Reading Too Much Into Baboon Skills?

THE REPORT “ORTHOGRAPHIC processing in baboons (Papio papio)” by J. Grainger et al. (1) demonstrates that baboons can learn to recognize printed words. The Perspective by M. L. Platt and G. K. Adams (“Monkey see, monkey read,” 13 April, p. 168) incorrectly uses these results to suggest that humans could be taught to read by a method that depends on recognition of the visual letter sequence alone. Moreover, the Perspective suggests, contrary to the evidence, that dyslexia could be remediated by a similar visual method.

A reader’s task is not to distinguish the large class of real words from nonwords (as the baboons did) but to connect a specific printed word with the corresponding word in his/her spoken language. In addition to recognizing words seen before, the reader must reliably identify words that have not previously been encountered in print. There is a big gap between the skill of learning visual redundancy and the skill of recovering the spoken equivalent of a new printed word; the experiment of Grainger et al. does not inform us about the second process.

Grainger et al. cite neurobiological evidence that skilled readers use a cortical visual pathway to recognize words. Not mentioned, however, is evidence that the path to becoming a skilled reader involves developing the cortical substrate necessary to recognize letter-sound relationships before developing the fast-mapping visual circuit (2, 3). The implication that learning to read can be successful without acquiring the letter-sound relationship runs counter to the great bulk of scientific evidence collected over the past few decades (4, 5).

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Response
WE AGREE WITH KATZ ET AL. THAT READING is more than orthographic processing. True reading requires a mapping of visual forms onto arbitrary symbols to give words meaning. Notwithstanding our tongue-in-cheek title (“Monkey see, monkey read”), baboons clearly cannot read. Nor are they likely to ever acquire that skill, for precisely the reasons Katz et al. outline. Nevertheless, several lines of evidence, including the work by Grainger et al. (1), suggest that reading is not yoked ineluctably to spoken language. Foremost, many individuals—notably the congenitally deaf—learn to read without ever hearing speech.

Grainger et al. only examined orthographic processing, a skill that is necessary but not sufficient for reading. Their findings suggest that the formation of letter-sound relationships is not necessary for orthographic processing but address neither whether such a skill is necessary for reading generally, nor whether it plays a facilitative role in learning orthography in humans. Although Grainger et al.’s finding—that baboons can learn the statistics of letter co-occurrence inherent in English—has strong implications for understanding the neurobiological mechanisms supporting reading and their evolution, this is distinct from the question of what methods will be most successful in reading education. We acknowledge the substantial literature supporting the importance of phonological coding in learning to read.

In our Perspective, we made no specific recommendations for teaching children to read or remediating dyslexia. Nevertheless, understanding the neurobiology of reading may suggest new ways to remediate dyslexia. Recent work has emphasized that different subtypes of dyslexia, characterized by specific functional deficits, reflect dysfunctions in distinct neural circuits, the relative importance of which can vary with both the individual and the writing system (2, 3). The presence of dyslexia in deaf individuals further demonstrates the need for an increased understanding of the various neural systems that can support reading (4, 5), given that the reading strategies employed by some deaf readers may differ from those used by individuals with intact hearing (6, 7). If the etiology of some cases of dyslexia involves specific deficits to orthographic processing, and orthographic processing relies on conserved neural systems for processing visual form and objects, then interventions targeted at these visual deficits may benefit these individuals.

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References
The last surviving (1) of the three Mascarene-endemic fruit bat species of Mauritius (Pteropus niger) now faces elevated extinction risks, as the government disregards science and bows instead to the demands of industry. In response to pressure from fruit growers, the Mauritian government is working to amend the country’s law that protects bats (2). Meanwhile, the Parent Ministry of the National Parks and Conservation Service is calling on the World Conservation Union (IUCN) to review the bat’s threat category (3, 4). Together, these moves will enable culling of an endangered species (2). Conservationists’ appeals to the government to adopt a more evidence-based approach have gone unheeded.

In 2008, the species’ IUCN Red List category was reclassified from Vulnerable to Endangered (5). The bats have suffered extensive habitat loss and degradation (6), and they are highly vulnerable to stochastic events like cyclones (1). Legalizing culling would add to these pressures, putting the species at further risk. The government’s move is particularly troubling because it coincides with a recent policy that is restrictive to conservation research and local capacity building in conservation (7).

Seeking to cull a species with a recent history of worsening conservation status will be detrimental to Mauritius’s good reputation (1, 8), built on having saved several endemic species from extinction (e.g., the pink pigeon, Columba mayeri) (1). The government has lost further credibility by providing no reasonable evaluation of expected benefits of specific quotas of bat culling. Moreover, the current bat protection law has proved difficult to enforce (2, 5), which casts serious doubts on the government’s ability to enforce culling quotas in the future.

The international community should encourage Mauritius to conserve the bat population by exploring and extending alternative programs, such as protective netting. Mauritius should not undermine the bats’ key ecological role as the largest surviving frugivore in the island’s threatened native forests (9).
rather than tourists who pose the highest risk of introducing alien species on their clothes and equipment.

Whose responsibility is it to prevent or manage alien invasive species in Antarctica? The Madrid Protocol prohibits the introduction of any alien species in an effort to minimize their interference with native wildlife, but all evidence to date points to a failure in its implementation across the continent (8). Sufficient data now exist for signatories to implement robust biosecurity policies on sea and land, initiate alien species management programs, audit new research initiatives, and monitor compliance of both public and private operators. Australia and New Zealand are world leaders in managing invasive species (9), and their territorial claims in the region put these countries in a unique position to lead a coordinated biosecurity strategy across the entire continent. The establishment of an International Antarctic Biosecurity Agency, funded through subscriptions from signatories to the Antarctic Treaty and a visitor levy, would be an essential first step to deliver on the full aspirations of the Madrid Protocol. The Antarctic Treaty System is often cited as a flagship example illustrating that the international community can satisfactorily govern the commons. It is time to put this into practice by moving beyond documenting biological invasions and toward managing the problem. The IPY data provide the first continent-wide evidence that knowledge of impacts has not kept pace with the high rates of species introductions. The difficulty in eradicating established invasive alien species in these pristine environments demands a greater emphasis on risk prevention rather than minimization (10) to be urgently adopted in existing management plans.

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5. IAATO, Don’t Pack a Pest to Antarctica! (http://iaato.org/dont-pack-a-pest).


CORRECTIONS AND CLARIFICATIONS

Letters: “Presumed guilt in the anthrax case” by J. Guillemin and “Response” by D. A. Relman (11 May, p. 669). Due to an editorial error, an incorrect version of the text was published. The original author names, affiliations, and references were correct. The text has been corrected in the HTML and PDF versions online. The correct text follows.

Letter: In his review of my book American Anthrax on the 2001 anthrax letter attacks (“Have we ‘met the enemy,”” 3 February, p. 540), D. A. Relman accuses me of imposing a “presumption of guilt” on the FBI’s prime suspect, U.S. Army microbiologist Bruce Ivins. In fact, I described many ambiguities in the case against Ivins and took no personal position on his guilt or innocence. I relied on the report of the National Research Council (NRC) committee that evaluated the FBI science, and, regarding a possible foreign source for the letter spores, I accepted its conclusion that “We consider these data to be inconclusive regarding the possible presence of B. anthracis Ames at this undisclosed overseas site” (2). Relman served as vice chair of the committee that reached this conclusion.

Response: In my review of American Anthrax, I sought to highlight the valuable contributions of this book to the public understanding of this complex and controversial case, as well as the book’s shortcomings. It is true that Guillemin makes no explicit statement about her position regarding the guilt or innocence of Ivins. However, statements such as, “the FBI had solid scientific proof that the spores in the anthrax letters matched those in a flask, labeled RMR (Reference Material Receipt)-1029, that was in Ivins’ keeping at the Army’s medical institute at Detrick” (p. xxii), and “a criminal—either Ivins or someone else—had used the Institute’s Ames anthrax spores to commit murder” (p. 251), misrepresent the strength of the scientific evidence that points to this flask as the source of the spores in the letters (and by inference, Ivins and/or the Army’s institute at Fort Detrick, MD). A variety of weaknesses in the FBI’s scientific investigation are discussed in detail in the NRC Report (2), but unfortunately, these weaknesses are not given much coverage in her book. Guillemin is correct: I served as vice chair of the NRC committee that issued this report.

Letters: “Conservation concerns in the deep” by A. C. Hartmann and L. A. Levin (11 May, p. 668). Corresponding author A. C. Hartmann can be reached at achartma@ucsd.edu.