Field Study of an Enhancement Effect on Lettuce Seeds- Replication Study[1]

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Abstract

In parapsychology there is a classic healing experiment in which seeds are stressed, and then randomly assigned to either a healing or control group (e.g. Grad,1963, 1964). Several of these studies have found that there is greater germination rate and growth in the healed group.

A field trial, using this basic design, was run in 2000 on an organic farm (Roney Dougal & Solfvin, in press). In this experiment, the healthy organic seeds were not stressed beforehand, and the healer was asked to enhance the seeds for enhanced germination, greater growth and better health. Only the third aspect gave significant results with the plants grown from the enhanced seeds having less fungal disease ($F(3,24) = 3.13$, $p = .044$).

This replication study has two primary hypotheses: the enhanced seeds will have greater growth and better health, than the controls. There were seven trials beginning in April, the final harvest being in December. We used a randomized double blind design with four treatment conditions: one jar of seeds (HX) was enhanced by the healer while a control person mimicking his actions with a second jar (NH) and two jars (C1, C2) remained untreated on the table. After an assistant randomly relabelled the jars (A, B, C, D), the seeds were germinated in trays in a polytunnel, planted out after three weeks, and (about 10 weeks later) harvested in two sections, half of each group (row) one week, and the other half a week later. Each lettuce was weighed upon harvesting and after trimming, rated for slug and fungal damage, and sent off to market.

Only five trials (plantings) were conducted, owing to two trials that were not planted out in time. The enhanced seeds produced a heavier crop with less damage, but the planned (rank) analysis is insufficiently powered with the reduced number of trials, and a more appropriate analysis was substituted. Adapting from previous studies (Braud & Schlitz, 199x) of intentionality effects on biological systems, z-tests and effect sizes were computed for the enhanced (HX) group for each harvest, and Stouffers Z method to combine them across the five plantings (trials).

The analysis showed that the enhanced (HX) seeds produced lettuces with gross and net weights significantly larger than chance expectation, with average effect sizes in the .10 to .20 range. The second hypothesis was also confirmed by significantly reduced slug and fungal damage, with slightly smaller average effect sizes than the growth measures. Moreover, the enhanced seeds yielded about 10% more crop (by weight) during the season than any of the other three treatment conditions, suggesting a practical value for the commercial farmer. This is good news for organic farming where the lack of fungicide and artificial fertiliser can result in a lower yield.

Introduction

A classic healing experiment with a very simple design that is suitable for large scale field trials is the one made famous by Grad (1963, 1964). Two trays of seeds, which have been stressed in

[1] Acknowledgements with deep gratitude go to the following: Radford Mill Farm for once again assisting this work so wholeheartedly; Paul Young, without whose financial assistance this study could not have happened; Marke Pawson, for his gentle and excellent healing abilities; and all the randomisers and harvesters for their unstinting help and good humour in often very trying circumstances. This paper was originally presented at the Parapsychological Association conference, Paris. August, 2002. A complete version is published in Roney-Dougal, S.M. & Solfvin, J. (2003). "Field study of an enhancement effect on lettuce seeds - Replication study" *Journal of Parapsychology,* 67(2), 279-298.

some way, are prepared. One of the trays is watered with water that has been held by the healer, and the other with ordinary water. Several of these studies have found that more seeds germinate, they germinate faster, and there is greater growth from the healed tray.

Over the past few years, there have been several large scale trials of "distant healing on medical outcomes of patients attending a cardiac hospital (e.g., Byrd, 1988; Harris et al, 1999; Sicher et al, 1998). Significant health benefits have been shown for the treatment groups. This demonstrates the feasibility and practical value of researching parapsychological phenomena in real life settings.

The study run in 2000 (Roney Dougal & Solfvin, in press) was the first controlled investigation of a healer's intention on the healthy growth of plants on a commercial organic farm. The healthy organic seeds were not stressed beforehand, as we were looking for greater health in the enhanced plants, and the healer worked directly with the seeds rather than with water. Lettuce seeds were chosen as these germinate rapidly and come to harvest in about 10 weeks with approximately 10 sowings in the year, thus allowing for sufficient trials in any one season. There were three hypotheses: that the seed would show greater germination, greater growth and better health. Of these only the third hypothesis showed significant results, with the plants grown from the enhanced seeds showing significantly less fungal disease ($F(3,24) = 3.13$, $p = .044$). There was a strange anomaly in the growth rate in that one row (row D) consistently gave greater weight. This was suspected to be due to an expectancy effect, as the farm had been given feedback after the first pilot trial, in which the plants from the enhanced seed had been significantly larger than the rest, and had been in row D.

This years study is a close replication to see if these findings are robust. It has two primary hypotheses:

1) The enhanced seeds will have greater growth than the control.
2) The enhanced seeds will have better health than the control.

The following four outcome variables were pre-planned:

1) Growth variables: gross and net weight of the plants were measured when harvested;
2) Health variables: the plants were checked for slug and for fungal damage, and rated on a five-point scale.

It was decided not to assess germination rate as there is virtually a hundred percent germination with this healthy organic seed. Also, this had been a heavy burden for the grower and had not given any significant result. And the primary reason for running these trials is a very practical one, looking to see if a farm can have a better harvest with healthier crops as a result of enhancement by a healer. So, in this case, germination rate becomes secondary to harvest results.

Method

Radford Mill farm, an organic farm growing vegetables for the local community, as well as free range organic eggs, yogurt and meat, once again kindly agreed to be the farm for this study. The crop was lettuce as before.

The seeds were all sown by one person to ensure uniformity of sowing procedure. The seeds were germinated in a dark shed. The initial growing conditions were in trays in a polytunnel, with the approximately three week old plants being transplanted out into a south-facing field, bordered on all sides by non-experimental plants, so that they were in the centre of the rows, to ensure equivalent growing conditions. The experimental seeds and plants were treated in an identical manner to all the rest of the crop. Temperature, humidity, soil conditions, and wind factors were kept as equivalent, within each trial, as possible.

There were various differences from the preliminary study. As the last trial in the previous year had not been sown until too late in the season for the plants to be planted out in the field, like all the previous sowings, it was decided to run only seven trials this year. Owing to family problems, the healer who worked with us last year was unable, at the last moment, to attend, so another healer (MP) offered to work in his stead. He used a very different healing method. There was a serious

outbreak of foot and mouth disease in Britain at this time, so we were unable to use the farmhouse building for the treatments as we had done last year, so this year the enhancements occurred in the packing shed. And, just as the trials were starting, the grower who had worked with us last year left the farm for another job. He was replaced by two people, who had been working with him the previous year, and between them they very kindly helped with the trials.

Enhancement Procedure

For each trial, in the packing shed, in the presence of the experimenter (SRD) a person, who acted as the randomiser, was given a sealed pot of 1000 red oak lettuce seeds (Valdai). They counted 100 seeds, in to each of four identical jars, making a total of 400 experimental seeds in each trial. These were then closed with a screw top lid. The randomiser was a person who knew no one who worked on the farm, and had no contact with the farm other than on the one occasion they performed the function of ensuring that the four jars of seeds were randomly ordered. At this point nobody knew which jar would be given to the healer all four jars were identical with no identification. One jar of seeds (HX) was given by SRD to the healer; the second (C1) and the fourth jars (C2) were untreated controls and were left untouched on the table; the third jar (nonHX) was given by SRD to the control person, who handled it exactly as MP handled his. This person claims no healing ability and mimicked the actions of MP whilst he was doing the enhancement. This person also performed this function last year.

MP "enhanced" the seeds by holding his hands approximately one foot from, with the palms angled towards, the jar. Each enhancement lasted about five minutes, but this part of the procedure was not standardised. After the enhancement, when everyone had left the shed, the randomiser assigned labels with the trial number and A, B, C or D to the four jars of seeds, which had been left on the table in the places where each person had sat. There was a different randomiser for each trial. On most occasions two enhancement sessions were held one after the other on the same morning. On these occasions there was the same randomiser for both the trials, and the randomisation was done after both enhancements were complete, the jars from the initial enhancement having a label stating the trial number affixed, until after the second enhancement, when the randomisation procedure occurred. (For full details of the randomisation procedure, please see Appendix 1.) Once the randomiser had labelled the jars they left them in the middle of the table for the grower to collect, and left the farm.

For trials 6 and7 this procedure was varied slightly, and the control jars C1 and C2 were taken outside the shed by SRD during the enhancement session. The rationale behind this was that Schwartz (1990) found that controls in the same room as the healer can be affected. This was not taken into account in the preliminary experiment, and was included as a variable here, as both SRD and the healer felt it might be valid.

Growing Procedure

There were seven trials beginning in April, the final harvest being in December. Thus there were a total of 2,800 lettuces in the whole experiment. There were varying lengths of time between the enhancement and the sowing of the seeds. The seeds were sown, germinated and grown in the polytunnel for approximately three weeks on average. This crop was then planted out in the field, the experimental plants all being planted in the centre of each row of lettuces, with non-experimental rows planted on either side so that at all times the experimental plants were surrounded by other plants. With regard to this part of the procedure we had to let the grower decide what was appropriate, dependent on weather, the needs of the wholesale market, etc. Sadly, only five trials were sown and planted out in good time for a proper harvest. It was decided, by SRD and JS, before seeing the raw data, to analyse only the first five trials. Trials 6 and 7 will be analysed separately.Various measures were recorded during the growth of the plants:

After they had been sown and germinated, SRD recorded the numbers of seeds that had germinated . When they were planted out, she recorded the number of plants in each row. And when they were harvested she recorded the number that made it to harvest.

Harvesting Procedure

At a time determined by the grower, half of each row of lettuces were harvested one week (e.g. trial 1a), and the remaining halves the following week (e.g. trial 1b). This was because the farm does not have a market sufficiently large for the sale of 400 lettuces of one variety in any one week. Each lettuce was harvested by being cut at ground level and put into labelled trays. These were brought in to the packing shed and a team of five people then assessed the lettuces for health and weight. First the lettuce was assessed for fungal damage, which was constrained to slimy leaves, most of which were at the base of the plant, and also for slug damage, by noting the number of holes in each leaf. This was recorded on a five-point scale, with 1 indicating little damage up to 5 indicating much damage. Then the lettuce was weighed to give gross weight. The outer leaves were trimmed and then they were reweighed to obtain net weight, which was a lettuce ready for packing for sale. Those that were large enough were then packed in bags.

At the beginning of each harvesting session, the harvesters all independently rated a lettuce for slug and fungal damage, and then checked to see how closely their assessments matched. If there was a difference they discussed this and rated another lettuce, until agreement was reached.

After all the data had been recorded and sent to JS for analysis, the randomiser revealed the codes.

Results & Analysis

The data consisted of only five trials (or plantings) since two plantings were lost due to being planted out too late. Each of the four outcome variables were averaged, by treatment group, for each harvest (first, second) of each trial. Following the analysis procedure for the previous study (Roney-Dougal & Solfvin, in press) the averages were ranked by treatment group, with 1 being assigned to the best outcome (larger weight or less damage), through 4 for the worst. Ties were handled by the standard method, assigning both groups the mean of the two ranks for which they competed groups tied for 2nd and 3rd place were both assigned the rank of 2.5. Tables 1 through 4 show the group averages and rankings for Gross Weight, Net Weight, Slug Damage, and Fungal Damage, respectively.

The enhanced (HX) group has heavier plants with less damage. However, the reduced number of trials makes the statistical analysis of these ranks insufficiently powered. There were also concerns that the two harvests for each trial may be correlated, requiring separate analysis that would reduce sample size even further. In addition, it was desired to make better use of the large within-group sample sizes, and to provide effect sizes as well as probabilities for comparison with other studies. Therefore, a more appropriate analysis was substituted for testing these hypotheses. Adapting from previous studies (Braud & Schlitz, 1991, Schlitz & Braud, 1999, Schneider, Binder, & Walach, 2000) of intentionality effects on biological systems, z-tests and effect sizes were computed for the enhanced (HX) group for each harvest, and Stouffers Z method to combine them across the five plantings (trials).

Statistically significant results are seen for all four outcome variables, in both first and second harvests. Moreover, ALL significant values are in the predicted directions, that is, increased growth (gross and net weights), and decreased slug and fungal damage. Average gross weight for first harvests is larger than chance expectation (ES = .09), though not statistically significant ($Z=1.47$, $p = .072$), but is statistically significant for second harvests (ES = .19, $Z=3.04$, $p < .001$). Net weight for

the enhanced group is significantly greater than chance expectation for first harvests (ES = .16, Z=2.49, p < .01) and second harvests (ES = .15, Z = 2.28, p = .011).

Average slug damage ratings are reduced significantly for first harvests (ES = -.11, Z = -1.66, p < .05), and for second harvests (ES = -.12, Z = -1.82, p < .05). Average fungal damage is statistically significantly reduced for first harvests (ES = -.13, Z = -2.11, p < .05), but not significantly so for second harvests (ES = -.03, Z = -0.41, p = n..s.).

Overall, the effect sizes noted here are in the small range, ranging from .09 to .19 across the five experimental plantings, and this accounts for why a less sensitive analysis does not reveal them. However, the strength of these results is augmented by a remarkable level of consistency in directionality. This is precisely the sort of consistency which can, over time, cumulate into a substantial amount.

Thus, both hypotheses are supported in this study. The enhanced (HX) group of lettuces achieved significantly greater gross and net weights, as well as significantly less slug and fungal damage, than would be expected by chance. These combine to produce a substantial total yield for the enhancement group, fully 10% more crop (by weight) than any other group for the season.

Discussion

The results this year replicate the preliminary findings from last year that a healer can enhance seeds so that the plants are healthier in that they resist fungal damage. This year we also have the result that the plants from the enhanced seed grow larger. Both gross and net weights are greater in the enhanced group. Last year we had an anomalous finding with the growth, in that row D was always the largest whatever the condition. It was suspected that this was due to an expectancy effect, because the farm had had feedback concerning the first pilot trial in which the healers plants were in row D and were the largest. There was no feedback this year and no expectancy effect and enhanced growth in the treatment group.

The enhanced net weight is partly created by the lack of fungal disease in the plants, since less fungal disease means that the plants need less trimming. This is particularly beneficial for the farm as less disease means bigger plants packed for market, which means greater numbers of plants for sale. This is because only those plants above a certain weight are saleable. As organic farms do not use fungicides or artificial fertilisers, this is particularly beneficial to them.

Should there be an question of the practical value of this, Table 6 presents the rather dramatic consequences of a small effect which cumulates consistently over time. The farm who agreed to the host this study, and to put up with the additional arrangements and inconveniences entailed in it, is of course not interested so much in theory as in the bottom line. And here it is of the five trials, the group of seeds treated by the healer was the first place winner in lettuce production for four out of five plantings. Overall, the treated seeds produced about 10% more crop than any other group. Over the course of the summer, this amounted to about 15kg, or over 30 pounds more lettuce in the treatment group. Organic farmers have found that, on average their crop yields are 10% less than non-organic farms, so the effects found here compensate adequately, and so help to make organic farming more viable.

There are still many questions to be answered in future research. The results of the current study are dramatically different from those of the previous year, and this may be due to any one of several procedural changes. There was a different healer this year, different research assistants, as well as a different grower for the farm. And one wonders how robust these results are, whether a similar result will obtain next year on the same farm, or on different farms.

LIMITATIONS: This study has some methodological limitations. First, the external validity (generalizability) of these results is limited by having only one healer enhance the seeds. On the other hand, a high level of internal validity was maintained by the careful use of blinds, randomisation, and especially by the novel employ of three control groups, a mimic treatment and two untreated

controls. With one treated group among four rather than among two, we can be more confident that chance factors (fortuitous randomisation) or field workers guessing which group received enhancement cannot account for these results. Moreover, three control groups provides additional between group variance control. With strong internal validity, we assure that the treatment (HX) group outcomes are indeed valid in this study, and leave the external validity issues for future research.

A second limitation of this study is the use of an alternative statistical analysis selected after the codes were broken and the pre-planned analysis prepared. However, the pre-planned analysis by ranks was inadequate due to an unexpectedly small number of trials; the alternative analysis is in fact more appropriate for this dataset; is adapted from the most commonly used analysis for intentionality effects on living systems; makes better use of the large within-group sample sizes in this study; and provides effect sizes for comparison with other studies. Moreover, only the pre-stated hypotheses for the current study were tested, and no further data manipulations or selections were employed. Thus, the alternative analysis is a consequence of an unanticipated event in the data collection and not, strictly speaking, a post-hoc analysis.

A third limitation is the assumption that by arbitrarily filling the four jars with 100 seeds each, they are equivalent. In the future, more careful attention needs be paid to this, and the jars randomly assigned (rather than arbitrarily) to the four treatment conditions, as well as randomly relabelling them (A, B, C, D) after the treatment is completed, as was done here. While it seems unlikely that this detail could account for the results of this study, such subtle potential confounds should be eliminated.

Conclusion

The results of this study suggest that it is possible to take laboratory findings out into the field, and that enhancement by a healer can bring benefit to a farm. The results of this study can be added to those suggestive of psi, but also suggests that under some circumstances the application of intentionality to real world problems may have measurable consequences. More research is needed to determine whether this was an isolated result or a potentially generalizable one. And more research is needed on the practical value of psi in our everyday lives, of where and how it may operate. Thus, the current finding extends the database of intentionality effects on living systems horizontally, but not vertically. It adds to the growing database suggestive of intentionality unexplainable by physical factors or by chance, but we are left to wonder why it occurred, what it means, why it didnt occur last year, and whether it will occur again. Bringing the laboratory into the field at least has the advantage of providing practical benefit while we struggle with the deeper issues.

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