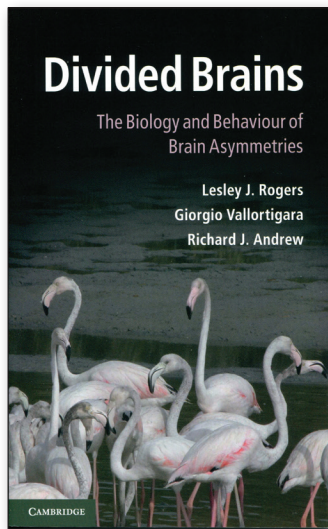


BOOK REVIEWS, NOTES AND COMMENTS

Edited by

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DIVIDED BRAINS The biology and behaviour of brain asymmetries

Lesley J. Rogers,
Giorgio Vallortigara,
Richard J. Andrew.
Cambridge: Cambridge
University Press; 2013.
229 p.
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\$ 58.00.

In the mid 19th century French neurologist Paul Broca discovered that speech is impaired upon damage of the left frontal lobe, providing the first evidence that the human brain is functionally lateralised. At a first glance, the pink flamingos on the cover of this elegant textbook on brain asymmetries may sound inappropriate. However, the legend (back cover) reveals: "Birds respond differently when looking with the left or the right eye. Flamingos, seen here, turn their neck to the left or right when resting and the direction of this predicts their level of aggression" [1]. Avian studies – initially in the lab with seminal studies of experimental psychologists on pigeons and chickens and more recently also in the wild – have provided the most compelling descriptive and experimental evidence that the phenomenon of brain lateralization and functional phenotypic asymmetries is not limited to humans. Birds show a highly developed and sophisticated visual system. Their head anatomy allows facultative monocular vision, as in starlings and pigeons, to full binocular vision, as in owls. Cerebral asymmetries are organized in complementary specializations for different kind of stimuli and functions reflected in morphological left-right asymmetries within the two main visual systems ascending to the forebrain (thalamofugal and tectofugal pathways). The tribute to birds is definitely deserved and there are plenty of avian examples in this book. Fish are another group that contributed substantially in widening the knowledge on brain asymmetries, especially on functional aspects, with important research by the Italian group of biopsychologists led by Angelo Bisazza at Padua University.

The main message and theme of *Divided Brains* is that lateralization (structural and functional differences between the right and left brain hemispheres), with its direct behavioural counterparts, is not confined to humans, where at a time left-handed children were sub-

mitted to "corrective" protocols, to switch at least for writing (notably, in English "right" means "correct"). It is actually widespread throughout vertebrates and even in several invertebrates. Lobsters develop a "crusher" and a "cutter" claw morphologically distinct. Does laterality reflect an organizational plan? Are there population biases? Sex biases? Individual biases? What are the advantages of such asymmetries? Are there associated mental disorders?

The authors, three authorities on animal asymmetries, provide a timely, concise and fluent synthesis of the evidence, especially from the past 20 years that have seen a surge in interest on the topic, with entire departments, research groups and programs specialised and dedicated to lateralization, often approached with the classical integrative perspectives of Nobel laureate Niko Tinbergen at the roots of modern behavioural biology [2]. In fact the book integrates research from psychology, neuroscience, behavioural ecology, and evolutionary biology. Coherently, the authors follow the Tinbergen approach also in the editorial organization in six main chapters: a solid explanatory introduction (1); function (2); evolution (3); development (4); causation (5); applications and future directions (6). A rich bibliography (46 pages, about 900 references) and the analytical index conclude this successful editorial effort.

In the introduction we learn the basics, including a beautiful historical overview, from Paul Broca (1865) through Fernando Nottebohm (canary brain, mid 70s), to the current *in vivo* fMRI visualizations of lateralised brain activity. We learn about handedness and motor asymmetries as well as lateralization of imprinting and other cognitive processes. There is clearly a common basic pattern in vertebrates: in most species, including fish, amphibians, birds, and mammals, the left hemisphere is specialized to categorize objects and familiar stimuli and to control routine circumstances, while the right hemisphere is specialized to respond to unexpected stimuli and predators and to express important emotions. The demographic aspect is crucial to understand the relevance of the phenomenon: individual asymmetry means no lateral bias in a given population as a whole, whereas population asymmetry means that most individuals are lateralized in the same direction, as for example handedness (70-90% right-handed) or head-turning in humans, where twice as many adults turn their head to the right as to the left when kissing [2].

In chapters 2 and 3 it appears that the evolutionary origin of lateralization is still enigmatic. In humans hemispheric specialization evolved about 2.5 millions years ago, along with language. The authors make the cogent hypothesis that stabilising selection on directional asymmetries acted on populations when lateralised individuals cooperate. The idea is converging that enhanced multitask ability and an aided consolidation

and retrieving of memory are the most likely benefits of evolving a divided brain. The authors also hypothesise that moderate asymmetries could enhance the efficiency of the brain, and this could play a role in the evolutionary maintenance of lateralization.

Chapter 4 focuses on the interplay with developmental factors – e.g. light exposure of the avian embryo, steroid hormones of maternal origin – that can shape the lateralizing brain (enhancement, suppression, or shifts in lateralization) also inducing sex differences. Chapter 5 discusses the state of the art of sex differences in human brain lateralization while detailing the interactions between hemispheres (thanks to the corpus callosum) as well as the specific lateralized brain anatomical structures, which include the habenulae, hippocampi, cerebellum, optic tectum, amygdala, and cingulate cortex. Split-brain patients, who had undergone surgical section of the corpus callosum, have provided crucial evidence on the transfer of information between hemispheres. The part on lateralized processing of emotions and behaviours within this context, including human amusement, laughter in chimpanzees, macaques, and rats, and risk taking in various species appears the most appealing. Section 5.11 provides an overview of lateralization and disorders of behaviour, especially in those disturbances involving lateralized structures, such as the amygdala and the prefrontal structures (schizophrenia, autism and Asperger's syndrome). The last chapter is very stimulating: one could not immediately realize the potential for improving animal welfare, a hot issue lately, by observing and taking into account lateralised nostril, ear and eye preferences or lateralised behaviours that predict aggression. Being viewed by the left eye (right hemisphere) of a feral horse signals an enhanced emotional state that is likely to result in aggression acts towards his handler or a conspecific. Dogs wag their tails preferentially to the left (right hemisphere) when viewing unfamiliar dominant dogs, but to the right side (left hemisphere) when looking at their owner [4].

Every chapter is subdivided in sections, never too long, it has a useful brief introduction and a take-home concluding summary efficiently parcelling the high density of information without disrupting the attention. The result is that reading is always devoid of circularity and straightforward to the intended message.

In sum, this book is highly recommended to experts and students of brain and behaviour, either typical or pathological, including veterinarians: it fruitfully integrates the recent progress in animals with the state of knowledge in humans, always beware of oversimplifications.

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LA TERRA Un'isola nello spazio

Silvano Focardi
Siena: Edizioni Cantagalli;
2011. 142 p.
ISBN: 97-88-8272-768-0.
€ 15.00.

[*Earth: an island in the space*]

Are human activities indeed harmful for planet Earth? Is sustainable development actually feasible and effective? How is it possible that the North pole is one of the most polluted areas, despite being apparently far from pollution sources (p. 90)? Where did the Peruvian anchovies go (p. 97)? These are examples of the dramatic questions tackled in this timely and self-containing book.

The author, full professor of ecology at the University of Siena with an outstanding track record of scientific publications especially in ecotoxicology and environmental health, takes the inspiration from the unexpected question he got from two primary school boys (his 10-year old grandchildren), as confessed in the preface: what does sustainable development mean?

Despite the ecosystems represent the essence of our planet, the need of a policy on environmental protection and management has emerged and started growing only since a few decades (early 60s). In 1970 the "Earth Day" gathered hundreds of thousands of students in the US campuses. In 1983 the so-called Brundtland report (*Our Common Future*), from the name of former Norwegian Prime Minister who was Chair of the World Commission on Environment and Development, defined and posed the basis of a style of human course of development that should combine current welfare and economic growth with environmental protection and future preservation of resources [1]. Since then, envi-

ronmental issues and ethics started becoming political issues, with legal, administrative and financial resources allocated to them. At the beginning of the new millennium the results are basically disappointing, or at least far below expectation.

Curiously, after an explanatory preface, Focardi starts telling the history of the mysterious Easter Island (in native language Rapa Nui, meaning “big island/rock”), a Polynesian island – famous for its 887 monumental statues built by the early native people – that became uninhabitable after the wood resource collapsed due to overexploitation. Ships could not be built anymore and the population remained self-imprisoned. The comparison with planet Earth’s fragility and a fatal destiny such as that of Easter Island becomes then an encumbrant syllogism, and the title of the book (*Earth: an island in the space*) as well. It brilliantly unmask the illusion that the Earth is so big compared to our individual dimension, giving the feeling of being immune to all human impacts and adversities.

The text goes on with the classical Malthusian paradigm: the major problem is represented by the exponential growth of the human population. The statistics are clear-cut and unambiguous, including realistic scenarios provided by cogent simulations. With the current growth rate it takes about six hours to reach the number of inhabitants of a city like Siena and about 8-9 months of a country like Italy. The examples provided are diverse and incontrovertible. The prefix “over-“ became pervasive: overpopulation, overfishing, overgrazing, and so on. Basic ecology concepts are explained, such as the energy cycles, the greenhouse effect and the model of Ehrlich and Holdren about the impact on ecosystems [2], before moving to what happens to the organisms. Classical ecotoxicological examples, such as those concerning biomagnification across trophic chains and the subtle effects of endocrine disrupters are thoroughly depicted. Then, an extensive part on climate change explains the evidence and the effects, with many examples and projections based on research carried out in Antarctica, where the author and his team have been directly involved in long-term projects, e.g. on penguins ecology [3].

Pollution, climate change and energy are the grand problems and challenges. They are simply and clearly outlined. What to do? Despite the depressing evidence and the well-recognized difficulties to objectively predict our ecological future, at the end of this nice book an optimistic attitude shines through. According to the author there is the possibility to change the way and turn the tide. It comes from the amazing capability of the ecosystems and populations of animals and plants to recover thank to their complex evolutionary history shaping their resilience, and we do have empirical evidence of this at local scale. However, this could happen only if a strategy of sustainable development will be applied at global scale.

The text is fluent and pleasant to read, being supported by a useful compilation of illustrations, including colour pictures, simple graphs and charts, and a final glossary.

In conclusion, this is an easy and illuminating read-

ing on a fundamental topic, especially dedicated to young people, from primary school to university level, but also to their parents, grandparents, teachers and mentors. And to any scientist encountering difficulty to step down from the “ivory tower” and speak to the “real” people. Not an easy task, yet fully achieved by Silvano Focardi – we suspect, also thanks to his young grandchildren who constantly peep out from the text.

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AMORE, SESSO E POESIA Detto e non detto dell'amore di coppia

Massimo Biondi.
Roma: Alpes; 2013.
120 p.
ISBN: 9788865311684.
€ 10,00.

[Love, sex and poetry. What is said and what is not on romantic love]

The author, who is full professor of psychiatry at the Sapienza University of Rome, has built on decades of clinical experience, as well as thoughtful conversations with colleagues and friends, in order to put together this short, highly readable book on love and intimate relationships.

Despite being written by an academic, with a long-lasting experience in teaching, the tone of the book is far from that of a dry, technical, scientific textbook; rather, it has a relaxed, informal, flowing tone rendering it very enjoyable.

Biondi openly expresses his strong belief in love and family, while moving from the premise that a person's network of affective bonds is most fundamental in life. In fact it was recently shown that centenarians survive

thanks to these affective neuro-psycho-endocrine-nutritional networkings. Nevertheless, throughout the book, he maintains a respectful attitude towards the wide diversity of human experience and expression in love and intimate bonding. Themes such as falling in love, desire, romance, sex, unfaithfulness, adulterous relationships, jealousy, separation, and divorce, are all treated with a fresh, open approach. While not refraining from openly expressing his personal views about several issues, Massimo Biondi maintains a non-judgemental attitude, and quotes the old adage *Nihil humanum a me alienum puto* coined by the Roman poet Terence.

Readers with scientific backgrounds would find in the well-separated paragraphs of this nice, graciously illustrated book many interesting topics, such as how chronobiological rhythms may affect relationships between couples, the relaxing and stress-reducing effect that the smell of substances produced by masculine sweat glands exerts on women, and the characteristics of a male or female attractive face. Other intriguing topics, to be appreciated by all readers, include love at different ages, a classification of adulterous relationships and the related marriage “prognosis”, and the delicate issue of the erotization of the therapeutic relationship.

Throughout the book, the author underlines the importance of the poetic aspects in love and sexual life. As he points out, to many people being male or female means doing what sex manuals or the iPhone sex apps recommend and dictate. In this way, spontaneity and poetry are lost, and with them some of the most important elements that an intimate relationship can provide. He reminds us that the most precious things in life are memory and being loved. This is why anniversaries are so important, as they are shared with the loved one, thus bringing love and memory together. Well tight, biologically entangled.

The book has such a fresh approach, and the subject matter is so fascinating, that almost every reader should find something of interest in these pages. If a fault is to be found with the book, it may lie in its brevity, as many readers might have appreciated a more extensive discussion of some topics. This issue may possibly be addressed in a future, enlarged edition of the book.

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