *et al*., 1971).

better than MCE. No figure is reported for the group majority vote condition, although performance was nonsignificantly lower than the individual condition. One potential problem with this study is that Weiner, who had determined the target sequence, independently judged the target and dream codings and compared her judgements with McCain to check for discrepancies; her memory of the target sequence might have influenced the resolution of any such discrepancies.

Child, Kanthamani and Sweeney (1977) studies

Child *et al*. (1977) conducted two telepathy experiments with Sweeney acting as the only percipient. Sweeney slept at home as Child selected and sent a randomly selected art print for ten minutes from 10:45 p.m. In experiment 1, judging took place after the series. Each of the three authors (i.e., including the sender) independently rated the eight dream transcripts against the eight pictures that had been selected as targets. No detail is given as to whether the order of targets and/or transcripts was randomized (which is essential because the sender knew the order in which the targets were selected and the receiver knew the order in which her dreams occurred) nor do the authors describe any controls to ensure that sender and percipient did not come into contact between sessions. Performance, based upon the combined judgements, was better than MCE (the mean SOR was 10.37 where MCE is 13.5) although this difference is not significant. In experiment 2, the procedure allowed the percipient and Kanthamani to make their judgements the following morning. Two of the seven sessions were later disregarded because Sweeney had not recalled any dreams. It is not clear why only seven trials were completed; it would have been better if the decision to exclude any trials had been made *a priori* in order to avoid accusations of optional stopping. The ranks awarded to targets were again combined to give a mean SOR of 8.85, which is significantly better than the MCE of 13. When the results of these two studies were combined, the cumulative result was significant. Child *et al*. (1977) reported that 'In subsequent months we carried out similar experiments with the agent in Connecticut and the participant in either Tennessee or Italy. These experiments showed little deviation from chance.' (pp. 92–3) but mentioned no further details. These replication attempts do not appear to have been published and are therefore unavailable for review.

Dream versus Ganzfeld ESP performance

Kanthamani conducted a number of further studies, but which investigated clairvoyance rather than telepathy. The first two experiments (Kanthamani *et al*., 1988) were intended to compare Ganzfeld and dream clairvoyance. One of the authors, Rustomji-Kerns served, as the sole percipient, as 'she had rich experience in dream work and in maintaining a dream journal' (p. 414). In the preliminary experiment she completed four Ganzfeld and four dream trials. The order of the conditions was not counterbalanced. After completing a Ganzfeld session, Rustomji-Kerns slept at home and suggested that she would wake in the night

and write down her dreams. She added any further associations or impressions when she awoke the next morning. A common target was used for the two conditions in each trial, which may be problematic because the participant, when dreaming, would have knowledge of her own Ganzfeld experience so that the mentation for the two conditions may not have been independent.

The following morning, as a group, Rustomji-Kerns and the two experimenters judged first the Ganzfeld and then the dream mentation against four pictures in the target set, using ratings and rankings. However, the judges discussed any correspondences before making their judgements, which could have compromised the independence of these judgements. In the pilot experiment, involving ten trials per condition, a fourth judge also judged both types of mentation independently from the others in a counterbalanced fashion. Their ratings were used to compute combined z-scores of ratings for target pictures. Once the judging had been completed, the target envelope was opened. For the preliminary trials, the mean z-scores indicated that in the Ganzfeld condition the targets were rated slightly higher than the non-targets but the reverse was true in the dream condition. However, neither of these means nor the difference between them was statistically significant.

In the pilot experiment, Ganzfeld trials were not successful, giving a mean z score that was suggestively below MCE. The mean z score for dream judgements was positive but not significant. However, the difference between the conditions was suggestive. A secondary analysis using sum of ranks showed the dream protocol to be significantly better than the Ganzfeld protocol.

An attempted replication (Kanthamani & Khilji, 1990) involved a sample of ten participants who, in this case, each contributed two trials of each type, completed in a counterbalanced order. There were only two judges; the participant and the experimenter. Again, there was evidence of missing in the Ganzfeld condition and hitting in the dream condition and, although neither of these deviated significantly from MCE, the difference between the conditions was again significant. Analyses of the combined ranks confirmed earlier findings, but here dream performance was also significantly better than chance. However, we are not convinced about the validity of the t-test analyses conducted given that it would appear, from the reported degrees of freedom, that the two data points per participant in each of the two conditions were treated as independent.

A further confirmation (Kanthamani & Broughton, 1992) of the superiority of dream over Ganzfeld mentation involved 20 volunteers. Each participant contributed a Ganzfeld–dream trial pair followed by a dream–Ganzfeld pair, as this was the most successful order of presentation from the previous study. The study confirmed, once again, a significant difference between Ganzfeld and dreaming trials, with the latter being superior. Performance in the dream condition was significantly above MCE. The analysis for this study appears not to have repeated the error of treating participants' two data points in each condition as independent.

Sargent and Harley (1982) reported a pilot study that tested for precognition both in the Ganzfeld and in the dream state. In this study Sargent served as both

participant and experimenter for all 24 Ganzfeld trials while Harley performed a similar role for all 20 dream trials.[10] Sargent and Harley did not analyze the two conditions separately, but rather combined performance for the two conditions, giving a sum of ranks of 101 that is below the MCE of 110. Although performance in both conditions was better than MCE, neither comes close to significance (SOR for Ganzfeld is 53, where MCE = 60; for dream trials SOR is 48, where MCE = 50). Ganzfeld performance was a little better than dream performance, however.

A more recent Ganzfeld versus dream clairvoyance study, using a repeated measures design, was conducted by Eppinger (2001). Fifty participants, pre-selected for their capacity for dream recall, completed a Ganzfeld and a dream clairvoyance trial in a counterbalanced order. Participants who could not remember their dreams from a given night were asked to repeat the trial with the same target. After a dream trial, the participant came into the laboratory with his or her dream report and rated and ranked four picture postcards. Unlike the Kanthamani studies, there were no additional independent judges. Although performance was lower than MCE in both conditions (dream SOR = 131, Ganzfeld SOR = 137, MCE = 125), it was marginally better in the dream condition.

Thus, in summary, four out of five clairvoyance studies found dream ESP performance to be superior to Ganzfeld performance, and three of these found this difference to be statistically significant. The other study by Sargent and Harley, which compared precognition performance under similar conditions, found a trend in the opposite direction; however, this study used an independent design for the two conditions and so the differences could have been due to individual differences between the two participants. The superiority of dream over Ganzfeld ESP performance evident here suggests that the former warrants the kind of further systematic investigation from which the latter has benefited.

Additional Sargent, Harley and McLaren studies

McLaren and Sargent (1982) conducted another dream precognition study with a single participant who kept a dream diary. Seventeen trials were overt precognition trials in which the participant was asked to rank a set of four pictures, determined by McLaren, against each dream record and to mark any dreams that he felt had been successful with 'CC' ('confidence call'). McLaren then randomly determined the target. The other thirteen trials were covert precognition trials in which the judging and determination of the target were carried out by Sargent. Only the results for the overt trials are reported (though in two places these appear to have been incorrectly labelled as 'CP' trials). Performance on the non-CC trials indicated significant psi-missing; performance was insignificantly better than chance on the CC trials. Unfortunately there is insufficient information provided concerning the methodological and security aspects of this study to evaluate their adequacy.

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[10] The reader should be made aware of an exchange between Blackmore (1987) and Sargent (1987) concerning the protocol of some of Sargent's Ganzfeld sessions.

Harley (1989) conducted an exploratory dream clairvoyance study, with himself serving as participant and experimenter. Unlike the Maimonides studies, Harley 'tried to avoid associating to the dream, so that the transcript was as far as possible pure dream material' (p. 3). The independent judge rated the dream transcript against two sets of four pictures in order to look for possible displacement effects. Harley's rankings were suggestively poorer than MCE and his ratings were significantly poorer. An independent judge's performance was also significantly poorer than MCE. The author noted that none of the target pictures had strong emotional connotations, which may have been a contributing factor to failure here.

Markwick and Beloff studies

Markwick and Beloff (1983, 1988) conducted two 100-trial dream clairvoyance/telepathy (and clairvoyance/precognition) experiments with Markwick as participant, based in London, and Beloff as experimenter, based in Edinburgh. Randomly selected target pictures or objects were placed in a box by Beloff. Markwick only recorded 'selected dreams and hypnagogic imagery' (Markwick & Beloff, 1988, p. 77) and then ranked each duplicate set of five target possibilities. Some of the trial judgements were based upon multiple nights' dreams. In the first experiment (Markwick & Beloff, 1983), overall performance was significantly better than chance but seemed to decline after trial 64 following a crisis in Markwick's personal life. This significant finding is of particular interest given that 'It was obtained by a skeptically minded subject working under an ultra-rigorous regime, with a reputed negative experimenter' (Marwick & Beloff, 1983, p. 229). Experiment two was similar except that only picture targets were used and two of the runs involved precognition rather than clairvoyance. Markwick's earlier success was not replicated and her performance was worse than chance, though not significantly. Markwick and Beloff (1988) speculated that the failure to replicate may have been due to a 'balancing out' of direct hits and extreme misses, which effectively cancelled each other out.

Hearne studies

In the first telepathy study by Hearne (Hearne & Worsley, 1977), eight sender–receiver pairs, half of whom were emotionally close, participated. While the receivers were in the third or fourth REM period of the night, the senders were presented (or not) with stimuli that both participants had a phobia about (e.g., a spider) during randomly sequenced experimental and control periods. It was hypothesized that information received concerning the phobic target would induce a fear response in the receiver and this would be indicated by an increase in heart rate. However, there were no significant differences in measures of heart rate or eye motility for the experimental versus control periods.

In an ingenious pilot study (Hearne, 1981a), the participant attempted to use ocular signalling during a lucid dream to communicate a four-digit target number being sent by the experimenter. Of nine nights spent in the sleep laboratory, only

two yielded lucid dreams. During the first of these the participant awoke himself without having signalled; during the second, he saw several different numbers during his dream and made several aborted attempts to signal them. None of the numbers suggested were correct. The experimenter was not blind to the target because he also acted as the sender. If the signals in the EOG output were ambiguous, then interpretation could have been biased by knowledge of the targets. An independent blind judge ought to have interpreted the EOG traces.

In another study (Hearne, 1981b), eight emotionally close sender–receiver pairs participated in an experiment that investigated whether the receivers, in either a waking, NREM or REM sleep state, could detect when electric shocks were administered to the sender. There were no significant differences in the receivers' mean heart rate between the experimental and control periods in any condition. One pair seemed to demonstrate a difference in the waking condition but two replication attempts with this pairing failed.

In another single-participant telepathy study (Hearne, 1987), the participant, who had a history of writing about and interpreting dreams, slept at home and was awoken during REM by a home 'dream machine'. On eight non-consecutive nights, Hearne attempted to send a randomly selected magazine picture between 5:00 and 7:00 a.m. The participant recorded any dreams that she could remember upon awakening after 5:00 a.m. The following day, she ranked a duplicate set of eight pictures. However, it is not clear how the sender and receiver were prevented from communicating between the sending and judging periods. The participant scored below MCE. Hearne (1985) had earlier reported a case of ostensible precognition involving his dream machine but it is not clear whether this was part of any formal investigation and the report is not particularly impressive.

In another home dream telepathy study (Hearne, 1989) readers of a national newspaper attempted to dream about different randomly selected target pictures that Hearne sent each hour from midnight to 10:00 a.m. Readers recorded the most significant part of any dreams plus the time(s) that they awakened. There were 511 usable dream reports that were divided into ten piles according to the awakening time. Two judges viewed a different sample of dreams from each pile and judged whether each dream related to one of two possible targets or neither. Surprisingly, the judges were unable to allocate two-thirds of reports and these were consigned wastefully to an 'indeterminate' category and not included in the analysis. The judges matched 97 of the 171 (56%) allocated dreams to the correct target. The majority vote for each time/target period resulted in six hits and four misses (MCE = 5). No attempt was made to control for the stacking effect[11] or the fact that the number of dream reports differed across the different target/time periods.

[11] A stacking effect occurs when more than one participant is making judgements based upon the same target sequence (e.g., Milton & Wiseman, 1997, p. 93). In such circumstances, any chance coincidence of selection or judging biases can serve to artificially amplify or diminish hit rates.

Dalton, Sherwood and colleagues' studies

More recent work has concentrated on the question of whether consensus methods are superior to individual performance. With consensus judgement procedures, the responses from a number of individuals are combined to give a single judgement. This group-judging method is different from that implemented by Kanthamani and co-workers because here each participant gives ratings on the basis of their own dream transcript rather than a number of judges rating the same transcript.

Dalton *et al*. (1999) acted as experimenters and participants in an investigation of dream clairvoyance. The experimenters were blind to the target because an automated system randomly selected and played each target video clip repeatedly during the night (between 3:00 and 4:00 a.m.). During each of 32 trials, the participants slept at home and kept a record of any dreams. In the laboratory the following morning, participants viewed four video clips and individually rated and ranked the clips and then shared their night's dreams. These individual ranks were then combined to generate an objective consensus rank. The group consensus ratings and two of the three individuals achieved direct hit rates that significantly exceeded MCE. As expected, objective consensus performance was better than any of the individual performances, though no statistical examination of the difference was conducted. *Post hoc* inspection of the trial data suggested that the group had been more successful with emotional targets, particularly when they were negative. This is perhaps not surprising given that spontaneous cases of dream ESP often seem to feature negative life events (see Ullman *et al*., 1989, Chapter 2). Although experimental waking ESP studies are equivocal with regard to the target emotionality issue (Delanoy, 1988) some studies do suggest that emotional target materials are more conducive than neutral materials (e.g., Bierman, 1997).

Sherwood *et al*. (2000) attempted to partially replicate these findings in a 28-trial study that also considered a 'discussion consensus judging procedure'. In order to reach a discussion consensus, the participants read each other's dream mentation and then discussed all of the material until they had reached a decision about the target identity. Results confirmed earlier findings, with a greater number of direct hits being obtained by using their objective consensus judgements than by using their own individual judgements. The discussion consensus was only marginally superior to the objective consensus. Effect sizes for the group were slightly smaller than the previous study but this may have been because the consensus judgements were based on two rather than three participants' responses. Again, a greater proportion of direct hits was obtained when the target was negative.

Dalton *et al*. (2000) reported a sixteen-trial extended replication attempt in which four undergraduate students acted as experimenter–participants. Again, dynamic targets were used but this study did not use a computer-controlled testing system. A major difference between this and earlier work was that the target for each trial was determined before the study began rather than on a trial-by-trial basis, which could raise security concerns. The primary analysis was of binary

hits, with the group judgement giving rise to thirteen hits in sixteen trials, including seven direct hits, which was independently significant and superior to three of the four individuals. The choice of outcome measure is surprising, given that earlier studies by the lead author had used direct hits, although it is in keeping with the practice at Maimonides. The superiority of emotional over neutral targets was not confirmed by the group performance but three of the four individuals were more successful with emotional targets.

Sherwood *et al*. (2002) conducted an exploratory investigation of dream precognition using static targets. During twelve trial nights, three of the authors (Sherwood, Roe, Simmonds) slept at home and recorded their dream mentation. The following morning, they viewed four static pictures, and rated and rank ordered them. These individual rankings were combined to form an objective consensus judgement. Once judging was completed, the experimenter determined the target. The group and two of the individual participants scored below MCE in terms of direct hits while the other participant (SS) scored slightly above MCE. The results of this study did not provide much evidence for dream ESP nor any definite advantage of consensus over individual judging methods, in contrast to three previous studies. However, two of the participants in this investigation did not report having good prior dream recall, the static targets used were not especially engaging or emotional and there may have been problems with the randomization method used.

Roe *et al*. (2002) investigated dream clairvoyance and used dynamic targets selected for stronger emotional content. In this study, a distinction was made between the *emotional valence* and *emotionality* of targets. The procedure adopted was similar to Dalton *et al*. (1999) with aspects of the study controlled via an automated system. Contrary to predictions, neither the group nor any of the individual performances were significantly better than MCE. Group consensus judgements were more successful than two of the individuals but not significantly so. One individual (SS) again scored above chance, but this was counterbalanced by another individual (DL) who scored below chance with a similar effect size. There was a tendency for more emotional targets to be given lower ranks, and a suggestion that engaging clips were better than non-engaging ones, but these effects were generally quite small and with one exception did not achieve significance.

Post-Maimonides dream ESP success

It is somewhat difficult to assess the success of the post-Maimonides studies overall and in relative terms because they used different outcome measures (sometimes more than one) so there is no single metric that runs across all of the studies. As with the Maimonides studies, sometimes the full details of statistical analyses were not reported. In order to make comparisons across the studies we have again converted the statistical test results to the common effect size measure r, and these are given in Table 2 for each of the 21 sets of data for which the statistical test results were available (four studies did not provide the necessary

information). Many of the post-Maimonides studies did not use independent blind judges but instead employed participant and experimenter/sender judging. However, as with the Maimonides studies, many of the post-Maimonides studies employed combined/consensus judging procedures and data from these judgements (which were mostly rankings) were used to calculate the effect size whenever possible. We can see (from Table 2 and Figure 2) that the effect sizes for the post-Maimonides studies range from –0.49 to 0.80. The majority of studies have a positive effect size, meaning that the targets were identified more often than chance expectations.

It is apparent that some of the most successful post-Maimonides studies were conducted by particular groups of researchers. The most successful post-Maimonides dream ESP studies were the two telepathy experiments (r = 0.58 and 0.80) conducted with Sweeney as receiver (Child *et al*., 1977). Kanthamani and colleagues (Kanthamani *et al*., 1988; Kanthamani & Khilji, 1990; Kanthamani & Broughton, 1992) and Dalton and colleagues (Dalton *et al*., 1999; Sherwood *et al*., 2000; Dalton *et al*., 2000) also conducted series of successful clairvoyance studies (from r = 0.24 to r = 0.63). This suggests that

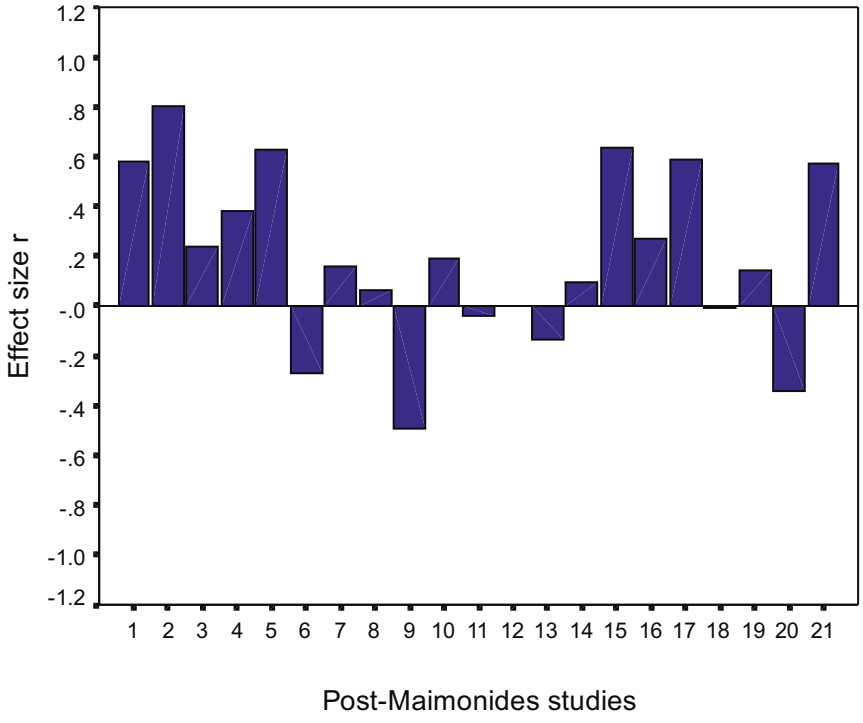

Figure 2.

Effect size r estimates based upon participants' and/or experimenter/senders' data for 21 post-Maimonides data sets.

replication has been possible within laboratories and within a group of researchers; however, independent replication across laboratories and across researchers is also required in order to demonstrate the validity of an effect.

Despite the differing numbers of studies it is clear that the three precognitive studies were the least successful (effect size range from r = –0.34 to 0.07, median –0.04); the telepathy (from r = –0.27 to 0.80, median 0.10) and clairvoyance studies were more successful (from r = –0.49 to 0.63, median 0.25). Investigations of different types of ESP have resulted in different levels of success.

Differences Between the Maimonides and Post-Maimonides Dream ESP Studies

When the study effect sizes are combined[12] for the Maimonides (r = 0.33, 95% C.I. 0.24 to 0.43) and post-Maimonides studies (r = 0.14, 95% C.I. 0.06 to 0.22), respectively, we can see that performance was better than chance with medium and small effect sizes. We can be 95% confident that the true effect size is positive and therefore better than chance expectations for both sets of studies. The Maimonides studies were significantly more successful than the post-Maimonides studies in terms of effect size ($t = 2.14$, $df = 34$, $p = 0.04$, two-tailed), although there are a number of differences between the two sets of studies that may have contributed to this. A meta-analysis of the studies that involves coding of the presence/absence or quality of particular features is needed to see whether the effect size covaries with particular variables.

For example, the vast majority of post-Maimonides studies did not involve laboratory monitoring of EEG–EOG (or some other physiological measure) or deliberate awakening from REM sleep in order to record dream recall (with the exception of Hearne, 1981a; 1981b). The advantage of awakening participants from REM sleep is that dream recall is much more likely, and can lead to more detail and longer overall reports. Reviews of studies involving laboratory awakening from REM have concluded that dreams are reported in about 75–80% of cases (see Empson, 2002; Goodenough, 1991). Spontaneous awakenings in the morning are less likely to lead to dream recall, and any dreams that are reported tend to be those from the last REM period only (Empson, 2002), or indeed may lead to no dreams being recalled. The Maimonides procedure tended to ask participants for their associations as well as their guesses, which means that the judges probably had more, and richer, information upon which to base their judgements.

Another potential advantage of the Maimonides procedure is that, in the telepathy studies, sending efforts were synchronized with REM periods, whereas in post-Maimonides research the relationship was more haphazard. However, one way of increasing the likelihood of at least some overlap is to show or send the

[12] The combined effect size calculation involved the use of Fisher's transformed values of r (see Clark-Carter, 1997, pp. 558–9, 644–6). Due to the difficulty in carrying out a Fisher's transformation of an r greater than 1 for the sensory bombardment study (Study L), we have used the Fisher's transformation associated with a conservative r of 0.999.

target repeatedly for a period of at least 90 minutes (equivalent to one sleep cycle); this method was used in some successful post-Maimonides clairvoyance studies (e.g., 15, 16, 19).

The majority of post-Maimonides studies also involved the participants sleeping in their own homes (1–10, 13–21) rather than in a laboratory (11, 12). The advantages of having the participants sleep at home and awaken naturally are that they are likely to feel more comfortable and their sleep routines are disrupted less. This is why sleep laboratory studies try to allow one night for the participants to adjust before the experiment begins. It is very important to allow a few pilot nights per participant for home dream ESP experiments, too. We would also argue that it is important not to schedule trial nights too close together and to avoid consecutive nights because the latter can put pressure on participants and can compound any sleep disruptions.

Another difference, which is possibly confounded by the amount of information available for judging, is that the Maimonides programme tended to use independent blind judges whereas post-Maimonides studies tended to use participant judging. It is possible that some judges, by aptitude or through experience, may be better able to discriminate between 'normal' dream material and potentially psi-mediated material. Some recent post-Maimonides research has also suggested that consensus judgements might offer a slight advantage over individual judgements (e.g., 15–17).

Some senders and receivers, and certain pairings, might have been better than others, too. The Maimonides researchers went to some lengths to screen for 'effective' senders and receivers (including the recruitment of participants with prior success in psi studies) and to exploit conducive pairings. Post-Maimonides studies have tended not to screen so carefully or to use 'gifted' participants. It is clear that post-Maimonides studies did not always select participants even for having good dream recall (e.g., 20). This is crucial for studies that do not employ deliberate awakening from REM sleep.

The majority of Maimonides studies investigated telepathy whereas the majority of post-Maimonides studies investigated clairvoyance. The presence of a sender in many of the Maimonides studies may have contributed to the overall success of the research program. It could be that the sender plays some active role in the psi process or that there is simply a psychological effect in that the receiver feels more comfortable and/or optimistic. Certainly the Maimonides team felt that '[T]he active involvement of the agent [sender] is an important ingredient for success', (Ullman *et al*., 1973, p. 212). Nevertheless, many of the post-Maimonides studies did not use a sender (3–5, 8–11, 15–21) and, if they did, did not select them on the basis of prior success.

Van de Castle (1977; 1989), himself a participant in a number of dream ESP studies, has argued strongly that the laboratory climate is an important contributor to the success of a study. Further research is needed to try to operationalize the important environmental aspects, which might also be related to the characteristics of research personnel, so that these can be manipulated in future studies. One environmental variable that warrants further attention is the earth's geomagnetic

field (GMF). Periods of lower GMF activity have been associated with reports of spontaneous precognitive dreams (Krippner *et al*., 2000) and greater accuracy on experimental dream ESP trials (Dalton *et al*., 1999; Krippner & Persinger, 1996; Persinger & Krippner, 1989 but see also Sherwood *et al*., 2000). However, recent research suggests that the relationship between GMF and free-response ESP performance may depend on the Local Sidereal Time (LST) at the time of the trials (Spottiswoode, 1997).

Finally, target materials used by the Maimonides team were chosen because of their emotional intensity as well as for their vividness, colour and simplicity, and this was regarded as a crucial feature of the protocol (Ullman *et al*., 1973; Van de Castle, 1977). Recent dream ESP research has supported the idea that emotional targets might be more conducive than neutral targets but the target pools used in post-Maimonides research do not seem typically to have been selected on their basis of emotionality characteristics.

Conclusion and Recommendations

Our review has shown that dream ESP remains a promising, if somewhat neglected, area for parapsychological research. Combined effect sizes for both Maimonides and post-Maimonides studies suggest that judges may be able to correctly identify target materials more often than would be expected by chance using dream mentation. There is evidence of conceptual replication within both sets of studies, although this seems to be concentrated within certain research teams. Overall, the Maimonides studies were more successful than the post-Maimonides studies but this may be due to procedural differences. There is a need for a meta-analysis of the experimental dream ESP literature, not only to provide an estimate of the overall effect size but also to identify process-oriented factors that might influence study outcomes. We hope that future researchers will also note some of the methodological shortcomings we have identified and address these in their study designs. Home dream ESP research is a less expensive and less labour-intensive alternative to sleep-laboratory-based research and merits further investigation. We hope that this review will help re-awaken interest in this neglected but promising paradigm.

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