Introduction

The ganzfeld database has received considerable attention since Bem and Honorton's (1994) publication. They report a significant difference between static and dynamic targets, although they do not report significant hitting with static targets.[*] None of the 355 ganzfeld trials analyzed by Bem and Honorton were done in a *clairvoyant* mode—all of these trials used senders.

These data inspired two questions:

(1) Is a sender a necessary or sufficient participant in the process?

(2) Is target type dependency real?

The answer to the first question is settled for forced-choice. Clairvoyant *ESP* card studies (Honorton, 1975) show significant hitting—senders are *not* necessary. But what is the situation for free-response? As part of a cooperative effort between Psychophysical Research Laboratories and the Cognitive Sciences Laboratory, we asked Honorton to conduct a meta-analysis of the ganzfeld database to determine the answer (Honorton, 1992). In that review, Honorton examined the ganzfeld studies that were published in the English-language parapsychology literature between 1974 and 1991. Besides published reports, the meta-analysis also included doctoral theses and abstracts of otherwise unpublished studies. Honorton found that only 12 of 73 studies reported not using a sender, and their combined results did not reach statistical significance ($Z = 1.31, p \leq 0.095$). The difference was in favor of the sender protocol ($Z_{diff} = 1.49, p \leq 0.137$).

We agree with Honorton's criticism that the studies do not attempt a differential comparison between sender and no sender. As a result, none of the studies were blind to the sender condition. In parallel to the experiments we report here, we asked Honorton to design and conduct such a study. Dr. Robert Morris and the research group in the Psychology department at the University of Edinburgh have taken over that task.

This paper reports on two non-ganzfeld experiments that we conducted in 1992 and 1993 to address sender and the target dependencies.

The 1992 Experiment

We used a 2×2 design to study the effects of sender vs no sender and static vs dynamic target type, on the quality of anomalous cognition (AC)[†]. The details of the design, results, and conclusions from the study are described in this section.

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[*] It may be that this difference will vanish when other factors are accounted for. In private communication with Professor Jessica Utts, she reports that she did not find a significant difference between target condition when receivers brought their own sender.

[†] The Cognitive Sciences Laboratory has adopted the term *anomalous mental phenomena* instead of the more widely known *psi*. Likewise, we use the terms *anomalous cognition* and *anomalous perturbation* for *ESP* and *PK*, respectively. We have done so because we believe that these terms are more naturally descriptive of the observables and are neutral in that they do not imply mechanisms. These new terms will be used throughout this paper.

Target-pool Selection

The static targets were 50 of the 100 *National Geographic* magazine photographs that have been used in our laboratory for many years. By design these targets had the following characteristics:

- Topic homogeneity. The photographs contained outdoors scenes of settlements (e.g., villages, towns, cities, etc.), water (e.g., coasts, rivers and streams, waterfalls, etc.), and topographical features (e.g., mountains, hills, desserts, etc.).
- Size homogeneity. Target elements are all roughly the same size. That is, there are no size surprises such as an ant in one photograph and the moon in another.
- Affectivity Homogeneity. As much as possible, the targets include only material which invokes neutral affectivity.

This set was divided into 10 sets of five photographs that were determined to be visually dissimilar by a fuzzy set analysis (May, Utts, Humphrey, Luke, Frivold, and Trask, 1990) and fine-tuned by inspection.

For the dynamic targets, we digitized and compressed 30 video clips from a variety of popular movies or documentaries. With the exception of cartoons and sexually-oriented material, the clips contained nearly anything. Examples included an indoor motor bike race and a slow panoramic scan of the statues on Easter island.

The overall intent of these dynamic targets was to control for cognitive surprise, to provide target elements that are easily sketched, and to mimic the content of the successful ganzfeld dynamic targets.

Receiver, Sender, and Monitor Selection

We chose five experienced receivers that had produced significant AC effect sizes in previous investigations. The sender for all of the trials was the principal investigator (PI), located in Lititz, Pennsylvania. All trials were unmonitored.

Protocol

Each of the five receivers contributed 10 trials in each of the conditions shown in Table 1. Although 10 trials seems too few for such a study, we computed that the statistical power within a cell was 80%, given the "known" historical effect sizes of approximately 0.8 for these receivers.

Table 1.

Experiment Conditions

Target Type	Sender
Static	Yes
Static	No
Dynamic	Yes
Dynamic	No

Target Preparation

Prior to beginning the study, an experiment coordinator randomly generated a unique, counterbalanced set of 20 static and 20 dynamic targets for each of the five receivers. Within each target type, a counter-balanced set of sender/no sender conditions was also generated. A copy of each target (i.e., either a color photograph or a short clip on video tape) was placed in an envelope and a trial number, 1-40, was written on the outside. Those envelopes containing targets from the no-sender condition were sealed and those for the sender condition remained unsealed. Each set of 40 targets were packaged separately and shipped to the PI.

Trial Schedule

Two of the five receivers resided in California, and the others resided in Kansas, New York and Virginia. The experiment was conducted over a five-month period. Individual schedules were developed so as to cause as little inconvenience to the receiver's daily routine as possible. Not more than one trial per day or three trials per week were conducted.

Session Sequence

For each trial and for each receiver:

(1) The PI selected the appropriately numbered envelope from the box of targets for the receiver.

(2) In the sender condition, he looked at the selected target for 15 minutes and attempted to "transmit" it to the intended receiver during a prearranged trial period.

(3) In the no-sender condition for the static targets, he placed the sealed envelope on his uncluttered desk for the 15 minute trial period.

(4) In the no-sender condition for the dynamic targets, he played the video repeatedly for 15 minutes without sound, and with the TV monitor located in an unoccupied room.

(5) At the conclusion of the 15-minute trial period, and after the receipt of the receiver's response by FAX, he sent a copy of the target material (i.e., either a photograph or video tape) to the receiver by mail.

During each trial:

(1) At the prearranged time, the receiver withdrew to a quiet room in his or her home and sat at a desk.

(2) For a period lasting up to 15 minutes, the receiver wrote and drew his or her impressions of the intended target material.

(3) At the end of the trial, she/he sent a copy of the response to the PI by FAX machine.

(4) By return mail, she/he obtained a copy of the target as feedback for the trial. The target copy and original response were subsequently sent to the experiment coordinator in Menlo Park, California.

We did not provide specific instructions beyond logistical information to the receivers, because they were all experienced at this type of task. They were, however, knowledgeable about the general characteristics of the two target pools.

When the experiment coordinator received the receiver's response, all identifying information (i.e. name, date, and time of trial) was removed. Periodically during the course of the experiment, the experiment coordinator provided an analyst, who was blind to the target choice, with a set of responses and associated target packs for analysis.

Analysis

We conducted two different analyses in this study:

(1) Our standard 1-of-5 rank-order technique to construct effect sizes and p-values.
(2) An analysis of variance (ANOVA) to address the 2×2 questions.

Rank-Order

For each trial, there was a single response and its associated target pack (i.e., either static or dynamic). An analyst, who was blind to the condition and target for the trial, was asked to rank-order five targets (i.e., the intended target and four decoys) within the given pack. This was a forced ranking, so regardless of the quality of match between the response and targets, he/she had to assign a first place match, a second place match, and so on for each of the five targets. The output from this part of the analysis was a rank-order number (i.e., one to five, one corresponding to a first place match) for the correct target.

For each receiver, target type, and condition, there were 10 such rank-order numbers which constituted a block of data. A rank-order effect size was computed for a block as:

$$\varepsilon_{i,j} = \frac{\overline{R}_0 - \overline{R}_{i,j}}{\sqrt{\frac{N^2-1}{12}}},$$

where $\overline{R}_{i,j}$ is the average rank for target type i and sender condition j, and $\overline{R}_0$ is the expected average rank, which for this study is equal to three for all cases. N is the number of possible ranks and is equal to five throughout this study. The effect size reduces to:

$$\varepsilon_{i,j} = \frac{3 - \overline{R}_{i,j}}{\sqrt{2}}.$$

Analysis of Variance

A two-way analysis of variance (ANOVA) was computed for each receiver. The two primary variables were target type and sender condition (i.e., ANOVA main effects). Each of these variables possessed the two states shown in Table 1 above.

Hypotheses

The overall null hypothesis was that $\varepsilon_{i,j}$ will not be significantly different from zero.

Using an F-test, we hypothesized that the quality of AC does not depend upon a sender regardless of target type. Similarly, we used an F-test to test the hypothesis that the quality of AC does not depend upon target type, regardless of the sender condition.

The ANOVA also tests for potential interactions between the target and sender conditions. For example, it might be that a sender is required for dynamic targets and not for static ones. We did not hypothesize with regard to interactions.

Effect Size Results

Five receivers completed 40 trials each. Table 2 shows the effect sizes computed for the 10 trials in each cell. The underlined effect sizes indicate 1-tailed significant results. Receiver 009 showed significant evidence for AC in the static target, no-sender condition ($p \leq 0.02$); receiver 372 in the static target, sender condition; and receiver 518 in the static target, no-sender condition ($p \leq 0.05$). Combined, the static, no-sender condition was significant ($p \leq 0.02$)

Table 2.

Effect Sizes

Receiver	Sender Static	No Sender Static	Sender Dynamic	No Sender Dynamic
009	−0.071	0.636	−0.141	0.141
131	−0.071	−0.071	0.212	0.495
372	0.707	0.141	−0.354	−0.283
389	0.141	0.212	0.000	0.000
518	−0.088	0.530	−0.495	0.283
Totals	0.198	0.297	−0.028	0.028

ANOVA Results

Table 3 shows the results of an ANOVA on these data. Since there were 10 trials within each cell, the degrees of freedom are the same for all receivers and, therefore, are only shown in the column headings. Two receivers show significant main effects. Receiver 372 showed a tendency to favor static over dynamic targets (i.e. $p \leq 0.03$), and receiver 518 showed a tendency to favor no sender conditions (i.e., $p \leq 0.04$). Notice the underlined values in Table 3—for these receivers the ANOVA hypothesis that the data were drawn from the same distribution is rejected, and there were no significant interactions between target type and sender condition.

Table 3.

ANOVA Results

Receiver	Sender Condition		Target Type		Interaction	
	F(1,36)	P-Value	F(1,36)	P-Value	F(1,36)	P-Value
009	0.38	0.54	0.68	0.42	2.08	0.16
131	0.18	0.67	1.66	0.21	0.18	0.67
372	1.01	0.32	5.47	0.03	0.61	0.44
389	0.01	0.91	0.33	0.57	0.01	0.91
518	4.43	0.04	0.97	0.33	0.06	0.81

Combining results across receivers, the ANOVA showed no significant main effect for the sender condition. The main effect for target type, while not significant, was strongly in favor of the static targets $(F(1,196) = 2.91, p \leq 0.09)$. We found no significant interactions for the combined data $(F(1,196) = 0.02, p \leq 0.89)$.

Since there were no significant interactions, we combined the data for static targets regardless of the sender condition (i.e., 100 trials). The sum-of-ranks was 265 (i.e., exact sum-of-rank probability of $p \leq 0.007$, effect size = 0.248). The total sum-of-ranks for the dynamic targets was 300 (i.e., $p \leq 0.50$, effect size = 0.000). From these data, we concluded that static targets may be better than dynamic targets.

Discussion and Hypothesis Formulation

Static targets being better than dynamic ones is surprising not only because it fails to support the ganzfeld result, but also because it actually suggests the opposite. There are a number of possible contributing factors for this outcome. They include statistical artifacts, idiosyncrasies of our receivers compared to the ganzfeld participants, and procedural differences. Another possibility may be that rank-order statistics were used, as they were in the ganzfeld. Since absolute measures of AC are better than relative measures in process-oriented research, and since the target-type inference was based on relative measures, perhaps this accounts for some of the result. Please see an expanded discussion of this point in the 1993 experiment below.

We propose, however, a different explanation: the fundamental differences between the target pools in this experiment are, in themselves, a source of noise and confound the interpretation.

To understand this noise source, we must first assume that AC data are weak and difficult to recognize. Target pools which contain a large number of differentiable cognitive elements, in conjunction with receivers who believe that this is the case, are a source of noise. Receivers are encouraged to report *any* imagined impressions, since those impressions might be part of the target. Since AC is assumed to be weak, most of what is generated is more from the receiver's imagination than from the signal. This noise is generated from an active imagination coupled with an agreement not to edit the internal experience. A full description of these points can be found in May, Spottiswoode, and James (1994a).

The receivers in our experiments have learned the natural limitations of our usual *National Geographic* target pool by experience and by instruction. They have become skilled at internal editing and do not report impressions that they know are absent from the overall target pool, thus there is less incorrect material in their responses.

We conclude, therefore, that in this experiment, receivers were unable to produce significant evidence of AC with dynamic targets. They produced, what is for us, significant reduced functioning with static targets. We speculated that this drop of functioning in both target conditions arose because the protocol would not allow the receivers to edit their internal experience. They were told that the dynamic targets could be virtually anything, and since they were blind to the static-vs-dynamic target condition, they were unable to edit their imaginations, even for the static targets.

Based on this speculation, we developed the following hypotheses for our replication study in 1993:

(1) A significant increase of AC will be observed for dynamic targets if the dynamic pool is designed with a similar set of topics that match the static pool from the 1992 study.

(2) An increase of AC will be observed for static targets because the receivers will be able to edit their internal experience.

The 1993 Experiment

In this experiment, we included a static vs dynamic target condition to replicate the findings from the ganzfeld, but dropped the sender condition, since it appeared not to influence the results of our 1992 investigation. All trials were conducted with a monitor but without a sender.

Target Pools

We redesigned both the static and dynamic targets with the constraint that they all must conform to the topic, size, and affectivity homogeneity of the original static targets. We identified a large number of videos that could be edited to produce 50 *National Geographic*-like segments. A single frame from within each video clip, which was characteristic of the entire clip, acted as its static target pool equivalent.

Thus, we improved the target pools from our 1992 experiment in two ways:

(1) The new dynamic pool possessed a reduced number of differerentiable cognitive elements compared with the dynamic pool we used in 1992.

(2) The content of the dynamic and static pools were nearly identical, by design.

During the experiment, the targets were chosen randomly and were counter-balanced with regard to static and dynamic target types, within receivers.

All static frames were digitized (i.e., 640×480 pixels) for 24 bits of color information, compressed by JPEG, and stored on-line for feedback and display purposes. The dynamic targets were digitized at near real-time rate and stored on three magneto-optical read/write diskettes. The "video" clips could then be displayed on our full-color, Sun Microsystems computer monitor in real-time.

Receiver, Monitor, and Sender Selection

For the new experiment, we chose four of the five experienced receivers who had participated in our 1992 study. All trials were conducted without a sender and were monitored by the PI, who was blind to target type and content for each trial.

Protocol

Three receivers contributed 10 trials in each of the two target conditions, and a fourth (i.e., receiver 372) contributed 15 trials in each condition.

Trial Schedule

The experiment was conducted over a seven-month period, and all trials were conducted at our laboratory in Menlo Park. One of the four receivers (i.e., Receiver 009) lives locally, but the others traveled to our facility for one-week visits. All viewers participated in no more than one trial per day.

Session Sequence

Before the session began, and after the receiver and monitor were sequestered in our AC laboratory, an assistant, who was otherwise not involved in the experiment, randomly generated a target in accordance with the target selection criteria (i.e., counter-balanced for type within receivers and randomly within type).

During the session:

- The monitor provided the following tasking statement to the receiver: "There is a scene that needs a description. Access to that scene is through the word *target*."
- For a period lasting no longer than 15 minutes, the receiver wrote and drew his or her impressions of the intended target material, with the monitor asking for clarification on specific response elements.
- When the monitor and receiver agreed that the data was complete, the monitor halted the session, copied the response material, and secured the original.
- The monitor provided computer-based feedback of the intended target material and emphasized the points of agreement between the response and target.

We again emphasize that for each trial the monitor and receiver were blind to the target selection.

All four receivers participated in a total of 20 trials with this design. At no time during these trials was the target material displayed during the AC session. Instead, the intended target, which existed on a computer disk, was designated by name only. Only during the feedback phase was the intended target displayed.

We asked receiver 372 to participate in an additional 10 trials that were randomly counter-balanced between static and dynamic targets. We used an automated version of the above procedure and, during the session, the target material was silently displayed on a computer monitor in another room. The session protocol was identical to the one above except for the automatic target generation and display.

For these 10 trials, the monitor initiated an automatic computer program after receiver 372 had entered the AC laboratory. This program randomly counter-balanced the target type and selected a single target for the session. Regardless of the type, the program required that a specific optical disk, unlabeled with regard to content, be mounted and the dynamic version of the selected target was then copied to an internal hard disk. All static equivalent targets were already resident on the internal hard disk. Once the transfer was complete, the monitor was instructed to initiate the trial. For the next 60 seconds, the computer screen remained blank, thus allowing the monitor sufficient time to enter the adjacent AC laboratory and remain blind to the target choice. At the end of the the 60 seconds, the computer program began to continuously display the target regardless of type. The computer program kept track of all the specific details that were used later during the analysis phase.

Analysis

We conducted two different analyses in this experiment:

(1) Our standard 1-of-5 rank-order technique to construct effect sizes and p-values.

(2) A blind rating from a predetermined rating scale.

Our rank-order procedure was similar to the one we used in our 1992 experiment. The sole difference was how and when the decoy targets were chosen. In our earlier investigation, the decoys were prede-

termined using fuzzy set analysis and fine tuning. Thus, they existed prior to the start of the experiment. In this study, the decoys were chosen by computer at the time of analysis, and did not exist during the actual trials.

Prior to the start of this experiment, we divided our 50 targets into 10 sets of five targets each. Differing from our earlier approaches, the targets within each pack were as similar as possible. We were able to identify five broadly different topic categories (e.g., cities near water, ruins, etc.), and we created two different packs of five targets for each specific category. We made all target pack decisions based on our experience and subjective assessment.

Decoys were chosen by the computer at analysis time. First, the computer selected the topic set of five packets from which the actual target was chosen. Then, the computer randomly selected one target from each of the remaining four target packs for the decoys.

Blind Rating Scale

Rank-order analysis does not usually indicate the absolute quality of the AC. For example, a response that is a near-perfect description of the target receives a rank of *one*. But a response which is barely matchable to the target may also receive a rank of *one*. Table 4 shows the rating scale that we used to perform a blind assessment of the quality of the AC responses, regardless of their rank. Even though ranks correlated with ratings (Spearman's $\varrho = -0.6$, $df = 78$), we feel that rating scales like this potentially reduce an additional source of variance in correlational or comparative studies.

To apply this subjective scale to an AC trial, an analyst begins with a score of *seven* and determines if the description for that score is correct. If not, then the analyst tries a score of *six* and so on. In this way the scale is traversed from *seven* to *zero* until the score-description seems reasonable for the trial.

Table 4.

0-7 Point Assessment Scale

Score	Description
7	Excellent correspondence, including good analytical detail, with essentially no incorrect information
6	Good correspondence with good analytical information and relatively little incorrect information.
5	Good correspondence with unambiguous unique matchable elements, but some incorrect information.
4	Good correspondence with several matchable elements intermixed with incorrect information.
3	Mixture of correct and incorrect elements, but enough of the former to indicate receiver has made contact with the site.
2	Some correct elements, but not sufficient to suggest results beyond chance expectation.
1	Little correspondence.
0	No correspondence.

Figures 1 through 3 (pages 12 through 14), illustrate the application of this scale and show that the quality of an AC response is not indicated by a first-place ranking. All three examples were given a rank of

one in a blind analysis from our 1992 study. The response to the waterfall target in Figure 1 included a number of pages of material about a city and other man-made elements. In all of our analyses, we strictly adhered to the concept that any material a receiver deletes from the the response prior to feedback is not counted in the analysis. As the receiver deleted the descriptions of man-made elements during the trial, the response in Figure 1 is considered as complete. This target-response pair received a score of *seven*. Figures 2 and 3 show examples of scores of *four* and *one*, respectively. In both cases, these responses were not edited by the receiver.

Hypotheses

The overall null hypothesis was that the effect sizes will not be significantly different from zero. We used an X^2 to test the hypothesis that the quality of AC, as measured by rank-order, does not depend upon target type.

Data Analysis and Results

The analysis for this study was partially automated. All the trial information was stored in a computer file and could be read only by the analysis program to guard against inadvertent display. An analyst initiated the program and selected which receiver to analyze. Since the program kept track of the results, it instructed the analyst which response to examine for the current trial. If the target for that trial was dynamic, the program instructed the analyst to insert enough disks, which were unlabled with regard to content, so that the target and four decoys could be copied to the computer hard disk. If the trial target was static, this step was unnecessary, as the static targets were already present on the hard disk.

A randomized order of the decoys and the target were presented in tabular form. A mouse click on the target name would launch either the dynamic or static display of the selected target. By this method, an analyst could review the entire target pack and rank-order them as usual. The ranks were entered into an appropriate place on the computer form. The ratings were done at the same time and entered into the form. Only after the completion of the analysis for this single trial was the data was locked into a file. The analyst could then select feedback as to the correct answer. The results for individual receivers were maintained in separate files. Three receivers participated in 10 trials for each target type and a fourth, 372, participated in 15 trials per target type. Tables 5 shows the average rank, the effect size and its associated p-value for the static target condition. We see that the combined data is significant and three of the four receivers produced independently significant results.

Table 5.

Results for Static Targets

Receiver	\<Rank\>	ES	p-value
9	2.20	0.565	0.037
372	1.87 ·	0.801	9.7×10^{-4}
389	3.10	−0.071	0.589
518	1.90	0.778	7.2×10^{-3}
Totals	2.22	0.566	7.5×10^{-5}

TARGET

rocks

water flowing
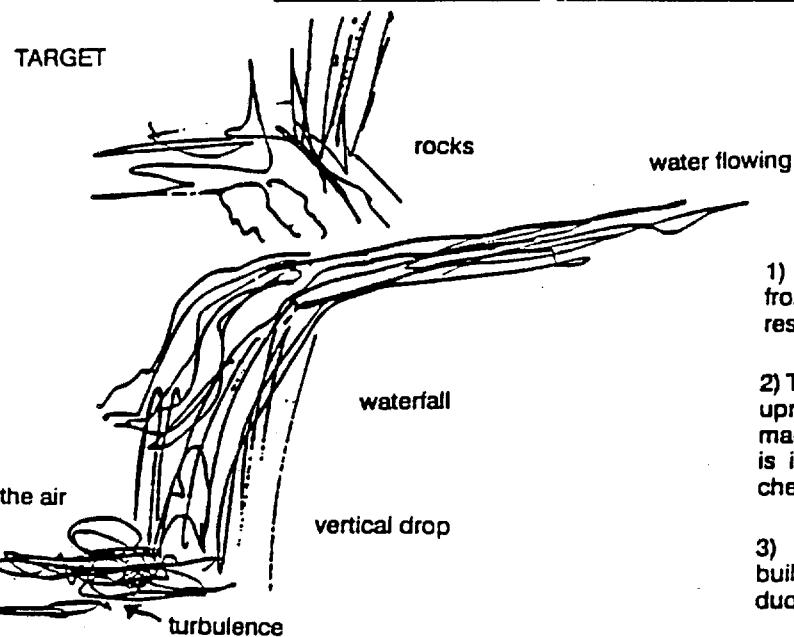
1) City, buildings seems to be a big leap from what I am feeling about the target. I'll restart.

2) Troubled by city feeling. Could be that the uprights are natural rather than man-made. In which case the city interpretation is incorrect and I am feeling MESA. I'll check verticals.

waterfall

vater spray in the air

vertical drop

3) DELETE Lights, structure, structures, building, and city. We gots a waterfall, dude.

turbulence

Figure 1. Target and response with a rating of 7.
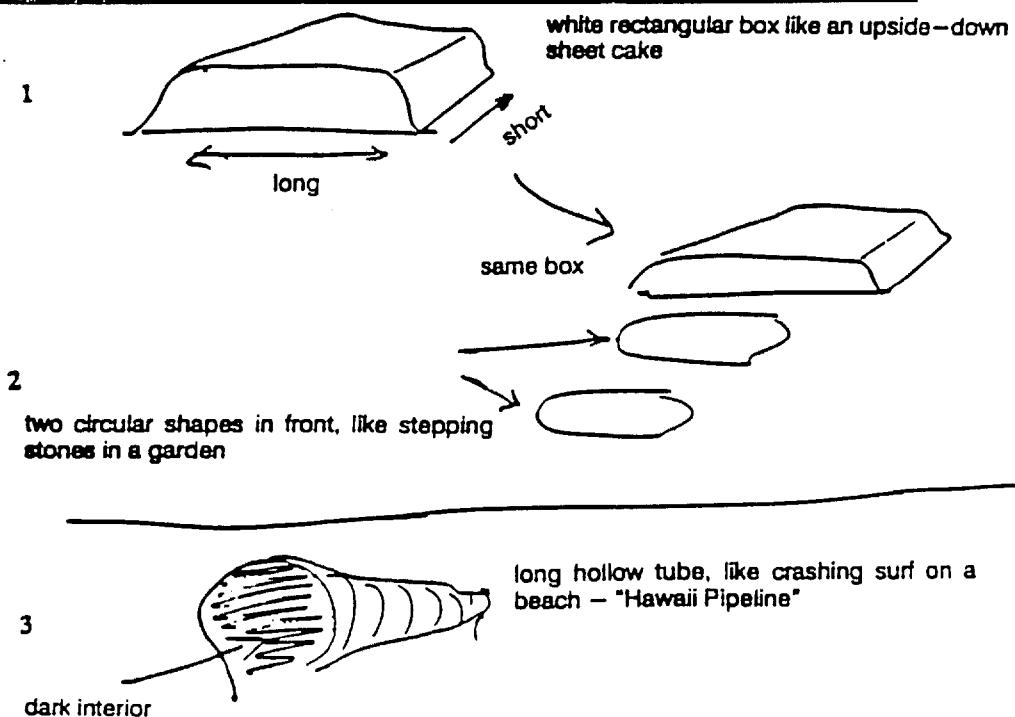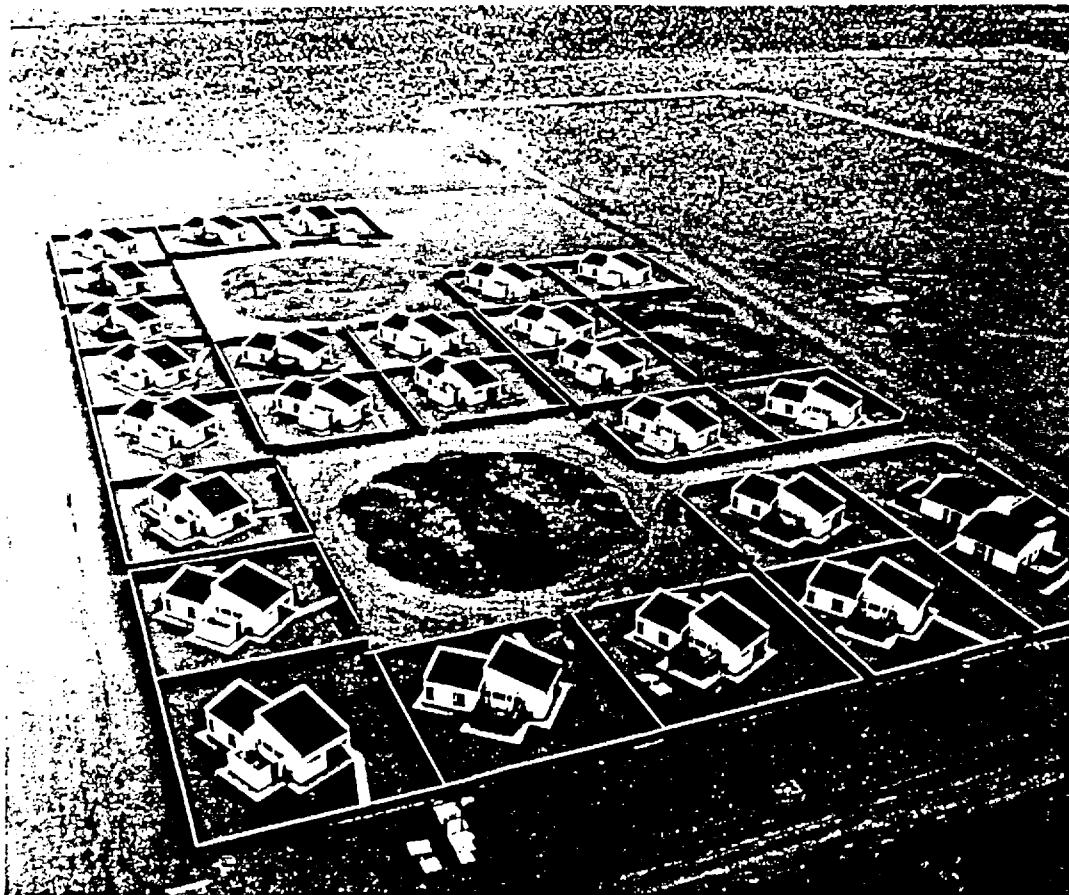
Figure 2.   Target and response with a rating of 4.
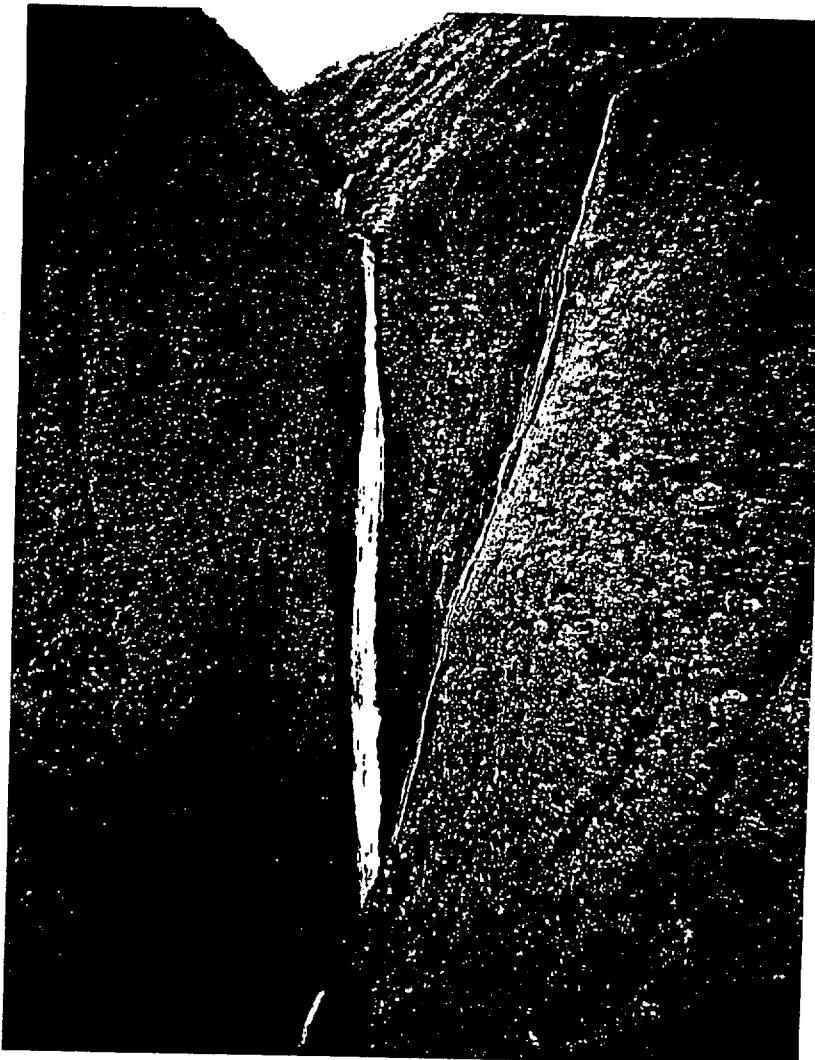
BEGIN—10:30 AM

puffy balls — almost cotton—like. Cottony
puffy splotches. Movement — whizzing
through these cottony puffs fast. Damp-
ness. A long walkway & metal girders.

BREAK

I keep wanting to say — specifically — air-
field landing strip. Flat land. Big airplanes
would land here like naval carriers. Has a
broken white line down the center of strip &
you see it straight on — like you would be
coming in for a landing.
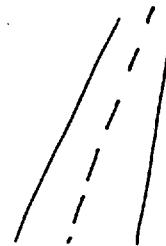
Figure 3. Target and response with a rating of 1.

Rank-order

We observed a strong increase of AC for the static targets in the 1993 trials as compared to that of the 1992 trials ($X^2 = 3.158$, $df = 1$, $p \leq 0.075$). Three of the four receivers had improved results in the 1993 trials as compared to those of 1992. Thus, the second hypothesis (i.e., an increase in AC for static targets) was supported.

Table 6 shows the same data for the dynamic targets.

Table 6.

Results for Dynamic Targets

Receiver	<Rank>	ES	p-value
9	1.70	0.919	1.8×10^{-3}
372	1.93	0.754	1.8×10^{-3}
389	3.00	0.000	0.589
518	2.40	0.424	0.091
Totals	2.22	0.566	7.5×10^{-5}

Using the rank-order statistics above, we saw no difference between static and dynamic targets in this study. The first hypothesis was confirmed: we observed a significant increase of AC with dynamic targets in 1993 from that of 1992 ($X^2 = 9.942$, $df = 1$, $p \leq 1.6 \times 10^{-3}$).

We then examined the question of static vs dynamic targets with regard to our blind rating system. Figure 4 shows the relative density for the static vs dynamic targets for the three significant receivers only. The mean and standard deviation for the static and dynamic targets was 3.31 ± 1.73 and 3.91 ± 2.06, respectively ($t = 1.32$, $df = 68$, $p \leq 0.096$). Including all receivers the means and standard deviations were 3.22 ± 187 and 3.51 ± 2.06, respectively ($t = 0.690$, $df = 88$, $p \leq 0.246$).
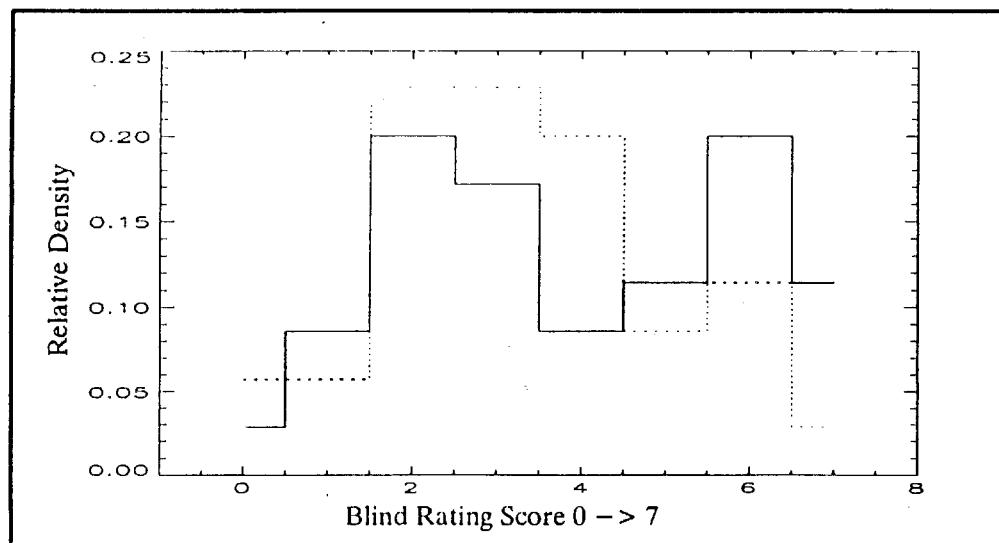

Figure 4. Static (dotted) vs Dynamic Ratings for Three Significant Receivers

It is difficult to interpret this analysis. If we claim that dynamic targets should be more readily sensed by AC, then we are entitled to examine only the significant receivers. While not overtly so, the trend supports that assertion. Ratings, however, can be biased because of content. We could argue that this difference is simply due to that fact that there is more content in the dynamic targets than in the static ones. There are two arguments against this assertion, however. In this experiment, the content of the dynamic targets was carefully chosen to match that of the static targets. In addition, our rating scale is sensitive to both incorrect and correct information. It seems unlikely, therefore, that the increase in scoring can be accounted for by content bias.

We see little evidence for a target type dependency when we include all receivers, or when we examine the overall difference, using the rank-order data ($X^2 = 0$, $df = 1$, $p \leq 0.5$).

General Discussion and Conclusions

In our first experiment, we found that AC statistics with static targets were better than with dynamic ones. We hypothesized that this difference resulted from a combination of the target pool design and the receivers' expectations. Following this idea, May, Spottiswoode, and James (1994a) define *target pool bandwidth* as the number of differentiable cognitive elements in a target pool. They suggest that a target pool, such as our original static pool, which contains enough elements to prevent guessing, while at the same time allowing for some internal editing of receivers' imagination, is optimal with regard to the reduction of noise. In the first experiment, the dynamic target pool did not fit this ideal. When we constructed a better dynamic pool for the second experiment, we observed commensurate increases in the effect sizes. May, Spottiswoode, and James suggest that their target pool bandwidth concept is testable, and it is our hope that these tests will be conducted in the near future.

In the second experiment, even after correcting possible defects in our target pool design, we were unable to observe a significant target type dependency. On the other hand, the direction for a replication is clear. May, Spottiswoode, and James (1994b) suggest that they have identified an *intrinsic* target property that correlates with the quality of AC (i.e., gradient of Shannon's entropy). If this is true, then there might be a fundamental argument that implies that dynamic targets *should* be better than static targets. If a dynamic and static target pool were constructed on the basis of the best gradients of Shannon's entropy, then a significantly improved test could be accomplished.

Finally, we comment upon the sender condition. Our results show, as in forced-choice AC, that a sender is *not* a requirement. It is reasonable to expect that if the sender condition is not blind, then some dependencies might be observed. Dr. Robert Morris and the research group of the Psychology department at the University of Edinburgh are currently conducting a study to answer the necessary and/or sufficient requirement of a sender.

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