

REG OUTCOME IN AN ALARM SITUATION IN ZEBRA FINCHES

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ABSTRACT: Micro-PK was explored in zebra finches (*Taeniopygia guttata*) to test the hypothesis of nondirectional REG randomness reduction during an alarm situation. A 15-s video clip of a crawling snake was presented to 80 participants and a REG's outcome during the presentation of the stimulus was analysed under three conditions: Bird Alone, Bird Plus Observer, and Observer Alone. One 200-bit trial was collected every quarter of a second during the presentation of the stimulus and the 5-min control period before the start of the disturbing stimulus, and the obtained cumulative chi-square deviation scores were analysed. The finding that the scores during the stimulus period for the three conditions belonged to the same population, their direction being the same when independently and globally analysed, together with the nonsignificant difference with respect to their controls do not support the proposed hypothesis. However, an as yet undifferentiated psi observer effect is suggested by the global scores of the stimulus periods departing from chance while the scores of the corresponding controls did not, by the former's values surpassing the latter, and by the scores of the stimulus periods deviating from chance when the observer was present.

Keywords: birds, micro-PK, REG, zebra finches

Devices known as random event generators (REGs) depend upon quantum effects, and although they are designed to produce a stream of purely random numbers, when people direct their attention to a single focus (not specifically intending to influence the REGs), a surprising reduction of randomness occurs.

This nondirectional effect was demonstrated when the attention of an audience (size from one person to 3 billion people) was concentrated on a single matter, be it a human disaster, a personal growth workshop, a comedy show, a poltergeist event, or a praying service (Bierman, 1996; Blasband, 2000; Mason & Patterson, 2007; Nelson, 2001, 2003; Radin, 1997; Radin, Rebman, & Cross, 1996; Williams, 2010).

When individual subjects were tested in an attempt to detect any effect of induced emotions on REG outcome, a reduction of randomness resulted during anger induction (Lumsden-Cook, 2005a), especially during anger and sadness dissipation (Lumsden-Cook, 2005b).

One question we may ask ourselves is whether attention or emotional states by nonhumans would also affect the random functioning of REGs. Although the prospect for enhanced experimental manipulation would be higher with nonhuman subjects, work with them is very scant. The only two studies of which I am aware dealing with the potential influence on up-to-date, reliable REG devices used soil nematodes and young chickens in

the experiment. The first one explored the role of the presence of different genetic lines of a nematode species on REG output, yielding marginally significant results in relation to output variance (Franklin, Kendall, & Vassilieva, 2005). In the second one, a small self-propelled robot on which chicks had been previously imprinted, and driven by an internal REG to manoeuvre randomly, moved significantly more often than chance toward the chicks' location, denoting a reduction in randomness in the output of the REG and suggesting psychokinesis (PK) by the birds (Peoc'h, 1995).

My hypothesis, based on the results of these studies, is that a nondirectional reduction in randomness in REG production will occur specifically during the presentation of a disturbing stimulus to birds. At the same time, an observer manipulation will be introduced into the experiment, in order to explore the existence of a psi observer effect.

Method

The animal species used was the zebra finch (*Taeniopygia guttata*). This bird is one of the most common subjects of research in many scientific disciplines, both in the wild and in the laboratory (Zann, 1996), serving as a model for investigation in neurology, behavior development, and environmental variables that impact human health, and it also appears to be gifted with the ability for short-term precognition (Alvarez, 2010a).

All subjects (80 adult male and female zebra finches) lived in two unisexual adult groups of conspecifics in 3 x 3 x 2 m aviaria near Seville, Spain, where water and food (seeds and vegetables) were supplied *ad libitum*.

The 70 x 35 x 35 cm testing cage was provided with four perches and a TFT screen at one end, where a still background image of red tiles was always on display during the experimental sessions. During the sessions, an Orion REG device was permanently in position on the centre of the cage floor and provided the data relative to output randomness. The laptop computer controlling the presentation of the stimulus on the TFT screen and storing the information from the REG was located in an adjacent compartment and was connected to the devices by two long cables. The same scene was shown at the same time on the TFT screen beside the testing cage and on the screen of the laptop computer in the observer compartment.

Three conditions were tested: (a) Bird Alone: the test was applied to 40 birds while the observer had gone away from the experimental area (5 to 25 m from the testing cage); (b) Bird Plus Observer: while the tests to 40 other birds were taking place, the observer (who knew in advance the time of stimulus presentation) was continuously receiving the same stimulation as the birds on a laptop screen and was intently waiting for the stimulus to appear; (c) Observer Alone: the same as in b (40 tests), but the testing cage was empty.

The experiments were performed between June 23 and November 9, 2010. Starting between 6:50 and 11:30 UT, the subjects (one at a time) were taken from their group and put in the testing cage. Each bird was unfamiliar with the testing situation and had not seen TV images before, and received only one test. During the test, the subjects could see the area with vegetation outside the aviarium, since being visually enclosed apparently reduces the expression of spontaneous behavior of alarm in zebra finches (Lombardi & Curio, 1985). Each subject was put into the testing cage for 30 min, where from the beginning it would encounter the still image of red tiles. After a period of 15 min, an alarm stimulus consisting of a 15-s video clip of a whip horseshoe snake (*Coluber hippocrepis*) slowly crawling over the red tile background was presented on the screen. The presentation of video playback on TFT screens has been used with great success to obtain behavioural responses in zebra finches and other estrildines (Ikebuchi & Okanoya, 1999; Galloch & Bischof, 2006, 2007; Alvarez, 2010b).

The operation of the REG on the floor of the testing cage was synchronized with the presentation of the stimulus and produced a sequence of 9,600 bits per second during the stimulus period and during the 5-min control period before the start of stimulus presentation of each condition.

The REG by Orion Electronics consists of two analogue Zener diodes, each independently producing a stream of random bits (ones and zeros), combined (using an XOR) and then transmitted to the port of the computer. The computer software was set to collect data at a rate of one 200-bit trial at the start of every quarter of a second (one trial), the rest of the REG production being discarded, and to provide the sum of the ones for each trial per subject during the observation period. Analyses of REG production were carried out for the 60 trials within the 15-s block during stimulation and for each condition.

Statistical analysis

Deviations from the expected mean of 100 for each trial and each subject were converted to normally distributed z scores. Therefore, for the total number of subjects there were 40 z scores for each quarter of a second. Because the hypothesis is nondirectional, z^2 scores, which are independent of the direction of the potential effect, were used, and the sum of the z^2 across trials ($\sum z^2$), being χ^2 distributed when summed across subjects and across time as the cumulative deviation of chi-square, were used as an index of deviation from random (Bierman, 1996).

Results

The per-trial values of the cumulative deviation of chi-square during the stimulus period and control periods of the three experimental conditions are shown in Table 1.

Table 1
*Cumulative Deviation of Chi-square (Mean and Standard Deviation) per Trial
 During the Three Conditions for the Stimulus and Control Periods*

	<i>M</i>	<i>SD</i>	<i>N</i>
Bird Alone			
Stimulus period	41.34	9.29	60
Control period	39.87	9.76	1,200
Bird Plus Observer			
Stimulus period	42.31	8.60	60
Control period	40.61	8.92	1,200
Observer Alone			
Stimulus period	42.13	9.84	60
Control period	39.90	8.73	1,200

The global values of the cumulative deviation scores of the stimulus periods, combined for the three conditions, were found to differ significantly from chance, $\chi^2(7,200) = 7,546.6$, $p = .002$, whereas the corresponding global values of the control periods, combined for the three conditions, did not, $\chi^2(144,000) = 144,454.5$, $p = .20$. The combined values of the per-trial chi-square cumulative deviations during the stimulus periods proved to be significantly higher than the corresponding values of the combined control periods (Experimental: $M \pm SD = 41.9 \pm 9.2$; Control: 40.1 ± 9.2), $t(3,778) = 2.57$, $p = .01$.

When the values of the cumulative deviation of chi-square were compared for the three conditions during the stimulus period, the three were found to belong to the same population by one-way ANOVA, $F(2,177) = 0.19$, $p = .83$, and the three paired comparisons proved to be nonsignificant by Scheffé test: Error MS (177) = 85.67, $p = .85-.99$.

The cumulative deviations of chi-square across subjects and across time during the stimulus periods were significantly different from chance in the Bird Plus Observer and Observer Alone conditions, $\chi^2(2400) = 2,538.3$, $p = .03$; $\chi^2(2400) = 2,527.8$, $p = .03$, and nonsignificant for the Bird Alone condition, $\chi^2(2400) = 2,480.5$, $p = .12$.

The total cumulative deviation of chi-square for the control period (the observation time before stimulus presentation) proved to be nonsignificantly different from chance in the three experimental conditions: Bird Alone, $\chi^2(4,800) = 47,845.6$, $p = .69$; Bird Plus Observer, $\chi^2(4,800) = 48,730.3$, $p = .01$; Observer Alone, $\chi^2(4,800) = 47,878.6$, $p = .65$.

The comparisons of the cumulative deviations of chi-square of the two conditions showing significant divergence from randomness (Bird Plus Observer and Observer Alone) with their controls yielded nonsignificant differences, $t(1,258) = 1.43$, $p = .15$ and $t(1,258) = 1.13$, $p = .26$.

Discussion

The main hypothesis of a nondirectional reduction in randomness during stimulation with birds as observers is not supported: when the birds were observers and the stimulus was presented, no significant difference was obtained with respect to their respective controls. When analysed both independently and globally, the scores during these two conditions did not differ from those obtained when no bird was present.

Although the exploration of a psi observer effect produced no definitive results, the existence of such influence is suggested by the following facts: (a) the global scores of the stimulus periods for the three combined conditions departed from chance, whereas the corresponding global scores during the control periods did not; (b) the global values of the stimulus periods surpassed those of the control periods; and (c) the scores of the stimulus and control periods for the Bird Plus Observer condition and of the stimulus period of the Observer Alone condition also deviated from chance.

Although not supported by the results, the potential of PK in a predatory context, such as the one mimicked in this study, appears to be worth considering. Since predation is a major selective force in the evolution of morphological, physiological, and behavioral characteristics of animals, if potential prey species could manipulate the predatory context to their own benefit by way of PK to reduce the risk of being captured, the selection for individuals and genes capable of such a feat appears inescapable. However, as noted by Levin (1996), PK and other psi abilities should have evolved to the point of being widespread today, while on the contrary, observation of animals in action does not appear to support this expectation.

Several hypotheses have been advanced (see Table 2) and reviewed by Levin (1996) to explain this inconsistency, including: (a) rejecting the implicit premise that psi is not observed in nature; (b) denying some aspects of neo-Darwinian evolutionary theory, although the neo-Darwinian approach gives some support to psi function (Broughton, 1988; Taylor, 2003); (c) difficulties resulting from signal-to-noise ratio due to the conflicting desires of many organisms; (d) the impossibility of reliable analyses of psi under present scientific paradigms; (e) the possible advantage to the animal of not advertising its own psi skills as an evolutionary strategy; (f) psi energy requirements being perhaps too high and unavailable; and (g) considering psi a function of nonmaterial consciousness, and therefore not entirely subject to encoding by genes, reducing the likelihood of its selection (Kennedy, 2004; Levin, 1996).

Table 2
*Hypotheses Intended to Explain Why Psi
 Does Not Appear to Be Widespread*

Psi present in biological phenomena still unexplained	Morris, 1970 Sheldrake, 1995
Denying aspects of neo-Darwinian evolution	Koestler, 1972 Sheldrake, 1981
Signal-to-noise ratio problems derived from conflicting desires of many organisms	Levin, 1996
Nature of psi disallowing reliable analysis under present scientific paradigms	Levin, 1996 Swanson, 2003
Profitable not advertising own psi skills under evolutionarily stable strategy	Broughton, 1993
Energy required for psi perhaps too high and unavailable	Levin, 1996
Psi in some way nonmaterial and decoupled from evolution	Levin, 1996 Kennedy, 2004

Considering that some evidence is available for the existence of PK in humans and other animals, of all these views, I consider the first one the most reasonable, as a variety of biological phenomena are still in need of explanation (Morris, 1970; Sheldrake, 1995). We should not just assume that the corresponding abilities will be explained in the future in an orthodox but as yet unknown way; instead, we should try to understand the actual mechanism of action from different perspectives.

As already stated, though not entirely supported by the results of this study, the possible action of an observer psi effect should not be discarded. Such an effect has been demonstrated in experiments with humans (Roe, Davey, & Stevens, 2006; Smith, 2003; Watt & Ramakers, 2003; Wiseman & Schlitz, 1997), and it perhaps also took place in an animal study in which the experimenter was continuously watching the subjects (cockroaches) during the tests, where the results showed a departure from chance in the opposite direction than expected (Schmidt, 1970).

References

- Alvarez, F. (2010a). Higher anticipatory response at 13.5 ± 1 h local sidereal time in zebra finches. *Journal of Parapsychology*, *74*, 323–333.

- Alvarez, F. (2010b). Anticipatory alarm behavior in Bengalese finches. *Journal of Scientific Exploration*, 24, 599–610.
- Bierman, D. (1996). Exploring correlations between local emotional and global emotional events and the behaviour of a random number generator. *Journal of Scientific Exploration*, 10, 363–373.
- Blasband, R. (2000). The ordering of random events by emotional expression. *Journal of Scientific Exploration*, 14, 195–216.
- Broughton, R. S. (1988). If you want to know how it works, first find out what it's for. In D. H. Weiner & R. L. Morris (Eds.), *Research in parapsychology 1987* (pp. 187–202). Metuchen, NJ: Scarecrow Press.
- Broughton, R. S. (1993). Taking psi ability seriously. In L. Coly & J. D. S. McMahon (Eds.), *Psi research methodology* (pp. 21–43). New York: Parapsychology Foundation.
- Franklin, M., Kendall, E., & Vassilieva, L. (2005). *The effects of genetically healthy and weakened Caenorhabditis elegans on a field random event generator (REG)* (International Consciousness Research Laboratories Technical Report #05.1). Retrieved 9 March 2011 at http://www.icrl.org/home/index.php?option=com_content&view=art
- Galloch, Z., & Bischof, H. J. (2006). Zebra finches actively choose between live images of conspecifics. *Ornithological Science*, 5, 57–64.
- Galloch, Z., & Bischof, H. J. (2007). Behavioural responses to video playbacks by zebra finch males. *Behavioural Processes*, 74, 21–26.
- Ikebuchi, M., & Okanoya, K. (1999). Male zebra finches and Bengalese finches emit directed songs to the video images of conspecific females projected onto a TFT display. *Zoological Science*, 16, 63–70.
- Kennedy, J. E. (2004). What is the purpose of psi? *Journal of the American Society for Psychical Research*, 98, 1–27.
- Koestler, A. (1972). *The roots of coincidence*. London: Hutchinson.
- Levin, M. (1996). On the lack of evidence for the evolution of psi as an argument against the reality of the paranormal. *Journal of the American Society for Psychical Research*, 90, 221–230.
- Lombardi, C. M., & Curio, E. (1985). Influence of environment on mobbing by zebra finches. *Bird Behaviour*, 6, 28–33.
- Lumsden-Cook, J. (2005a). Mind-matter and emotion. *Journal of the Society for Psychical Research*, 69, 1–17.
- Lumsden-Cook, J. (2005b). Affect and random events: Examining the effects of induced emotion upon mind-matter interactions. *Journal of the Society for Psychical Research*, 69, 128–142.
- Mason, L. I., & Patterson, R. P. (2007). Exploratory study: The random number generator and group meditation. *Journal of Scientific Exploration*, 21, 295–317.
- Morris, R. L. (1970). Psi and animal behavior: A survey. *Journal of the American Society for Psychical Research*, 64, 242–260.
- Nelson, R. D. (2001). September 11 2001: Exploratory and contextual analyses. Retrieved from <http://noosphere.princeton.edu/terror.html>

- Nelson, R. D. (2003). Global harmony. Global Consciousness Project exploratory analysis. Retrieved from <http://noosphere.princeton.edu/groupmedit.html>
- Peoc'h, R. (1995). Psychokinetic action of young chicks on the path of an illuminated source. *Journal of Scientific Exploration*, 9, 223–229.
- Radin, D. I. (1997). *The conscious universe*. San Francisco: HarperEdge.
- Radin, D. I., Rebman, J. M., & Cross, M. P. (1996). Anomalous organization of random events by group consciousness: Two exploratory experiments. *Journal of Scientific Exploration*, 10, 143–168.
- Roe, C. A., Davey, R., & Stevens, P. (2006). Experimenter effects in laboratory tests of ESP and PK using a common protocol. *Journal of Scientific Exploration*, 20, 239–253.
- Schmidt, H. (1970). PK experiments with animals as subjects. *Journal of Parapsychology*, 34, 255–261.
- Sheldrake, R. (1981). *A new science of life*. Rochester, VT: Park Street Press.
- Sheldrake, R. (1995). *Seven experiments that could change the world*. Rochester, VT: Park Street Press.
- Smith, M. D. (2003). The psychology of the “psi-conductive” experimenter: Personality, attitudes toward psi, and personal psi experience. *Journal of Parapsychology*, 67, 117–128.
- Swanson, C. (2003). *The synchronized universe*. Tucson, AZ: Poseidia Press.
- Taylor, R. (2003). Evolutionary theory and psi: Reviewing and revising some need-serving models in psychic functioning. *Journal of the Society for Psychical Research*, 67, 1–17.
- Watt, C., & Ramakers, P. (2003). Experimenter effects with a remote facilitation of attention focusing task: A study with multiple believer and disbeliever experimenters. *Journal of Parapsychology*, 67, 99–116.
- Williams, B. J. (2010). Global consciousness project: Exploratory block analysis of the Columbia space shuttle disaster. Retrieved from <http://noosphere.princeton.edu/papers/bw.columbiapaper.doc>
- Wiseman, R., & Schlitz, M. (1997). Experimenter effects and the remote detection of staring. *Journal of Parapsychology*, 61, 197–208.
- Zann, R. A. (1996). *Zebra finch: A synthesis of field and laboratory studies*. Oxford, UK: Oxford University Press.

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Acknowledgments

I thank M. Vázquez for help in finch maintenance, and E. Collado for preparing the software for stimulus presentation and collection of REG outcome.

Abstracts in Other Languages

Spanish

PRODUCCIÓN DE UN DISPOSITIVO REG EN UNA SITUACIÓN DE ALARMA EN EL MANDARÍN LISTADO

Con objeto de probar la hipótesis de reducción de aleatoriedad no direccional en la producción de un dispositivo REG (generador de números aleatorios) durante una situación de alarma, se exploró la existencia de micro-psicoquinesis en el mandarín listado (*Taeniopygia guttata*). A 80 aves se les presentó individualmente un videoclip de 15 segundos de duración de una culebra reptando en una pantalla TFT, y se analizó la producción de un REG durante la presentación del estímulo bajo tres condiciones: ave sola, ave más observador y observador solo. En cada prueba de cada cuarto de segundo se recogió la producción de 200 bits durante la presentación del estímulo y durante el periodo control previo de 5 minutos, y se analizaron los valores de las desviaciones acumulativas de chi cuadrado obtenidas. Los resultados no apoyaron la hipótesis propuesta, ya que los valores durante el periodo del estímulo para las tres condiciones pertenecían a la misma población estadística, su dirección era la misma cuando se analizaron independientemente y globalmente, y las diferencias entre los periodos experimental y control no fueron significativas. Sin embargo, la divergencia respecto al azar de los valores globales durante los periodos de estimulación y su correspondiente aleatoriedad durante los periodos control, el hecho de que los primeros sobrepasaran a los segundos, y el que los valores durante el periodo de estimulación con el observador presente se desviaran del azar, sugieren la existencia de un efecto indiferenciado psi-observador sobre la producción del dispositivo REG.

French

RESULTAT D'UN GEA DANS UNE SITUATION D'ALARME POUR DES DIAMANTS MANDARINS

RESUME : La micro-PK a été explorée avec les diamants mandarins (*Taeniopygia guttata*) pour tester l'hypothèse d'une réduction de l'aleatorité d'un GEA non-directionnel dans une situation d'alarme. Un vidéo clip de 15 s d'un serpent rampant fut présenté à 80 participants et un résultat de GEA durant la présentation du stimulus fut analysé selon trois conditions : Oiseau Seul, Oiseau Plus Observateur, et Observateur Seul. Un essai à 200 bits fut collecté à chaque quart de seconde durant la présentation du stimulus et la période contrôle de 5 minutes avant le début du stimulus perturbateur, et les scores obtenus de déviation cumulative χ^2 furent analysés. Les résultats montrent que les scores durant les périodes de stimulus pour les trois conditions appartiennent à la même population, leurs directions étaient la même lorsqu'elles étaient analysées indépendamment et globalement, et la différence non significative

entre les périodes stimulus et contrôle ne soutiennent pas l'hypothèse proposée. Cependant, un effet d'un observateur psi encore indifférencié est suggéré dans les scores globaux des périodes stimulus, s'écartant du hasard alors que les scores des périodes contrôles correspondantes ne le font pas, dans les premières valeurs surpassant les dernières, et dans les scores aux périodes stimulus déviant du hasard lorsque l'observateur était présent.

German

DAS ERGEBNIS EINES ZUFALLSGENERATORS BEI ALARMIERTEN ZEBRAFINKEN

ZUSAMMENFASSUNG: Um Miko-PK bei zehn Zebrafinken (*Taeniopygia guttata*) zu untersuchen, wurde die Hypothese getestet, ob sich in einer Gefahrensituation die ungerichtete Zufälligkeit eines Zufallsgenerators (REG) reduziert. Ein 15sekündiger Videoclip einer kriechenden Schlange wurde 80 Teilnehmern präsentiert, wobei das Ergebnis des REGs während der Präsentation des Stimulus unter drei Bedingungen ausgewertet wurde: Vogel allein, Vogel mit Beobachter und Beobachter allein. Ein 200-Bit-Trial wurde jeweils für die Dauer einer Viertelsekunde während der Präsentation des Stimulus und für eine 5-minütige Kontrollperiode vor Beginn des beunruhigenden Reizes erfasst. Die kumulativen Werte der Chi-Quadrat-Abweichungen wurden ausgewertet. Die Ergebnisse, dass die Werte während der Stimulusperiode für die drei Bedingungen zur gleichen Population gehörten, wobei ihre Richtung bei unabhängiger wie globaler Auswertung gleich blieb, zusammen mit den nichtsignifikanten Unterschieden in Bezug auf ihre Kontrollperioden, konnten die vorgeschlagene Hypothese nicht bestätigen. Jedoch wird ein bisher nicht weiter differenzierter Psi-Beobachter-Effekt nahegelegt, da die globalen Werte der Stimulusperioden vom Zufall abweichen, im Unterschied zu den Werten der dazugehörigen Kontrollabschnitte, indem die Werte der ersteren über denjenigen der zweiten liegen und indem die Werte der Stimulusperioden dann vom Zufall abweichen, wenn der Beobachter anwesend war.