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A Pilot Study of Distant 'Mind-Matter' Interaction with Digital Photography

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Abstract: This pilot study explored the possibility of (a) mentally producing, at a geographical distance, predefined images on digital sensors within modern professional-grade photographic equipment, and with (b) sufficient resolution to be objectively verified via a Structural Similarity Index by specialized software for pattern recognition. Three participants, expert in distant 'mind-matter interaction' techniques, completed a total of 49 trials. In 6 out of 49 trials (12.2%), the Structural Similarity Index of the 'target' image, chosen by the participant for the distant mental influence trial on the camera's sensor, was greater than that obtained when the target was different. These preliminary results suggest the possibility of using modern cameras to study the putative effects of distant 'mind-matter' interactions.
Keywords: mind-matter interaction; digital photo-sensor; photographic camera

The main purpose of this pilot study was to investigate the possibility of mentally and distantly influencing the digital sensor of a modern photographic camera to make a pre-chosen image appear on it.

This study is part of a rich field of research on mind-matter interaction that has an approximately 70-year history, as documented and presented by Duggan (2017).

According to the literature, this interaction could be on macroscopic objects like dice (Radin and Ferrari, 1991), motion of a plastic spinning target (Dullin and Jamet, 2020). microscopic objects like electrons in a random number generator (Bösch, Steinkamp, & Boller, 2006) and photons (Radin, Michel, & Delorme, 2016; Tressoldi, Pederzoli, Matteoli, Prati & Kruth, 2016, Kokubo, 2004), or organic material (Roe, Sonnex, & Roxburgh, 2014).

One intriguing phenomenon of macroscopic mind-matter interaction, is a type of mental influence called "Thoughtography" or "Paranormal photography" and is even mentioned in Wikipedia (2021a).

This type of mind-matter phenomenon is a purported ability to “print” specific images by simply wishing it mentally, without any conventional interaction with the camera and the photographic film.

However, as reviewed by Willin (2015), there are few relevant studies about such a type of phenomenon except for some documentation gathered by Eisenbud (1967; 1977) on work by Ted Serios (Braude, 2016), who attempted to reproduce mental images on photos from a Polaroid camera. Even though Eisenbud’s findings were convincing and not contaminated by fraud, Ted Serios’s results were criticized by Peyronnin, (2011) who claimed that the photos were manipulated.

With this study, the first of this type as far as we know, it was decided to investigate the possibility of mentally influencing sensors of modern photographic cameras specifically because they now have electronic instead of chemical sensors with a large number of pixels (the units of the sensor which record photons). Each pixel can reach a very high signal/noise ratio, so that for each pixel we can record a brightness range of 12 bits, or 4096 different values, increasing the details of the photos. The higher the number of pixels and their bits, the higher the details of the photos are.

We postulated that electronic pixels can be more easily influenced by mental intention with respect to the old photographic film.

Methods

Participants

The participants were three adult males with an average age of 67 years, ranging from 64 to 73 years, who were part of EvanLab’s group of experts in distant mind-matter interaction techniques.

Each participant was asked to complete at least one series of ten trials, each trial lasting 18 minutes. Two participants performed two series each, and the other performed one series only, totaling 50 trials in all.

Equipment

The equipment used in this study was the body of a NIKON D850 photographic camera, automatically activated by a timer device constructed ad hoc (see description at https://doi.org/10.6084/m9.figshare.12151932.v5), which counted the number of images shot, their exposure times, as well as the intervals between them. The choice of this model of camera was determined by the characteristics of its sensor, 45 megapixel at 12 bits and our budget.

After many preliminary trials it was decided to collect 36 images for each trial, each with an exposure time of 29 seconds, and spaced 1 second from the next, for a total of 18 minutes.

During all trials the camera's original black plastic lens cap replaced the lens to prevent any light entering, and the viewfinder's shutter was closed.

Furthermore, the camera body was wrapped in a thick black cloth from which only the connection cable to the timer device emerged; the camera body in its cloth was then placed inside a metal box.

Procedure

This procedure is original and was devised by all authors.

For each trial, each participant would arrange a suitable day and time with the research manager (tasked with overseeing the camera) in which to connect via Skype to allow them to be in their best psycho-physical conditions for the task at hand.

A single trial consisted of 36 shutter clicks with a 29 sec exposure at 1 sec intervals, totaling 36 clicks (snapshots) in 18 minutes. Of the 36 shots, the first 10 were considered to be pre-influence controls, the next three shots were set aside for the target image being sent, the next 10 shots set aside for the influence attempt on the camera's sensor, the following 3 shots were for withdrawal from the concentration state (relax), and the last 10 shots were for post-influence controls (see Table 1).

Table 1: Roles assigned to the 36 shutter clicks (snapshots) for each trial

1-2-3-4-5-6-7-8-9-10	**11-12-13**	**14-15-16-17-18-19-20-21-22-23**	**24-25-26**	**27-26-29-30-31-32-33-34-35-36**
PRE-MENTAL INFL. (5 min.)	**TARGET SEL.**	**MENTAL INFL.** (5 min.)	**RELAX**	**POST-MENTAL INFL.** (5 min.)

At the pre-arranged time, the research manager called the participant via Skype, started the timer and, after 5 minutes, signaled the start of the influence attempt for the image chosen by the participant. At the appropriate time he would signal the end of the influence period and, after the post-influence phase, memorize the image used in the trial.

Each participant was encouraged to use whatever he considered the most suitable method to produce an image on the camera's sensor; the image was freely chosen from a group of 11 shown previously to participants, which can be viewed at: https://doi.org/10.6084/m9.figshare.12151932.v5. The authors agreed on the choice of images by choosing capital letters and numbers that could be perceptually maximally different among them.

During the influence attempt, the participant could choose to either look at the image on his computer screen, look at it printed on paper, or just mentally imagine it.

At the conclusion of the 5 minutes of influence, the research manager advised the participant that the trial had ended and organized an appointment for the next trial.

Data Analyses

The 36 photos from each trial were saved in .NEF format and immediately sent to the research assistant to be processed.

Each photo was then changed to a .DNG format (digital-negative) using Adobe DNG Converter freeware software selecting the compatibility with DNG 1.4 not compressed in the "Change preference" menu.

Subsequently, each photo was changed into a 32x32 pixel format using a program created ad hoc with Matlab available at https://github.com/mbilucaglia/PsyCam applying a pixel binning operation to increase the signal/noise ratio (Jin and Hirakawa, 2012).

Binning refers to the combining of the electrical signal deriving from charges of neighboring pixels together to form a superpixel. We chose to implement an average on blocks of size [L/l]*[M/m], where L * M is the image's original resolution and l * m is the image's final resolution. The final .DNG image is not in color, but it is the original matrix (monochromatic) before the interpolation algorithm was applied, to give each trichromic pixel its red, green and blue values. Binning produces an improvement of the signal/noise ratio by a factor of log(N), where N is the maximum number of pixels chosen.

Finally, still using the Matlab's ad hoc program available at https://github.com/mbilucaglia/PsyCam, for each of the 36 photos in each trial, the Structural Similarity Index (SSIM, Wikipedia, 2021b) was calculated with respect to all 11 target images (Brunet, Vrscay, & Wang, 2012). SSIM is a method for measuring the similarity between images.

The following is a brief description of the SSIM procedure (Wang, Bovik, Sheikh & Simoncelli, 2004):

Given two equally sized images and their Structure SIMilarity Index (SSIM) is given by:

$$SSIM(I,J) = [l(I,J)]^{\alpha} \cdot [c(I,J)]^{\beta} \cdot [s(I,J)]^{\gamma}$$

$l(I,J) = \frac{2\mu_I\mu_J + C_1}{\mu_I^2 + \mu_J^2 + C_1}$ is the luminance term;

$c(I,J) = \frac{2\sigma_I\sigma_J + C_2}{\sigma_I^2 + \sigma_J^2 + C_2}$ is the contrast term;

$s(I,J) = \frac{\sigma_{IJ}+C_3}{\sigma_I\sigma_J+C_3}$ is the structural term;

α, β, γ are the luminance, contrast and structural exponents that can be varied to individually enhance (>1) or attenuate (<1) each term;

C_1, C_2, C_3 are the regularization constants for luminance, contrast and structural terms;

$\mu_X = \frac{1}{(mn)} \sum_{\substack{k=1 \\ l=1}}^{\substack{l=m \\ k=m}} X(k,l)$ is the mean value of image ;

$\sigma_X^2 = \frac{1}{(mn-1)} \sum_{\substack{k=1 \\ l=1}}^{\substack{l=m \\ k=m}} (X(k,l) - \mu_X)^2$ is the variance of image ;

$\sigma_{XY}^2 = \frac{1}{(mn-1)} \sum_{\substack{k=1 \\ l=1}}^{\substack{l=m \\ k=m}} (X(k,l) - \mu_X)(Y(k,l) - \mu_Y)$ is the covariance between images *X, Y*.

From the definition, SSIM is a "global" value, since it is based on "global" measurements (i.e. sample means, sample variances and covariance).

In order to obtain a "local" (i.e. at pixel level) value, a local of the images and is calculated by multiplying each one with a 2D gaussian kernel centered on the pixel . The local can be displayed as a similarity image.

The global SSIM is thus obtained by averaging the local as follows:

$$SSIM = \frac{1}{mn} \sum_{\substack{k=1 \\ l=1}}^{\substack{n \\ m}} ssim(k,l)$$

SSIM has the following properties (Brunet, Vrscay & Zhou Wang, 2012):

- Symmetry: *SSIM(I,J) = SSIM(J,I)*
- Boundness: *-1 ≤ SSIM(I,J) ≤ 1*
- *SSIM(I,J) = 1 <=> I = J*. Additionally, approaches 1 the closer I is to J.

Results

One of the original 50 trials were discarded because the images were damaged due to technical problems. The analysis therefore consisted of 49 trials, with a total of 1764 images (49 x 36). To verify whether or not the different participants' intention to make a specific target image appear on the sensor was effective, it was decided to compare the SSIM value of the target image chosen for the influence attempt to its SSIM value when it was not used in that attempt.

For example, if the participant chose a circle as the target image, to determine if the interaction was successful, the circle's SSIM value should be greater than when another image was chosen as target.

Using all three parameters of the SSIM, i.e. brightness, contrast and structural terms, in no trial was the value of the SSIM of the target image greater than the SSIM value of the other images.

However, when the brightness parameter was removed, the SSIM value of the target image was greater in 6 out of 49 trials (12.2%). Given that we compared the SSIM values up the sixth decimal place, the chance that one of the 11 images resulted with a highest SSIM value is 11/1.000.000.

The act of mental intention therefore seems to only affect contrast parameters and structural similarity and not the degree of brightness; this fact, if confirmed, will be useful from a theoretical point of view in order to understand how mental intention translates to the physical plane.

This result was achieved with the contribution of all three participants. The target images with the highest SSIM values were: circle (once), the letter E (once), the letter H (once), the π symbol (once), a triangle (once), and the letter X (twice).

In addition to the SSIM value of images, corresponding images with false colours were created using the HSV function of Colormap in Matlab. In practice, when the minimum and maximum values of each image were established, the 256 available RGB colours were assigned (Red, Green, Blue) from red for minimum values up to violet for maximum values.

An example is shown in Figure 1 (all coloured target images are available at https://doi.org/10.6084/m9.figshare.12151932.v5), whereas Table 2 presents the corresponding SSIM values and the trial phase from which they were obtained.

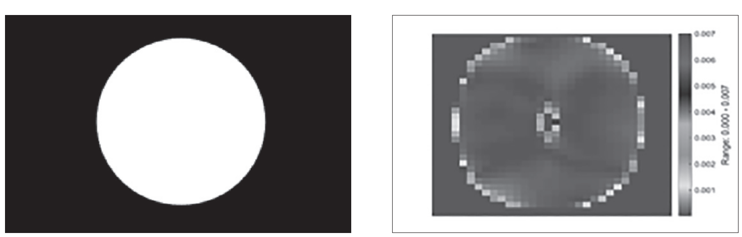

Figure 1

Table 2: SSIM values related to the target images which obtained the highest value in agreement with the intention of the participants.

Target Image	Circle	E	H	Pi	Triangle	X	X
SSIM	.305248	.094968	.081082	.082492	.173562	.223495	.223644
Trial phase	pre	pre	pre	pre	infl	pre	pre

Comment

If we consider that the optimal SSIM value is 1, it shows that mental influence is very weak even if sufficient to be detected via specialized software for pattern recognition.

Discussion

The aim of this pilot study was to investigate the possibility of mentally influencing, from a distance, the digital sensor of a modern photographic camera by imprinting predetermined images on it.

The main methodological difference with the old experiments is that it is not necessary for the participants to interact directly with the camera, but act on it at distance. Even if not used in the present study, our online procedure allows the possibility to use multiple participants simultaneously to study if their joint mental intentions are more efficacious with respect to the individual ones.

The results appear encouraging and the procedure used can be easily reproduced independently by those who intend to conduct research on this phenomenon, with interesting potential applications.

The image formed on the sensor of the camera via the conversion of photons to electrons during a trial is transformed into a sequence of bytes recorded on a digital memory card in the camera itself (a certain number of bytes for each photo snapshot). Strictly speaking, we do not know if the intended influence acted on the sensor or the memory card, even if actually influencing the byte sequence recorded on the card to obtain the desired image is highly improbable.

Furthermore, the energy needed to change the value of a bit from 0 to 1, or vice versa, on a memory card is much greater than that needed to produce a small signal on a sensor's pixel. The software program used in this study is able to greatly amplify the sensor's sensitivity – at the expense of definition – and so, even if for the purpose of mind-matter interaction it doesn't matter which camera part is acted on, we can exclude that what was measured in this study originated on the memory card.

It is also of interest that the results obtained were accentuated using only the contrast and structural feature parameters of the SSIM index, discarding the brightness parameter. It would appear therefore that mental intent only acts upon parameters defining the target image's outline and not on its brightness gradient. Obviously, this interpretation only applies to the target images used in this study.

Study limitation

Among the different limitations of this study, we point out that the original photos could be artificially manipulated by the research assistant who analyzed them. Even if we can affirm that such a type of fraud was not used, a control of this potential fraud should be applied by future studies. For example, send two independent judges the original photos or automatize the whole procedure, from the photos acquisition to their elaboration and target identification.

Another potential limitation of this study is how we elaborate the original photos in order to maximize the detection of the mental influence. Different levels of binning and types of algorithms applied to the original photos could improve the detection of mental influence and control the possibility of obtaining false positive images. These images appear very similar to the intended targets, but they are artifacts derived from images post-processing algorithms.

Furthermore, future studies should compare the intended images with control ones (obtained without any mental intention) in order to take in account potential artifacts.

However, we made all materials and software available open access for independent replications.

To conclude, if our findings are confirmed by future studies, we could achieve strong support of obtaining macroscopic mind-matter effects with possible practical applications in futuristic mental telecommunications.

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Une étude pilote sur l'interaction "esprit-matière" à distance employant la photographie numérique

Résumé: Cette étude pilote a exploré la possibilité de (a) produire mentalement, à une distance géographique, des images prédéfinies sur des capteurs numériques à l'aide d'un équipement photographique moderne de qualité professionnelle, et avec (b) une résolution suffisante pour être vérifiée objectivement via un indice de Similarité Structurelle par un logiciel spécialisé dans la reconnaissance des formes. Trois participants, qui seraient expérimentés dans les techniques d'"interaction esprit-matière" à distance, ont effectué un total de 49 essais. Dans 6 essais sur 49 (12,2 %), l'indice de Similarité Structurelle de l'image "cible", choisie par le participant pour l'essai d'influence mentale à distance sur le capteur de l'appareil photographique, était supérieur à celui obtenu lorsque la cible était différente. Ces résultats préliminaires viennent suggérer la possibilité d'utiliser des appareils photographiques modernes pour étudier les effets putatifs des interactions "esprit-matière" à distance.

Mots-clefs: interaction esprit-matière ; capteur photographique digital ; appareil photographique

Eine Pilotstudie zur ‚Geist-Materie-Interaktion' auf Distanz mittels digitaler Fotografie

Zusammenfassung: In dieser Pilotstudie wurde die Möglichkeit untersucht, (a) in geografischer Distanz vordefinierte Bilder mental auf digitalen Sensoren einer modernen professionellen Fotoausrüstung zu erzeugen, und (b) dies mit einer ausreichenden Auflösung, dass sie durch eine spezielle Software zur Mustererkennung über einen strukturellen Ähnlichkeitsindex objektiv verifiziert werden können. Drei Teilnehmer, die angeblich Erfahrung mit Techniken der ‚Geist-Materie-Interaktion' haben, absolvierten insgesamt 49 Versuche. In 6 von 49 Versuchen (12,2 %) war der strukturelle Ähnlichkeitsindex des "Ziel"-Bildes, das der Teilnehmer für den Versuch der mentalen Erzeugung auf dem Kamerasensor aus der Distanz ausgewählt hatte, größer als der bei einem anderen Zielbild ermittelte Ähnlichkeitsindex. Diese vorläufigen Ergebnisse legen die Möglichkeit nahe, moderne Kameras zu verwenden, um die mutmaßlichen Auswirkungen von Interaktionen zwischen Geist und Materie auf Distanz zu untersuchen.

Schlüsselbegriffe: Geist-Materie-Interaktion; digitaler Fotosensor; Fotoapparat

Un Estudio Piloto de la Interacción 'Mente-Materia' a Distancia con la Fotografía Digital

Resumen: Este estudio piloto exploró la posibilidad de (a) producir mentalmente, a cierta distancia geográfica, imágenes predefinidas en sensores digitales dentro de un equipo fotográfico moderno de nivel profesional, y con (b) suficiente resolución para ser objetivamente verificadas a través del Índice de Similitud Estructural mediante software especializado en reconocimiento de patrones. Tres participantes, quienes reportaron tener experiencia en técnicas de 'interacción mente-materia' a distancia, completaron un total de 49 ensayos. En 6 de los 49 ensayos (12.2%), el Índice de Similitud Estructural de las imágenes 'objetivo', elegidas por los participantes para el ensayo de influencia mental a distancia en el sensor de la cámara, fue mayor que el obtenido cuando el objetivo era diferente. Estos resultados preliminares sugieren la posibilidad de utilizar cámaras modernas para estudiar los supuestos efectos de las interacciones 'mente-materia' a distancia.

Palabras clave: interacción mente-materia; fotosensor digital; cámara fotográfica