

RESEARCH ARTICLE

Experimenter Psi Effect in Precognition Tests with Planarians

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Abstract—Two groups of 25 black planarians were allowed to crawl in a horizontal trough with one LED at each end, and the distance and direction of locomotion was recorded. Two blocks of trials were carried out. 1) The Active Experimenter block consisted of Experimental and Control trials. During the former, one of the two LEDs would be selected to be lit by an RNG and the experimenter would light it up. After one week the same subjects were submitted to the control trials, when exactly the same procedure was followed, although the two LEDs were disconnected from the electric source. 2) The Passive Experimenter block of trials followed the same procedure except that the computer directly lit up the LED randomly chosen by the RNG. The results of the Active Experimenter block showed that during the experimental trials, at the very moment of stimulation, the planarians were significantly more distant to the lit LED. During the control trials the subjects were also significantly more distant to the sham lit LED. The number of 5-sec periods (within the 1-min period) spent moving away from the LED to be lit was also higher. In both kinds of trials during the Active Experimenter block, the number of such periods significantly increased as the time point approached the moment of stimulation or sham stimulation. During the experimental and control sections of the Passive Experimenter block of trials, the planarians did not show any preference avoiding the LEDs to be lit or unlit, under the two criteria of distance values and number of 5-sec periods. From the results we may conclude that human activity had an Experimenter Psi Effect on the planarians or on the RNG device.

Keywords: behavior—distance measures—experimenter psi effect—planarians—precognition

Introduction

If anomalous phenomena are part of the natural world, we should expect them to follow the rules governing nature, and if those phenomena, as demonstrated to occur in humans, do not depend to a high extent on

our intellectual capabilities, but appear to be more connected to emotional or unconscious physiological states (Radin 1997, 2004, Bierman & Radin 1999, Bierman & Scholte 2002, Spottiswoode & May 2003, McCraty, Atkinson, & Bradley 2004, Sartori, Massaccesi, Martinelli, & Tressoldi 2004, May, Paulinyi, & Vassy 2005, Tressoldi et al. 2011), it would not be out of the question that such singular events also are found in the animal world, to which we belong.

In relation to anomalous anticipatory activity, although up to now the effort to bring this ability to light in animals has been scant, there are sufficient results to suggest that the phenomenon is widespread, being present not only in those animals endowed with a highly developed nervous system, such as birds and mammals (Duval & Montredon 1968, Sheldrake & Smart 1998, 2000, Radin 2002, Alvarez 2010a, 2010b) but also in primitive ones such as earthworms and planarians (Wildey 2001, Alvarez 2016).

Concerning the subject species of this study (the black planarian *Girardia dorotocephala*), recording the frequency of their Head Movements (a behavior indicative of distress or ambient exploration) showed them to be able to anticipate a noxious upcoming event (a startle sound), the effect being especially intense immediately before the presentation of the stimulus (Alvarez 2016).

When trying to understand the physiological mechanisms involved in human precognition, the use of animals endowed with a primitive nervous system could be of help. In connection with this, the use of planarians with that purpose could be of great interest, since, according to the structure and physiology of their central nervous system and cerebral ganglion, these are positioned as the most likely ancestors of the vertebrate brain (Baguñá & Romero 1984, Agata et al. 1998, Sarnat & Netsky 1985, 2002, Umeda et al. 2005, Murakoshi & Yasuda 2012).

Initially, the aim of this study was to arrive at a simple technique to study precognition in the black planarian, using distance measures instead of head movements (Alvarez 2016) for the detection of precognition, taking advantage of the planarians' strong photophobic response. Then, in view of the results of the first block of trials, the objective changed toward exploring the phenomenon of experimenter psi effect.

Before R. G. Stanford introduced the Psi-Mediated Instrumental Response (PMIR) model in 1974 and afterwards (Stanford 2015), it was assumed that in psi experiments the participant was nearly the only party responsible for the psi response. This model proposes that in the presence of a particular need the organism uses sensory and psi means to scan the environment for relevant objects or events, then using them in an instrumental way to satisfy the need. The model and the proofs on which it

stands showed that a psi effect can be produced without the agent intending to do so, provided that the psi effect favors the realization of a need or desire. Therefore, experimenters, presumably having at least a moderate interest in the success of their work, under the PMIR model would be expected to unconsciously use their own psi to fulfill their desires for the experiments. On this basis, J. Palmer hypothesized about the possible ways experimenter psi effect could occur in anomalous cognition experiments (Palmer & Millar 2015).

In addition, although the results of the long-term and worldwide experiment of the Global Consciousness Project (GCP) point to an effect by human collective emotions on the output of RNGs and the existence of a field-like Global Consciousness (GC) (Nelson 2013), a close examination of the information by Bancel (2017) appears to indicate that GC cannot explain the results, which may rather be due to a goal-oriented (GO) psi experimenter effect, associated with agents engaged with the project and aware of the pretended goal (most probably the experimenters). Nevertheless, Nelson's (2017) reply concerning the weakness of some of Bancel's assumptions (like the attribution of the effect only to an intentional source) and the structure of GCP data (like temporal and spatial parameters incompatible with the GO model) shows that GC should not be rejected outright in a successful model.

This study aims toward understanding the phenomenon of experimenter psi effect. My hypothesis was that under imminent stimulation precognition would show up in the results when the experimenter was an active participant during the tests, and would not manifest when the experimenter was passive.

Methods

A colony of black planarians was maintained in polypropylene plastic containers filled with dechlorinated (aged) tap water at 22–24 °C (Claussen, Grisak, & Brown 2003) with slow aeration, and fed on raw homogenized veal liver paste (frozen and then thawed at room temperature) and frozen and thawed larvae of chironomid midge flies, once a week, followed by water change. The planarians were allowed to feed for three hours and the water was then changed to remove any debris. They were kept on a normal diurnal cycle (exposed to diffuse natural light during the day and kept dark at night).

The use of light to test for precognition in planarians was based on their strong photophobic response (Parker & Burnett 1900, Taliaferro 1918, Halas, James, & Stone 1961, Arees 1986). The experimental chamber consisted of a 10-cm horizontal trough made of polystyrene; its transverse

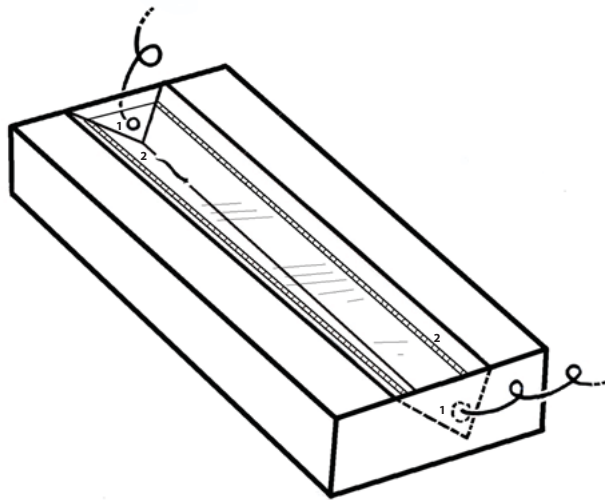


Figure 1. Experimental chamber. (1) LED. (2) Tape measure.

section was V-shaped and, in order to record the planarian's location, a millimeter tape measure was run along both sides of the trough. At each of both ends at the bottom of the trough there was a 5-mm LED-emitting blue-green light of 503–512 nm (model *verde-agua* 529PgOc, Robotecno, Spain), which corresponds to the species maximum ocellar sensitivity to 508 nm light (Brown & Ogden 1968). The trough was leveled to gravity, and during the experiments it was filled with water up to 5 mm (Figure 1).

To prevent reflections, the trough surroundings were painted matte black and covered with transparent matte acrylic medium. The trough was inside an empty $28 \times 16.5 \times 15$ cm aquarium, surrounded by water (with a heater in it, connected to a thermostat, to maintain the temperature at 22–24 °C) inside another, $35 \times 20 \times 26$ cm, aquarium. The whole block was mounted on a 10-cm layer of polyethylene foam sheet to reduce any vibration. Maintaining the experimental chamber at sufficiently high temperature (22–24 °C) would make the subjects more responsive to the onset of light (McConnell 1967).

Tests were carried out between 8:00 and 11:00 UT (apparently black planarians learn the correct response in a training task more often in the morning (Cohen 1965)). The subjects were transferred using 3-ml disposable plastic pipettes with a widened opening so as not to injure them.

The experiment was composed of two blocks. The first block (henceforth known as Active Experimenter block, carried out between January 12

and February 17, 2017, on 25 subjects) consisted of two sections of trials (Experimental section, followed after one week by the Control section, both on the same individuals). The second block (henceforth known as Passive Experimenter block, carried out between December 14, 2017, and January 14, 2018, on 25 different subjects) was also composed first of the Experimental section also followed after one week by the Control section on the same individuals.

At the beginning of each session, one subject was taken from its colony and placed exactly at the center on the trough (at equal distance from both LEDs). All trials consisted of an accustoming period of five minutes to adjust the planarians to the new environment, followed by another five minutes of light or sham stimulation.

At the end of the 5-min accustoming period of the Experimental trials of the Active Experimenter block, a random event generator (true RNG, by Orion Electronics) would determine that one of the two LEDs at the terminals of the trough would light up. Immediately after the RNG made the choice, I lighted the selected LED for the 5-min stimulation period. After one week, the same individuals were submitted to the control trials of this block, where exactly the same procedure, involving the computer, the RNG, and the experimenter, was followed, except that the two LEDs were in this case disconnected from the electric source.

The Passive Experimenter block of trials was organized in exactly the same manner as the Active Experimenter block, although in this case I (the experimenter) remained in the room but had no part in switching on the LED light, which was turned on directly from the RNG and the computer (as done in other planarian experiments (Alvarez 2016)). In the same way as for the Active Experimenter block during the Control section of the Passive Experimenter block, the LEDs were disconnected from the electric source.

After each trial, the trough was cleaned and dried, and before the next subject was tested water from its container was added. From the beginning to the end of the trials, all subjects were filmed with a 25-frames-per-second videocamera located 55 cm directly above the experimental trough (a Sony DCR-SR72E provided with a polarizing filter in order to suppress glare from the water surface). During the experimental sessions, the room was kept dark, and to allow filming in line with the species minimum evoked ocellar potential in the red (mainly at 600 nm and above, Brown, Ito, & Ogden 1968) diffuse illumination was provided by a led lamp emitting red 620–630 nm light.

During the video analysis, I measured the distance to ± 1 mm from the subject's tip of the head to each of the two LEDs at the very moment of stimulation or sham stimulation, and in the previous 12 5-sec periods

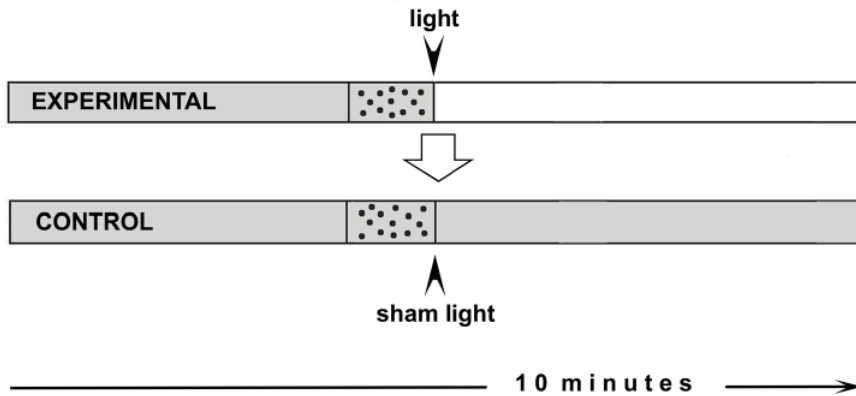


Figure 2. Order of events of the experiment. Time of darkness is represented in grey, and the stippled area corresponds to the time of observation. The diagram applies both to the Active and Passive Experimenter blocks.

(totalling one minute) I counted the number of periods in which the direction of locomotion was toward one or the other end of the trough. To obtain these two measures, the VLC Media Player computer program was used (Figure 2).

To prevent experimenter bias, after determining the exact moment of stimulation or sham stimulation and labeling each individual video clip, a third person kept the identity of each trial unknown to the author (who examined the video clips) until all analyses of each block were completed.

Statistical Analysis

Previous to all analyses, it was shown that out of the 100 cases of lighting or sham lighting in both blocks, 52 of them involved LED1 (26 to block 1 and 26 to block 2) and 48 involved LED 2 (24 to block 1 and 24 to block 2).

The distributions of distances to the LED which will light and will not light up (Experimental trials) or falsely light and will not light up (Control trials) at the moment of real or sham stimulation, and of the number of 5-sec periods spent moving away with respect to both LEDs during the 1-min period before real and sham stimulation for both blocks, did not deviate significantly from normality ($p > 0.20$, Kolmogorov-Smirnov test). Consequently, the t -test for dependent samples was applied to those data in order to find out if the planarians stayed farther away from the LED of the succeeding true or sham stimulus than to the other LED, as well

as comparing the distance values obtained in the experimental and control trials for the same individuals.

To ascertain the relationship between the passage of time and the behavior of moving away from the lit LED, the Pearson correlation coefficient test was applied to the order of 5-sec periods one minute before real stimulation with the mean number per period and subject of periods spent moving away from the LED to be lit up (distributions in all cases did not deviate significantly from normality).

Data analysis was done using the STATISTICA 6.0 computer program. All reported p are two-tailed.

Results

Active Experimenter Block

Distributions of distances toward LED 1 and LED 2 (irrespective of which one was lit) and of the number of 5-sec periods spent moving away from each of both LEDs (irrespective of which one was lit) during the Experimental and Control trials did not deviate significantly from normality ($p > 0.20$). During the experimental and control trials, at the moment of stimulation and sham stimulation, the distance toward both LEDs was statistically equivalent (Experimental: $df = 24$, $t = 0.58$, $p = 0.567$; Control: $df = 24$, $t = 1.64$, $p = 0.114$; t -test for dependent samples). The same lack of preference for either of the trough ends was shown in the number of 5-sec periods involving moving away locomotion (Experimental: $df = 24$, $t = 0.82$, $p = 0.416$; Control: $df = 24$, $t = 0.09$, $p = 0.928$).

During the experimental trials, when at the moment of stimulation the distance to the LED to be lit was compared with that toward the LED which would not light up, the planarians appeared significantly more distant to the lit LED ($t = 2.23$, $df = 24$, $p = 0.035$; t -test for dependent samples, Figure 3).

Unexpectedly, during the control trials (without any real light stimulation) at the instant of sham stimulation, the distance to the sham lit LED was also significantly higher than that toward the sham unlit one ($t = 2.32$, $df = 24$, $p = 0.029$; see Figure 3).

The comparison between distances toward the lit LED during the experimental trial and toward the sham lit LED during the control trials yielded a nonsignificant difference ($t = 0.168$, $df = 24$, $p = 0.868$; t -test for dependent samples).

With reference to the number of 5-sec periods within the final 1-min interval spent moving away from the LED to be lit and toward the LED which would not light up, during the experimental trials a significantly higher value was obtained for the former ($X \pm SE = 7.0$

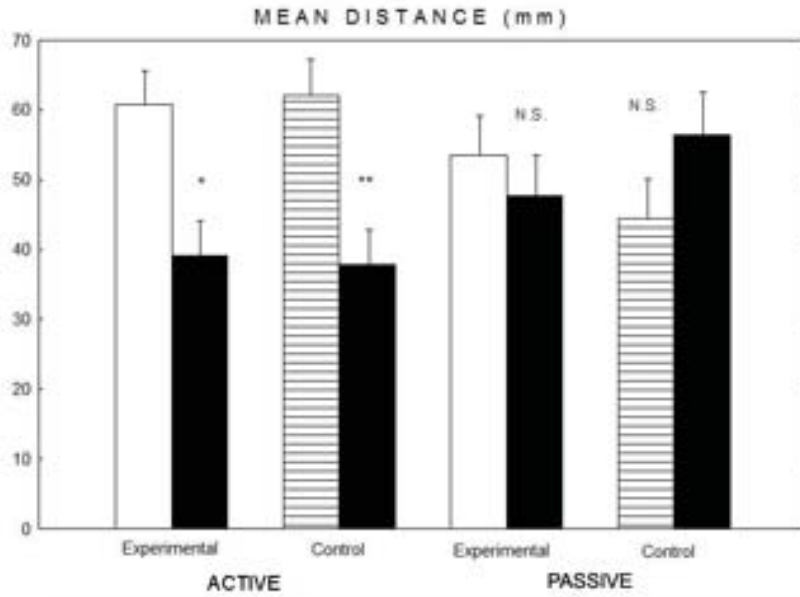


Figure 3. Mean distance (+SE) toward the LED which will light up (empty bars) and the one providing no stimulation (black bars) at both ends of the trough during the experimental trials and toward the LEDs related to sham stimulation (striped bars) and no stimulation (black bars) during the control trials at the very moment of real or sham stimulation of the Active and Passive Experimenter blocks. * $p = 0.035$, ** $p = 0.029$. N.S. = not significant

± 0.5 , and 4.5 ± 0.5 , respectively; $t = 2.73$, $df = 24$, $p = 0.012$), the effect being in the same direction and even slightly stronger during the control trials (7.5 ± 0.6 , and 4.2 ± 0.6 , respectively; $t = 3.63$, $df = 24$, $p = 0.006$; t -test for dependent samples).

During the experimental trials, when testing the relationship between the passage of time and the direction of locomotion away from the LED to be lit, a significant positive correlation was obtained between the order of time points of the 1-min period approaching the moment of stimulation and the mean value per subject of the number of 5-sec periods when the planarians moved away from that LED ($n = 12$, $r = 0.801$, $p = 0.002$; Pearson correlation coefficient test). Again, the effect was also positive and more intense during the control trials, when no real light stimulation took place ($n = 12$, $r = 0.873$, $p = 0.0001$) (Figure 4).

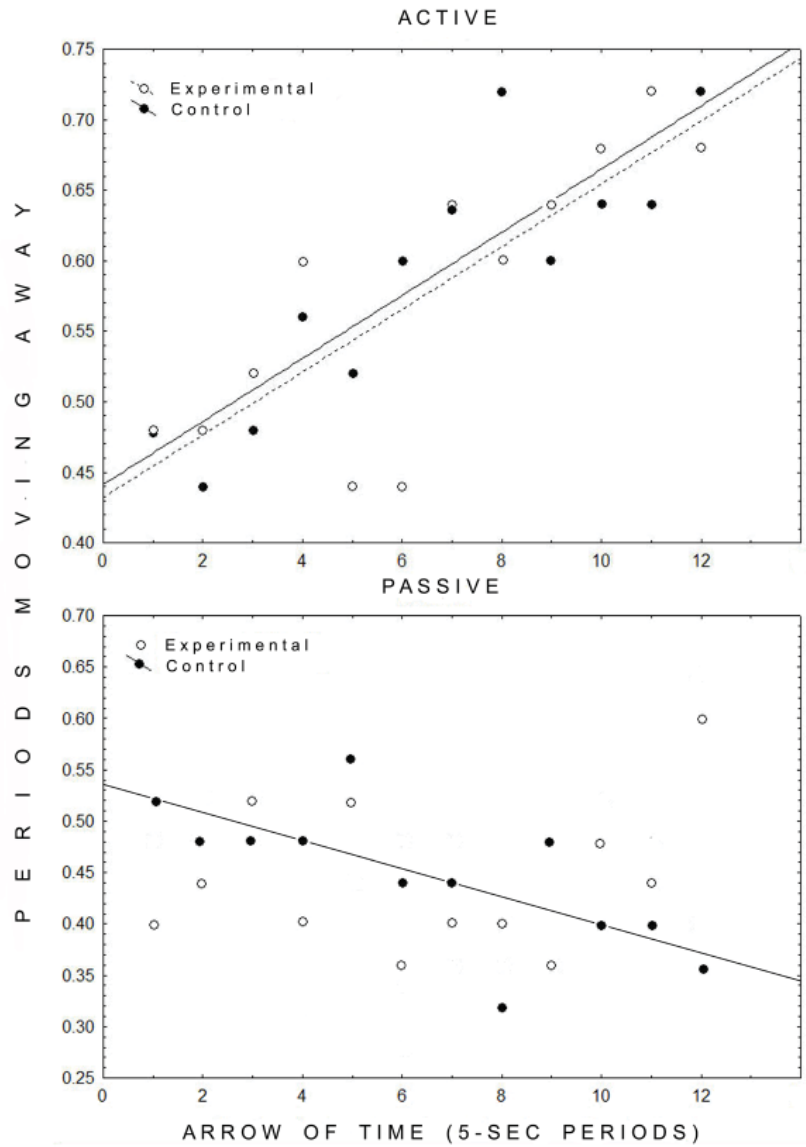


Figure 4. Scatterplots of the passage of time (order of 5-sec periods one minute before real and sham stimulation) against the mean number of periods spent moving away from the real or sham lit LED for the Active and Passive Experimenter blocks.

Passive Experimenter Block

Distances toward LED 1 and LED 2 (irrespective of which one was lit) and of the number of 5-sec periods spent moving away from each of both LEDs during the Experimental and Control trials did not deviate significantly from normality ($p > 0.20$). During the experimental and control trials, at the moment of stimulation and sham stimulation, the distances toward both LEDs were statistically equivalent (Experimental: $df = 24$, $t = 0.98$, $p = 0.339$; Control: $df = 24$, $t = 1.13$, $p = 0.270$). The same lack of preference was shown in the number of 5-sec periods moving away (Experimental: $df = 24$, $t = 0.44$, $p = 0.663$; Control: $df = 24$, $t = 0.45$, $p = 0.660$).

During the Experimental trials, the comparison of distances to the LED to be or not to be lit showed no significant difference ($t = 0.55$, $df = 24$, $p = 0.581$). The same result was obtained during the sham stimulation Control trials ($t = 1.08$, $df = 24$, $p = 0.289$; see Figure 3).

The difference between distances toward the lit or sham lit LED between the Experimental and Control trials was also nonsignificant ($t = 1.42$, $df = 24$, $p = 0.170$).

During the experimental trials, no significant difference was obtained in the number of 5-sec periods spent moving away from the LED to be lit and toward the unlit LED (5.3 ± 0.6 , and 6.1 ± 0.6 , respectively; $t = 0.70$, $df = 24$, $p = 0.490$). A similar result was obtained for the control trials (5.3 ± 0.5 , and 6.5 ± 0.5 , respectively; $t = 1.13$, $df = 24$, $p = 0.271$).

The relationship between the passage of time and the direction of locomotion away from the lit LED during the experimental trials was nonsignificant ($n = 12$, $r = 0.241$, $p = 0.4351$). Unexpectedly, in the case of the sham lit LED, the relationship was negative and significant ($n = 12$, $r = 0.698$, $p = 0.012$) (Figure 4).

Discussion

Together with the result of the Active Experimenter block of trials showing that planarians behaved in advance to avoid future real or sham light stimulation, the absence of a positive response when the experimenter was passive unquestionably points to a goal-oriented experimenter psi effect.

Then, the fact that planarians avoid in the same manner upcoming real and sham light during the Active Experimenter block of trials suggests that they are not responding to future light stimulation. During these trials the planarians were moving away from the LED to be lit or sham lit before the choice by the RNG was done, and at that time the experimenter did not consciously know yet the succeeding outcome of the choice. Consequently, if any information would have been communicated from the experimenter to the planarians, it would have to be of a retrocausal nature.

In any case, we should recognize that the effect might have acted not only over the planarian participants but also on other elements of the trial situation, perhaps making the RNG produce a non-random choice convenient to the experimenter (and the planarians'?) desires. That precognition and micro-PK effects may draw from similar mechanisms of information exchange between human consciousness and random processes has been suggested by Dunne and Jahn (1992), and actually it is not possible to experimentally distinguish precognition from PK. Pre-stated intention or awareness of the situation is known to correlate with shifts in the output of random microelectronic devices (Schmidt 1970, Bierman & Houtkooper 1975, Nelson et al. 1991, Dunne & Jahn 1992, 1995, Mason, Patterson, & Radin 2007, Ivtzan 2008, Alvarez 2012).

Although these findings and the absence of a response that could be categorized as precognitive during the Passive Experimenter block of trials would make us think that planarians are merely responding to psi indications by the experimenter, in another study with planarians where the RNG and the computer directly produced a noxious random stimulus (the experimenter remaining passive but present), the subjects showed alarm behavior significantly in advance of stimulation, suggesting the interpretation of actual precognition on their part (Alvarez 2016), although perhaps in this case the passive experimenter being present could be the actual source of psi. The same reasoning would apply to the result of a micro-PK experiment with birds (Alvarez 2012), where the experimenter was passive but present.

To the result of an experiment where animal subjects (cockroaches) were tested to see if they could influence a binary RNG device so as to avoid an electric shock, Schmidt (1970) responded suggesting that an experimenter psi effect could have occurred. The experimental situation (the experimenter was passive but always present observing the animals while the trials were run) and the obtained negative results (the cockroaches received more shocks than expected by chance) are in some way similar to those of the control section of the Passive Experimenter block of the present study, when planarians approached the imminent noxious stimulus (a negative relationship was found between the passage of time and the direction of locomotion away from the upcoming sham light).

If the experimenter psi effect actually took place in the case of Schmidt's cockroaches and in the Passive Experimenter block of trials of my planarians, it means that no great involvement by the experimenter is necessary for the effect to take place. In any case, this potential effect appears as considerably weaker than when the experimenter was present and active.

To circumvent the failure of conventional experimental approaches to produce reliable and replicable results (Kennedy 2003), Millar (2015) proposes abandoning the classical signal-based model in favor of physics-based approaches of non-local theories, which appear more in consonance with the often elusive facets of psi phenomena.

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