BRIEF REPORT

The Myth of the Decline Effect in Psi Research: The Empirical Evidence

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HIGHLIGHTS

A robust analysis of five types of research on extrasensory perception found that only 'remote viewing' studies showed a small but statistically significant decline in effect size over time.

ABSTRACT

The decline effect (DE) has been discussed in "psi" research since the early times of experimental investigations, and many causes have been advanced from: individual psychology, social attitudes, electromagnetic fields, experimental artifacts, or physical properties often related to quantum physics. Bierman (2001) found small and statistically significant decline slopes in all experimental protocols, but the mind-matter interaction with random number generators, where he found a positive quadratic polynomial slope. This study aimed to update Bierman's results, taking into account all studies completed up to 2023 and analyzed in different meta-analyses. Five experimental protocols were analyzed: including anomalous perception in a Ganzfeld condition, remote viewing, forced-choice design in extra-sensory perception, predictive physiological anticipation, and dream extra-sensory perception studies. The results showed that only one slope coefficient out of the five examined was statistically significant, indicating that there was no evidence of a general DE across the different experimental protocols.

KEYWORDS

Decline effect; extra-sensory perception; meta-analysis; replication.

INTRODUCTION

In the field of experimental investigation of extra-sensory perception (ESP) and mind-matter interaction, also broadly defined as "psi", a short-hand term for psychic abilities, there is a myth widely shared among scientists interested in such phenomena even if a formal survey has never been conducted. This myth is about the decline effect (DE). The decline effect is the disappearance of a phenomenon with the repetition of experiments aimed at identifying its characteristics or, more simply, to confirm its reality. This decline is very different from the decline in participants' performance who are requested to repeat an identical task many times on the same or different days. The former is referred to as "*chronological declines*" (Irwin, 1999, cited in Colborn, 2007, p. 2), and the latter is referred to as "*episodic declines*", which are "within an experimental run or within a session" (Colborn, 2007, p. 2).

Thalbourne's (2003) definition of DE identifies these two kinds of decline as '*within* study' and '*between* studies'.

In Schooler's (2011) seminal essay, the DE was taken as a solid fact, and the author discussed what could be the underlying causes, for example, statistical self-correction of initially exaggerated outcomes, also known as regression to the mean, or for the generalizability limitations of the initial findings, for example, to different samples of participants or changes in the experimental designs as it is typical in all so-called conceptual experimental replications (for a distinction between exact and conceptual replications, see Derksen and Morawski, 2022). Deliberate changes in experimental designs (from simple and fun, to complex and tedious) are introduced by theoretically oriented experimenters who want to understand the psi *process* rather than merely *prove* psi's existence, and these improvements in study quality over the years might account for DEs.

In psi research, DE has been discussed since the early times of experimental investigations (Bierman, 2001; Colborn, 2007), and since then, many causes have been advanced from individual psychology, social attitudes, electromagnetic (EM) fields, experimental artifacts, or physical properties often related to quantum physics. Bierman (2001) supported this claim using empirical data. Analyzing the regression line of the effect sizes observed in all experiments of six experimental protocols (e.g., ESP in a Ganzfeld condition, forced-choice precognitive ESP, mind-matter interaction with random number generators, etc.), Bierman found small and statistically significant decline slopes in all six experimental protocols, but for the mind-matter interaction with random number generators, (RNGs), where he found a positive quadratic polynomial slope.

After Bierman (2001), many other experiments have been carried out to test ESP and mind-matter interactions using different experimental protocols. The aim of this short report was to update Bierman's results, taking into account all studies completed up to 2023 and analyzed in different meta-analyses.

METHOD

Experimental Protocols Retrieval

All meta-analyses related to ESP and mind-matter interactions included in the database are available for open access at https://tidy.ws/cjnaxX were analyzed for inclusion.

Inclusion Criteria

The meta-analyses should include: (a) studies that had publication dates ranging over a span of at least 20 years, which we considered a robust time window to check for DEs, and b) databases to estimate the slope regressions.

Regarding the inclusion criteria (a), most meta-analyses spanned greater periods with respect to the inclusion criteria of 20 years as a minimum. Regarding (b), the regression slope can provide information about the rate of change over time. In our case, the *x*-axis indicates time in years, and the *y*-axis indicates effect size. A negative slope (a downward-sloping curve to the right) indicates a decline.

Included Meta-Analyses

The following meta-analyses were included in this study:

- Stage 2 Registered Report: Anomalous perception in a Ganzfeld condition-A meta-analysis of more than 40 years of investigation (Tressoldi & Storm, 2024).
- Remote Viewing: A 1974-2022 Systematic Review and Meta-Analysis (Tressoldi & Katz, 2023).
- Assessing 36 Years of the Forced Choice Design in Extra Sensory Perception Research: A Meta-Analysis, 1987 to 2022 (Storm & Tressoldi, 2023).
- Predictive physiological anticipation preceding seemingly unpredictable stimuli: A meta-analysis (Mossbridge et al., 2012) collapsing the data with "Predictive physiological anticipatory activity preceding seemingly unpredictable stimuli: An update of Mossbridge et al.'s meta-analysis' (Duggan & Tressoldi, 2018).
- On the correspondence between dream content and target material under laboratory conditions: a meta-analysis of dream-ESP studies, 1966-2016 (Storm et al., 2017).

Decline Effect Estimates

The DE of each of the five experimental protocols was estimated by the meta-regression linear function included in the metafor package (Viechtbauer, 2010) with year of study publication as a covariate and the standardized effect size of each study as the dependent variable. The five databases and the syntax code are available for open access at https://doi.org/10.6084/m9.figshare.24922620.v4 for independent analyses.

RESULTS

The slope coefficients with their 95% confidence interval and *p* values of each of the five experimental protocols, are presented in Table 1.

Table 1: Slope Coefficients With 95% Confidence Intervals (CI) and p-values of Each of the Five Experimental Protocols.

| Experimental protocol	Years range	Year span	N of studies	Slope	95% CI	p
Anomalous perception in a Ganzfeld condition	1974 (incl.) - 2020	47	113	.002	[-.002, .006]	.26
Remote Viewing	1974 (incl.) - 2022	49	40	-0.009	[-.016, -.003]	.004
Forced Choice Design in Extra Sensory Perception	1987 (incl.) - 2022	36	141	0.00045	[-.0001, .0010]	.088
Predictive physiological anticipation	1997 (incl.) - 2017	21	62	0.0035	[-.007, .014]	.50
Dream-ESP studies	1966 (incl.) –2014	49	50	-0.005	[-0.01, .0001]	.054
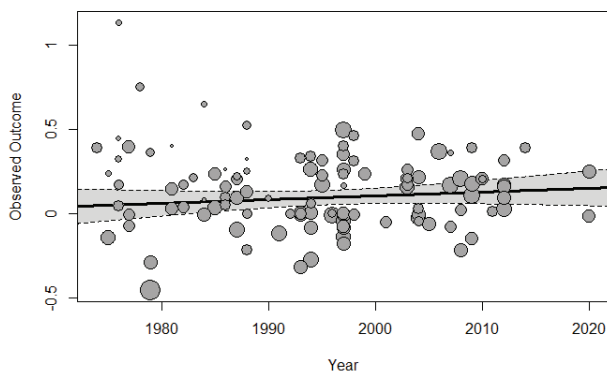
Figure 1a: Linear slope regression (dark line) with corresponding 95% CI (grey area) of the ESP in a Ganzfeld condition.
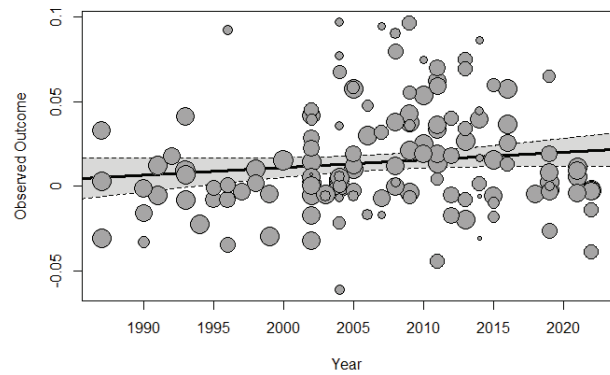

Figure 1c: Linear slope regression (dark line) with corresponding 95% CI (grey area) of the ESP with Forced-Choice protocols.
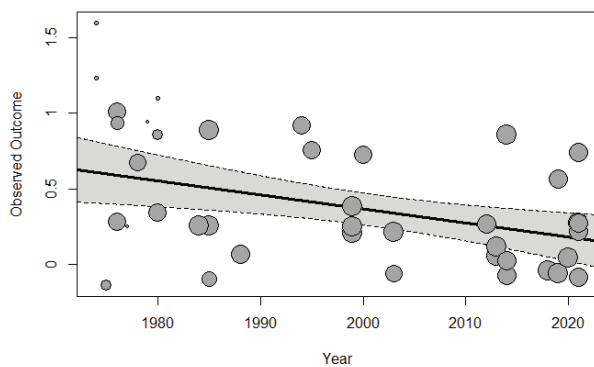

Figure 1b: Linear slope regression (dark line) with corresponding 95% CI (grey area) of the ESP with Remote Viewing protocols.
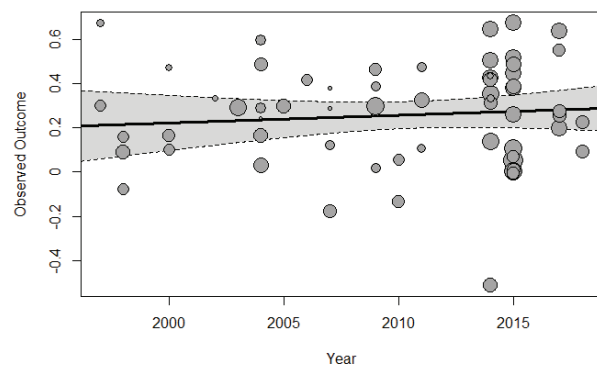

Figure 1d: Linear slope regression (dark line) with corresponding 95% CI (grey area) of the Predictive physiological anticipation experiments.
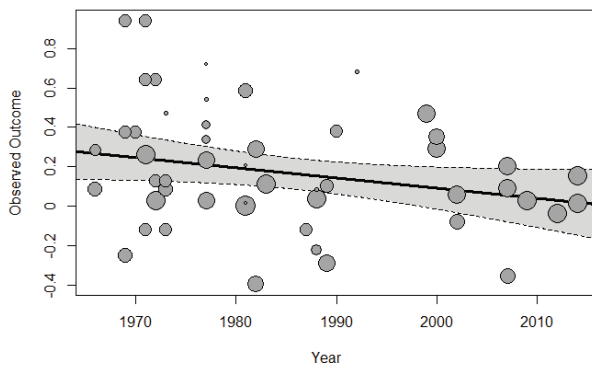
Figure 1e: Linear slope regression (dark line) with corresponding 95% CI (grey area) of the ESP in dreams.

DISCUSSION

The aim of this short report was to provide an update on the empirical support to DE in the field of ESP, estimating the regression linear slope of standardized effect sizes and taking the year of experiment publication as a covariate. To support the reality of DE, statistically significant negative slopes should be observed. Among the five selected databases, those related to Remote Viewing and ESP in dreams showed a statistically significant negative DE, whereas the remaining three databases showed statistically non-significant slopes.

However, if we consider not only the *p* values, but also the size of the slopes, it is observed that for both databases showing a DE, their values are very low, -0.009 and -0.005, for Remote Viewing and ESP in dreams, respectively. If we consider the average effect size observed in the Remote Viewing meta-analysis (Tressoldi & Katz, 2023), corresponding to .34; CI (95%) [.22, .45], and apply a DE of -0.009 each year, we should expect to reach an almost null effect size of .05 in approximately 32 years assuming no improvements in the experimental protocols.

For the ESP in dreams database, the authors of the meta-analysis (Storm et al., 2017) discussed the relevance of the methodological differences between the Maimonides Dream Lab and those carried out by other labs. Among the main differences, the participants in the Maimonides Dream Lab experiments dreamed in a dedicated lab and were continuously monitored during their sleep time to be woken up when reaching the sleep REM phase to identify the target stimuli. In contrast, most participants in the non-Maimonides experiments dreamed at home and sent their dream recalls related to the target stimuli to the experimenters.

If we estimated the DE of only the 36 non-Maimonides experiments, we obtained the following results:

slope = -0.0024; CI (95%) [-0.008, 0.003]; *p* = .40 (see Figure S1 in the Supplementary Material). Furthermore, the database of 50 studies in Table 1 combines two dream-ESP databases (Maimonides Dream Laboratory [MDL] studies and post-MDL studies), which are not significantly different from each other. Storm (2023) has shown that the DEs for both are not significant: MDL studies, *r*(12) = -0.02, *p* = .943 (two-tailed); post-MDL studies, *r*(34) = -0.20, *p* = .238 (two-tailed).

In summary, only one of the five databases related to different categories of experimental protocols related to ESP showed minimal DE. These results cannot be generalized to different experimental protocols; for example, to mind-matter interaction (psychokinesis) protocols. Consequently, we cannot exclude DEs in other domains.

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SUPPLEMENTARY MATERIAL

Figure S1.