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Effects of Distant Intention on Water Crystal Formation: A Triple-Blind Replication

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Abstract—An experiment tested the hypothesis that water exposed to distant intentions affects the aesthetic rating of ice crystals formed from that water. Over three days, 1,900 people in Austria and Germany focused their intentions towards water samples located inside an electromagnetically shielded room in California. Water samples located near the target water, but unknown to the people providing intentions, acted as "proximal" controls. Other samples located outside the shielded room acted as distant controls.

Ice drops formed from samples of water in the different treatment conditions were photographed by a technician, each image was assessed for aesthetic beauty by over 2,500 independent judges, and the resulting data were analyzed, all by individuals blind with respect to the underlying treatment conditions.

Results suggested that crystal images in the intentionally treated condition were rated as aesthetically more beautiful than proximal control crystals ($p = 0.03$, one-tailed). This outcome replicates the results of an earlier pilot test.

Keywords: intention—water—consciousness

Introduction

Can one person's intention affect another person's health from a distance? A growing number of clinical studies have investigated this question. Some of them provide positive evidence[1], others do not[2]. To help study this question under more stringent laboratory controls, investigators have also explored whether one person's intention can affect another person's nervous system from a distance[3]. From those studies the evidence is clearer. From a meta-analytic perspective the original question can be answered with a tentative yes[4]. Tentative, because while the evidence is statistically significant and repeatable, the observed effects are small in magnitude, nontrivial to replicate, and theoretical explanations remain speculative.[5]

Because of the complexities associated with studying human health and physiological responses, still other investigators have aimed towards further simplification by asking whether intention affects properties of water. This remains relevant to the question about health because the human body consists of 70% to 90% water, depending on age.[6] Evidence from those studies supports the hypothesis that intention affects properties of water[7], but like many of the empirical studies in this domain, most of the experimental reports have appeared in specialty journals and have gone unnoticed by most medical researchers.

One exception that has elevated the question about intention and water from the obscure to the infamous is the claim that water exposed to or ‘‘treated’’ by positive intentions results in frozen water crystals that are aesthetically more pleasing than similar crystals formed from ‘‘untreated’’ water[8]. In an earlier pilot experiment we tested this claim under double-blind conditions and found evidence in favor of the ‘‘intentional hypothesis’’ ($p = 0.001$).[9] The present study was a replication attempt conducted under triple-blind conditions.

Method

Water Sample Preparation

In preparation for the experiment, the first author (D.R.) purchased six plastic bottles of Fiji brand commercial bottled water, the same type of water used in the pilot study. D.R. randomly assigned (using a tossed die) the bottles with labels A through F, and then the second author (N.L.) took the bottles to the laboratory and randomly selected (again with a tossed die) two bottles as the treated samples, two as ‘‘proximal’’ controls, and two as ‘‘distant’’ controls.

N.L. noted the resulting assignments and placed two copies in separate envelopes which remained sealed until after the analyses were completed.[10] She retained one envelope and the other was stored in D.R.’s desk. Then she entered a double steel-walled, electromagnetically shielded room (Lindgren/ETS, Cedar Park, Texas, Series 81 Solid Cell chamber) at the Institute of Noetic Sciences (IONS) in Petaluma, California, where she placed the two treatment bottles on top of a small table and the two proximal control bottles under that table. The shielded room acted as a convenient, limited-access location in which to leave the bottles during the experiment.

N.L. then took a digital photo of the treatment and proximal control bottles, and placed the two remaining bottles (distant controls) in a Styrofoam box and stored them on top of a bookshelf on another floor of the laboratory building. D.R. edited the digital photo of the bottles in the shielded chamber to reveal just the two treatment bottles, then emailed the photo to M.E. and T.K. They used this photo as a visual aid for three groups that would later direct their intentions towards those bottles.

Throughout the experimental setup, N.L. was instructed to handle each of the water bottles in about the same way, and to hold them about the same length of time. During the intention periods all bottles remained in their originally placed locations and were not disturbed. The third and fourth authors (M.E. and T.K.) knew in advance that there would be treated and distant control bottles in this study, but they were not informed about the existence of the proximal controls until after all distant intention treatments had ended.

The comparison of principal interest in this study was the average (blindly rated) aesthetic differences of frozen water crystals obtained using the treated vs. proximal control samples. This is because those two conditions were located close to each other in the same environment, and because the proximal control was not influenced by M.E. or T.K.'s prior knowledge of its existence. That is, to take seriously the hypothesis that intention plays a role in this experiment, we felt it was necessary to constrain *who knew* about the potential targets of intentional influence. By analogy with a quantum optics system, in which the knowledge one has of the path that photons take through a double-slit apparatus influences the behavior of those photons, we speculated that knowledge of the experimental conditions in this test might influence what was ultimately measured. Thus, to provide some control over the distant intentions in this study we required a comparison condition that was unknown to M.E., to T.K., or to the groups of "distant intenders." This was provided by the proximate control. The distant control was retained in this study primarily because we used a similar control in the previous study, so M.E. and T.K. would have expected it.

Intentional Treatments

On May 20, 2006, in Graz, Austria, M.E. led a group of about a thousand people in a prayer of gratitude directed towards the water in the IONS laboratory, some 5,700 miles away. M.E. showed the audience where the IONS laboratory was located in relationship to Graz through a sequence of images from the Google Earth global mapping application. Then he showed the digital photo of the treatment bottles inside the shielded chamber with the words of an intentional "prayer for water" overlaid on the photo. After explaining the photo and purpose of the experiment, M.E. led the group in speaking aloud the words of the prayer for about five minutes. M.E. led a second group of 450 people in a similar exercise on May 23, 2006, from Nuremberg, Germany, and then a third group of 500 people from Munich, Germany on May 24, 2006.

The day after the third group sent their intentions, N.L. retrieved all six bottles from the laboratory. Then she and D.R. (who remained blind to the bottles' conditions) wrapped the bottles in separate sheets of aluminum foil and placed all six bottles in a box. That package was placed inside a larger box, cushioned with foam peanuts, and mailed to M.E.'s laboratory in Tokyo. At this point D.R. informed M.E. and T.K. about the existence of the proximal controls. Like D.R., M.E. and T.K. remained blind to the conditions of the six bottles throughout the crystal formation and statistical analysis phases. N.L. was not involved in the study again until after all data had been collected and analyzed, whereupon she broke the blinding code.

Crystal Analysis

Upon receiving the six bottles, T.K. blindly examined water samples from each bottle according to the following procedures:

1) From each bottle, a drop (approximately 0.5 ml) of water was placed into each of 50 Petri dishes, and a lid identifying the bottle's randomly assigned letter (A–F) was placed on each dish. Thus there were 50 water drops tested from each bottle.
2) Each dish was then placed on a tray in a random position in a freezer maintained at –25 to –30 degrees C for a minimum of three hours. The random placements helped to ensure that potential temperature differences within the freezer would be randomized among the dishes.
3) T.K. later removed the dishes from the freezer, and in a walk-in refrigerator (maintained at –5 degrees C) he look a photo of the apex of each resulting ice drop using a stereo optical microscope at either 100× or 200×, depending on the presence and size of a crystal. Based on the results of the earlier experiment, some water drops were not expected to produce any discernable crystals.
4) All 300 resulting photographs, from all six bottles, were then emailed to D.R., each identified with a bottle assignment letter A–F, and a within-bottle sample number from 1 to 50.

Aesthetic Assessments and Analysis

To provide blind, subjective assessments of the aesthetic beauty of the water crystals, D.R. created a website to allow individuals to judge each crystal photograph on two factors. The factor of principal interest was *beauty*, meaning that the picture was aesthetically pleasing in some way. A second, exploratory factor was *interest*, meaning that the picture was notable in some way. In both cases the rating choices ranged over a seven-point scale, from "not" to "very," e.g. "not beautiful to "very beautiful." Each participating judge viewed and rated 50 photos, randomly selected out of the 300 available photos, and presented one at a time in a newly randomized order.

We asked judges to rate both *beauty* and *interest* because prior research on aesthetic judgments, in realms ranging from fine art, to faces, to commercial product design, suggests that numerous factors influence aesthetic preference.[11] They include figural goodness, figure-ground contrast, stimulus repetition, symmetry, and prototypicality.[12] Such factors suggest that asking for a single rating of aesthetic beauty may not be sufficient to capture individuals' full assessments of the photographs of frozen water. Whether the factor of *interest* was the best possible variable to use for this purpose was unknown, and was thus considered exploratory.

To test the hypothesis that the crystals in the intentional condition would be rated as more beautiful on average than the same crystals in the proximal

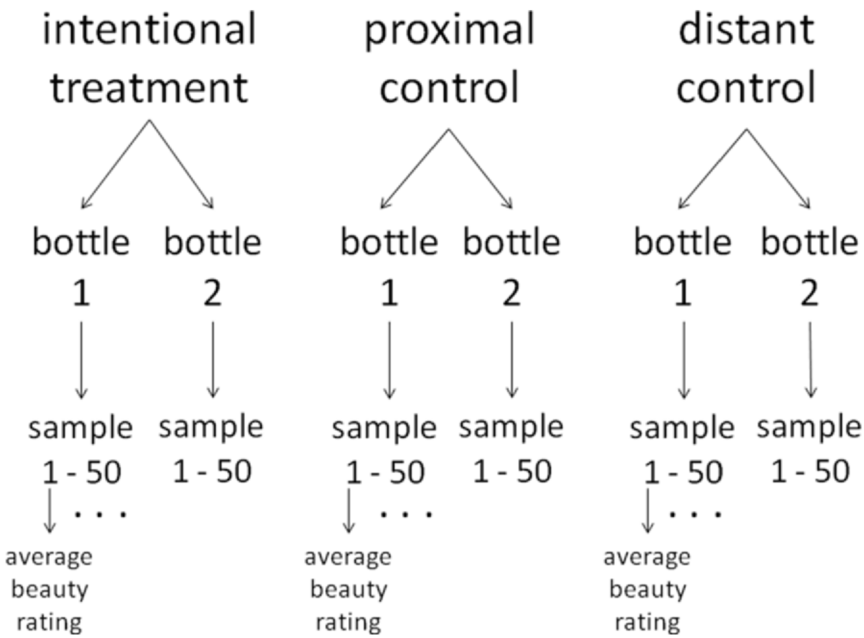

Fig. 1. The intentional hypothesis was tested using a hierarchically nested variance components analysis, with treatment condition as a fixed effect, and bottles within condition and samples within bottles as random effects.

control condition, a mixed, hierarchically nested variance components analysis of variance was employed[13], where treatment condition was a fixed effect, and the two bottles used per condition and 50 crystals sampled per bottle were both random effects (see Figure 1).

Image Contrast Analysis

In addition to the subjective assessments, we also used image processing software (Matlab 7.0.1 Image Processing Toolbox, The Mathworks, Inc., Natick, Massachusetts) to generate an objective score of image ‘‘contrast’’ for each of the 300 photographs. Contrast in this context refers to the proportion of black vs. white in an image. This was a useful metric because when crystals appear on the apex of frozen water drops, they tend to rise up beyond the surface of the drop, partially because ice expands when it freezes and also because water crystals grow out like branches on a tree. When a microphotograph is taken of such crystals, the narrow field of focus tends to separate the white-appearing crystal from the darker background, thus increasing the image’s overall contrast. When no crystal is present, the surface is flatter and the image has a more uniformly gray appearance (see Figure 2). We predicted that these *contrast* values would be

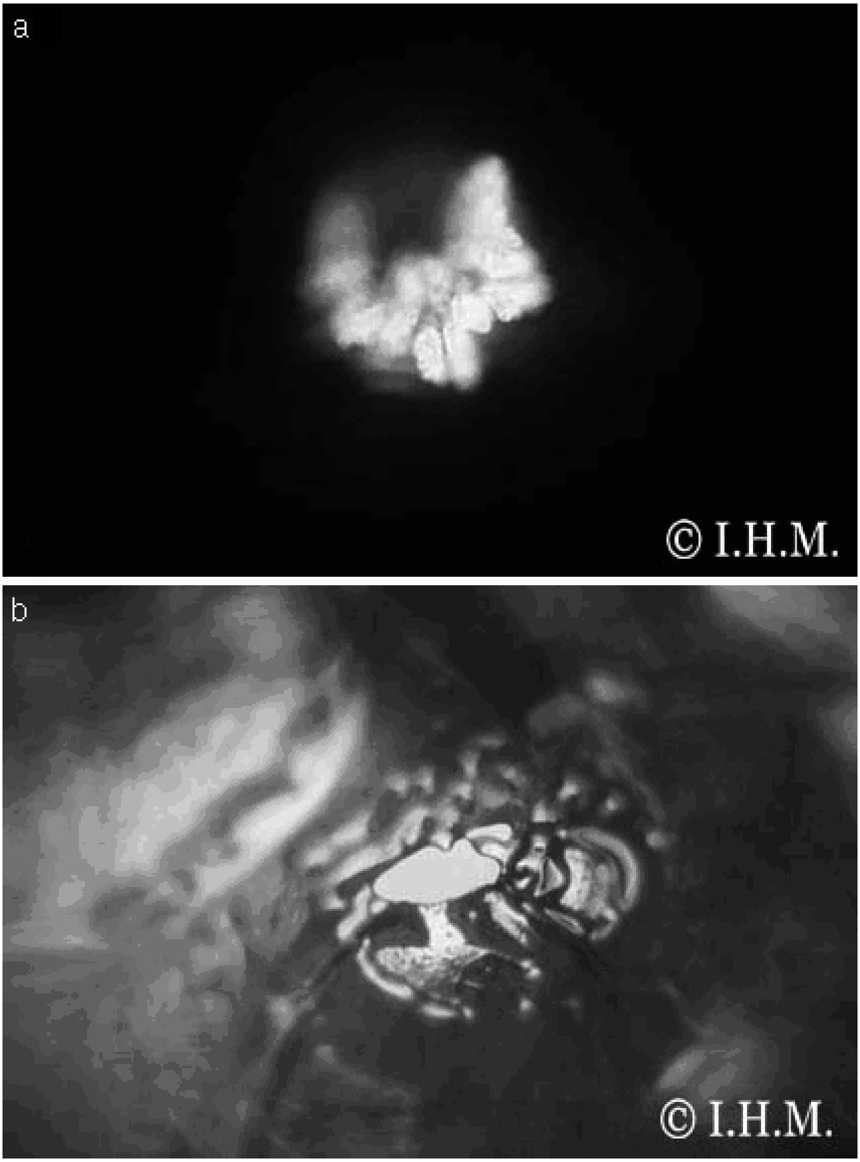

Fig. 2. Example of images with high (top [a]) and low (bottom [b]) contrast. The left image shows a crystal formation, the right does not.

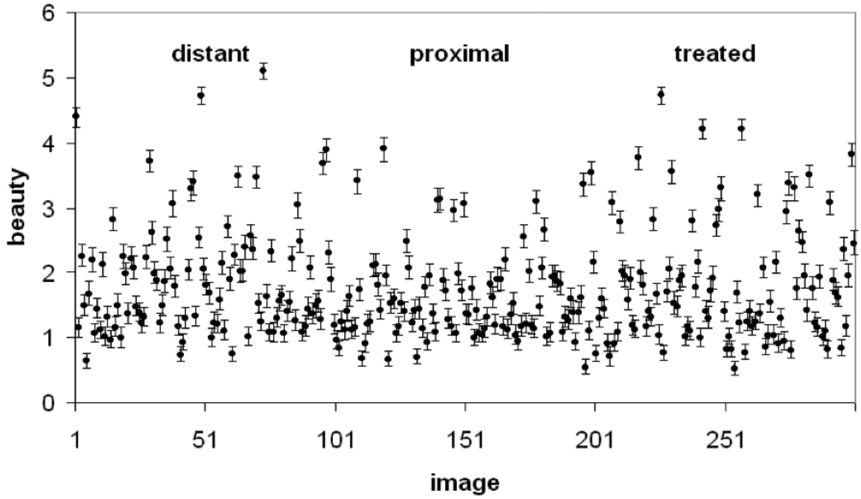

Fig. 3. Average ratings of aesthetic beauty for all 300 images, with 95% confidence intervals.

correlated with the average ratings of aesthetic *beauty*, and thus that *contrast* in the treatment condition would be higher than in the proximal control condition.

Results

Analysis of Crystals

Subjective assessment ratings were collected online for one month. During that time, 2,579 people had each assessed 50 randomly selected images, for a total of 128,950 assessments and an average of 430 *beauty* and *interest* ratings for each of the 300 images. These average ratings, in the form of point values, formed the dependent variables in the subsequent analyses. Assessment data from individuals who started to evaluate images but stopped before finishing all 50 were excluded from further analysis.

Figure 3 shows the average assessments and 95% confidence intervals for average ratings of aesthetic *beauty* for each image. Images 1–100 correspond to the distant control condition, 101–200 to the proximal control condition, and 201–300 to the treated condition. The grand average rating for *beauty* was 1.77 (on a scale of 0–6), thus most of the images were not regarded as particularly beautiful. Of the 300 images, 270 obtained average *beauty* ratings greater than 1.0. This subset of images was examined in a secondary analysis because it was more likely to contain crystalline shapes, which was of main interest in this experiment. That is, the intentional hypothesis was not that more crystals would form due to intention, but rather that crystals that did form would appear to be more beautiful in the treatment condition vs. the proximal control condition.

TABLE 1
Hierarchically Nested Variance Components Analysis for All Trials, with *Beauty* as the Dependent Measure

	Effect	df	MS	F	p
Condition	fixed	2	2.13	13.09	.03
Bottle/condition	random	3	0.16	0.23	.87
Sample/bottle	random	294	0.69		

The grand average rating for *interest* was 2.51. The correlation between average ratings of *beauty* vs. *interest* was highly positive ($r = 0.86$, $t = 29.1$, $N = 300$, $p \approx 0$). The correlation between *beauty* and normalized image *contrast* was also positive ($r = 0.30$, $t = 5.35$, $N = 300$, $p = 8.97 \times 10^{-8}$).[14]

Analysis 1: Aesthetic Beauty

The treatment condition resulted in a significant, albeit weak main effect ($p = 0.03$; Table 1; Figure 4). When *interest* was used as a covariate of *beauty*, the main effect for condition was no longer significant ($F[2,293] = 3.03$, $p = 0.20$). The latter is not too surprising given the strong correlation between *beauty* and *interest* variables. For the subset of 270 trials with *beauty* > 1.0, the results remained significant ($p = 0.04$; Table 2; Figure 4).

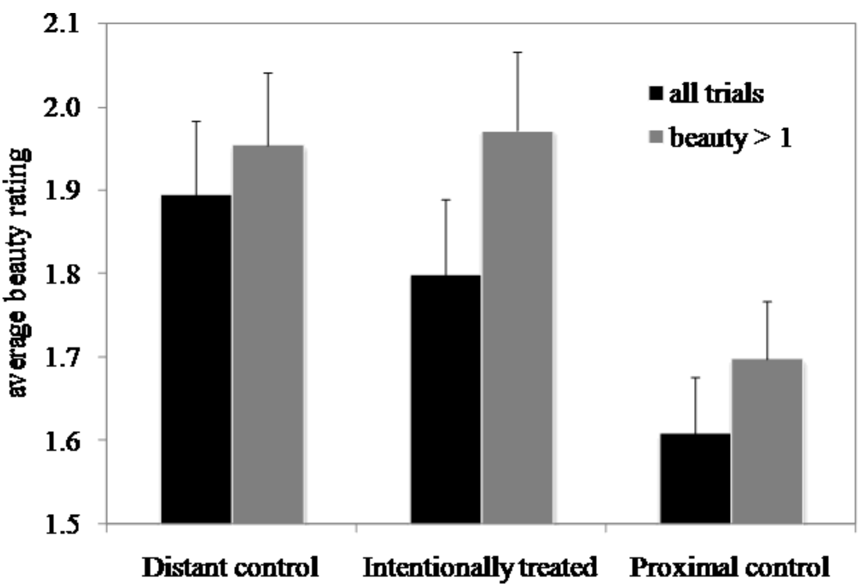

Fig. 4. Average ratings of aesthetic beauty for all 300 images, and for the subset of 270 images where average rating for *beauty* > 1.0, with one standard error bars.

TABLE 2
Hierarchically Nested Variance Components Analysis for All Trials where *Beauty* > 1

	Effect	df	MS	F	p
Condition	fixed	2	2.12	11.49	.04
Bottle/condition	random	3	0.19	0.28	.84
Sample/bottle	random	264	0.66		

The pairwise comparison of principal interest—treated vs. proximal controls—supported the intentional hypothesis for all trials (t[198] = 1.67, p = 0.05, one-tailed). The same comparison was somewhat stronger for the subset of trials where *beauty* > 1 (t[168] = 2.32, p = 0.01, one-tailed). The distant control condition resulted in slightly more beautiful crystals than the intentional condition when considering all trials (t[198] = 0.77), and slightly less beautiful for the subset where *beauty* > 1 (t[168] = –0.14).

Analysis 2: Image Contrast

Normalized image *contrast* scores resulted in a nonsignificant main effect across the three conditions for all trials (p = 0.25; Tables 3 & 4; Figure 5), but a pairwise comparison between the treated vs. proximal controls showed suggestive effects for both all trials, t(198) = 1.85 (p = 0.03, one-tailed), and for the subset of trials where *beauty* > 1, t(168) = 1.55 (p = 0.06, one-tailed). The distant control comparisons were nearly identical to the proximal controls.

Discussion

This experiment found a modestly significant difference (p = 0.03) in blind ratings of subjective aesthetic beauty of crystals formed from water samples "exposed" to distant intentions vs. proximal and distant control samples. The comparison of main interest confirmed, weakly, that the treated water crystals were rated as more beautiful, on average, than the proximal controls (p = 0.05, one-tailed). A similar analysis using objective ratings of image contrast was not significant when comparing across the three conditions, but a planned

TABLE 3
Hierarchically Nested Variance Components Analysis for All Trials, Using Normalized Image *Contrast* as the Dependent Variable

	Effect	df	MS	F	p
Condition	fixed	2	2.59	2.24	.25
Bottle	random	3	1.16	1.17	.32
Sample	random	294	0.99		

TABLE 4
Analysis for All Trials where *Beauty* > 1, Using Normalized Image *Contrast* as the Dependent Variable

	Effect	df	MS	df	MS	F	p
Condition	fixed	2	2.04	2.99	1.54	1.33	.39
Bottle	random	3	1.54	264	0.94	1.65	.18
Sample	random	264	0.94				

comparison between the treated and proximal controls again showed a modest difference in favor of the intentional hypothesis ($p = 0.03$).

It should be noted that the distant controls were judged as being slightly (nonsignificantly) more beautiful than the treated samples when considering all trials, but nevertheless for the comparison of main interest (treated vs. proximal controls) the difference was in alignment with the previously reported pilot test. The present experiment extended the earlier test design by including five new features to address potential alternative explanations. They included (a) using a proximal control condition to eliminate environmental differences between the treated and control samples, (b) placing Petri dishes in random positions in the deep freezer to average out any systematic temperature differences in the freezer, (c) employing a triple-blind design to control for expectation biases on the part of the photographer, judges, and data analyst, (d) including image processing to objectively characterize the images, and (e) analyzing all images rather than just those judged by the photographer to contain crystals.

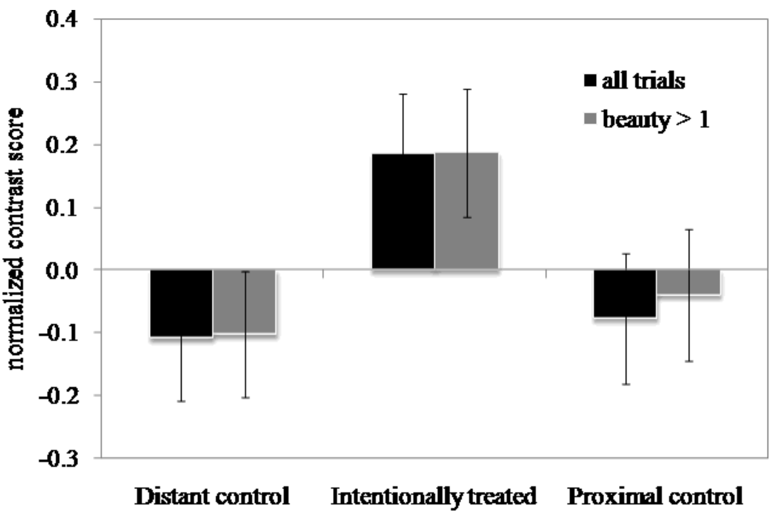

Fig. 5. Average normalized values for *contrast* for all 300 images, and for the subset of 270 images where average rating for *beauty* > 1.0, with one standard error bars.

These design elements excluded obvious environmental differences and conventional subjective biases as plausible explanations for the observed results, and the combined results of the two experiments appear to exclude chance as an explanation (unweighted Stouffer $Z = 3.34$, $p = 0.0004$). At first blush this seems to imply that distant intention influenced water crystallization properties in accordance with the hypothesis. However, as in any experiment involving intention, the intentions of the investigators cannot be cleanly isolated from those of the nominal participants and this in turn constrains how one should properly interpret the results.

In addition, there were many uncontrolled degrees of freedom in this experiment which may have allowed "unintended intentional" effects to creep in. They all involve human decisions, e.g. selecting six specific bottles of water from a huge population of available bottles, randomly assigning those bottles to three conditions, selecting and preparing the water drops, placing the water drop samples inside the freezer, searching for and photographing ice crystals on the frozen water drops at different magnification levels, choosing one of a large possible set of image processing algorithms to provide an objective measure of image contrast, and so on. The challenge for future tests of this kind is to find ways of reducing these degrees of freedom without imposing such severe constraints on the design that the effect of interest is either quenched out of existence, or that the experiment becomes so expensive to conduct that it doesn't take place at all.

Notes

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[10] The analysis reported here differs from the original plan in response to a reviewer's comments, so an argument could be made that this study, as reported, is actually double-blind.

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[13] Statistica 7.0, StatSoft, Tulsa, OK, Variance components and mixed model ANOVA/ANCOVA analysis, in a hierarchically nested design.

[14] Normalized contrast values were formed as $z = (c - m)/s$, where c was the raw contrast value for a given image, m was the mean of all raw contrast values, and s the standard deviation of all raw contrast values.