



Bedbug. Klaus Reinhardt. Reaktion Books Ltd, Unit 32, Waterside, 44–48 Wharf Road, London N1 7UX, UK. 2018. 184 pp. Price: £12.95.

They drink, and drink, and drink – up to three times their own body weight. No wonder, they are called the ultimate binge drinkers. At times, they are too bloated to return to their homes. Their stealthy lifestyle of drinking, and their habit of helping themselves uninvited stirs the strongest psychological fear amongst people. Evolved some 100,000 years ago, the drinking habit of bedbugs has sustained them as a species at the cost of humans, who continue to shudder at the mere mention of these tiny blood-suckers. Their influence on our lives has been unprecedented, pretty much every other bug, including the stomach bug, the computer bug, and the electronic bug carries that name tag.

In his 15 years of research on bedbugs, Klaus Reinhardt, a professor of applied zoology at the Technical University of Dresden in Germany, has found that only two from some 100 odd species of the family Cimicidae are found in our beds. While *Cimex hemipterus* resides in the tropical regions, *Cimex lectularius* dwells in temperate zones. Although bedbug sightings may have declined in many tropical countries in the recent years, increase in bedbug infestation in the UK, USA, Australia and Canada in the past 15 years clearly indicates that they have no respect for class and prosperity. In fact, London was heaving with bedbugs in the early 19th century.

Divided into nine profusely illustrated sections, covering aspects of bug diversity, bug sex and bug forecast, this book provides intriguing, engaging and entertaining insights into the life of an insect that

is as much part of science as fiction. Alexander Dumas sighted bedbugs during his travels; Shakespeare referred to them in his plays: and Queen Charlotte was not ashamed of the infested Buckingham Palace. Throughout recorded history, bedbugs have featured in literature, films, poetry and pop culture. The sci-fi musical ‘Bedbugs!!!’ had a successful run Off-Broadway in 2014. The musical comedy amplified extreme fear leading to paranoia about bedbugs becoming immune to almost all forms of insecticide. In the musical, a mad scientist, Carly mutates New York City’s bedbug population with her super-insecticide to take revenge of her mother’s bedbug-related death. Through the natural history lens, Reinhardt explores how bedbugs became ‘the other’, to represent personal animosity by creating parasitological villains.

The book provides multiple perspectives on an insect that causes more mental despair than any other human parasite, and yet has interesting aspects that call for tolerance towards it. For a species to be all-pervasive, it must have a distinct genetic make-up and a curious sex life. Bedbugs are indeed unique on both aspects. With 14,000 identified genes in the adult bedbug to 36,000 genes for the entire species, researchers are now looking at its genome that can help in the design of pesticides to get rid of these blood suckers. It is still early to suggest if such a possibility has been worked out to any degree of certainty. However, genetic research can indeed help in identifying genes that are associated with blood-sucking, or digestion, or their mating habits.

When it comes to the battle of the sexes, male bedbugs are clear winners as they stab knife-like copulatory organs through the skin into the body of the females. How do females survive such traumatic insemination? and contribute to building multiple progenies? Have female bedbugs invented a set of extra genitalia to cope with traumatic mating? Reinhardt sets aside such bizarre exaggeration to provide a set of possible strategies that female bedbugs may have developed.

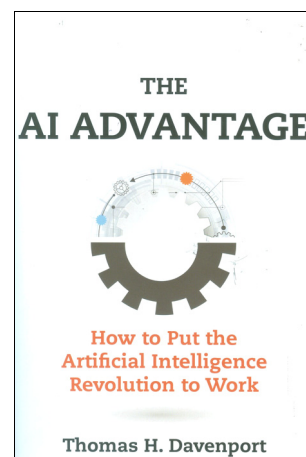
What makes this book insightfully interesting is the manner in which scientific research has been viewed keeping in mind the journey of this insect through history, literature and culture. We may not want to be soft on bedbugs, but the fact of the matter is that it costs more

than it is actually worth. This has led to resistant bedbugs. According to Reinhardt, there is a lot to learn about this profoundly misunderstood insect. The bizarre mating habits of bedbugs have recently led to the development of a homeopathic remedy to cure ovarian pain. It is well known that the flatness of bedbugs had helped Einstein unravel the presence of infinity.

The essential message from this book relates to institutionalization of the fear of bedbugs in identifying other vermin in society from the aim of decimating them. Reinhardt hopes that pest and vermin metaphors will not be used to invite thoughts of social segregation and eradication – like the annihilation of Jews in Germany and the Tutsi genocide in Rwanda. This book informs and entertains, suggesting tolerance as a means of controlling the bug.

SUDHIRENDAR SHARMA

7 Triveni, A6 Paschim Vihar,
New Delhi 110 063, India
e-mail: sudhirendarsharma@gmail.com



The AI Advantage: How to Put the Artificial Intelligence Revolution to Work. Thomas H. Davenport. The MIT Press, Massachusetts Institute of Technology, Cambridge, Massachusetts 02142, 2018. x + 231 pages. Price: US\$ 19.95/£14.99.

AI depends on mathematics, algorithms, computers. Knowledge creation depends on making conjectures and refutations and serendipity. Human intelligence is

neither ultimate nor absolute. *Homo sapiens* are not the ultimate manifestation of the genus Homo. *Homo sapiens* are still evolving and are likely to speciate into a more powerful life form in the future. The best of human knowledge is captured in human designed axiomatic systems. These systems are not perfect as we learn from Gödel Incompleteness Theorem, Turing's halting theorem and Chaitin's Algorithmic Information Theory. All future AI systems will need to account for these and many more yet undiscovered aspects of human intelligence derived knowledge. These aspects are not touched upon Thomas Davenport's *The AI Advantage*. This is not a criticism of the book because Davenport has sought to address a very different, down-to-earth audience of business entrepreneurs who are unlikely to possess deep knowledge of the functioning of the human brain, its intellectual abilities (and disabilities), its innovative ability to create artificial intelligence, etc. What AI does today, even half-century ago would have appeared superhuman and miraculous. Then, intelligent activity was assumed to be unmechanizable and therefore not a threat to 'intelligent' humans. It all changed when IBM's Watson beat human experts in the TV game Jeopardy in 2011 and Google's AlphaGo beat world champions in the game Go in 2017.

Davenport addresses a very down-to-earth and a very large business community which has begun to feel the heat and threat of advancing AI. It feels an urgent need to do something quickly, within budget, and within its grasping ability to align its current businesses into an AI-compatible state while maintaining business continuity and adapting to and managing the necessary transformations to survive in the future. Some of those transformations will be radical compared to their present business scope, style, content, and culture. Davenport's views, advice, tips, anecdotes, etc. for them is timely and commendable. It should be read before inserting AI into an existing business or embarking on a start-up. The book is aptly subtitled: *How to Put the Artificial Intelligence Revolution to Work*. Revolutions bring about a sea change. Failure to adapt to and manage change leads to disastrous consequences. Some short-term, band-aid rules can usually be found so that one lives long enough to fight another day. Davenport

provides such rules for the business community.

His key recommendation is don't go for the 'moonshot' (the cutting edge of AI that inter alia requires heavy R&D budget, a world-class talent pool, and an appetite for risk taking) but go for the 'low-hanging fruit' that can improve business efficiency, get existing employee pool to reskill by tapping their unused latent talent so that AI technologies being introduced at the workplace don't replace human workers but augment their skills (i.e. get smart people to work alongside smart machines). Indeed, any structured and repetitive work should be targeted in this manner. An obvious and must do first step example is engagement with employees and customers via chatbots and intelligent agents whose content smart employees can help create so that they can be more effective by being seamlessly informed by an AI system while dealing with critical human-to-human interactions across a wide range of business activities, e.g. customer relations, sales, operations, corporate IT, supply chains, product development, manufacturing, etc.

The book is very readable. Within 200 pages and 8 topically divided chapters, Davenport takes the reader through a comprehensible tour of what AI has to offer in terms of potential and presently implementable technologies. This is the real contribution of the book. It presents a reader with a 'business-to-run' doable and affordable AI knowledge that allows him to assess his business situation and select from a list of available technology options, with a sense of being in some control of the situation while doing so. As an aside, he talks about the current extreme revolutionary end of AI technology that IBM, Google, Facebook, Amazon, etc. are engaged in but which technology is out of reach for most intended readers of the book. He talks about the hope and the hype of AI to prevent the reader from floating into fantasy land.

The book's main content is down-to-earth material meant to help the reader

(1) *become familiar with available AI technologies* (statistical machine learning, neural networks, deep learning, natural language processing, expert systems, physical robots, and robotic process automation) and their respective functionalities (training and fitting models to data, neuronal weighing of inputs, han-

dling of multiple layers of variables and features, interpreting human speech and text, extracting logical rules from human experts, automation of physical activity, and automation of structured digital tasks);

(2) *understand the business capabilities of AI* (process automation, cognitive insight, and cognitive engagement) and where they can, respectively, be brought into action (automation of structured and repetitive processes, machine learning applications dealing with structured data, and machine learning, chatbots and intelligent agents for interaction with customers and employees);

(3) *focus on business strategy* (what to make or sell; design and evolve specific strategies for manufacture and marketing, the need to AI-align decision making, the need to innovate and hence hire and retain talent, acquire or partner with startups);

(4) *strike a balance between large-scale automation that retrenches employees and augmentation of human talent that does not but favors innovation and flexibility* (this is tricky as it needs one to identify highly structured information and information flow which can be extensively automated, and preferably augment the performance of high performing humans to become more productive and innovative. Many companies are likely to flounder at this stage); and

(5) *deal with issues related to ethical and social implications of AI* (it has unforeseen and unintended consequences, especially when seeking a judicious balance between opportunity, responsibility, and survivability).

At present, many existing businesses ardently want to absorb whatever AI technologies they can. Davenport gives them the pros and cons of 'build or buy', of replacing human workers or augmenting their capabilities with AI, etc. Startups naturally start a step ahead by aligning themselves with AI tools and services they deem necessary at inception. Davenport brings awareness about the nature of the AI revolution to the business community; he does not provide recipes which business leaders can readily use to turn their businesses around but lets them know what is available, how to procure them, and suggests how to mix and match available technologies with business needs. He augments his narrative with anecdotal evidence, often based on AI surveys conducted by Deloitte,

McKinsey, Gartner, and Teradata of how people perceive AI and go about dealing with the AI revolution, ranging from the mightiest corporations to more humbler business entities and the kind of successes and failures they have had. The reader thus benefits from being forewarned and forearmed. For agile and thinking business leaders, this tactical advantage can be crucial for their survival in the present. Success is more likely when disruptions are small, manageable and critical to the business.

However, given the current rapid advances in AI, the real unknown challenge all businesses face is how soon their

present investment in AI technology will become obsolete and what happens then. Davenport wisely does not get into this except to speculate because nobody knows. Startups have a slight advantage because they strive to innovate, and a few among them with varying degree of success may climb the risky ladder of success. But that is about all we can say. The unfolding AI revolution is already mingling and integrating with quantum computing and genetic engineering which raises the possibility that in the process the *Homo sapiens* may eventually be wiped out, not because of AI-induced unemployment but because of AI

assisted and induced speciation of the *Homo sapiens*. Darwin's theory of the survival of the fittest will then proceed to wipe us out just as all previous species of the genus *Homo* have been. How the new species will evolve, how soon it will evolve, what it will consider as intelligence, and how it will organize itself into communities is something we can only guess.

RAJENDRA K. BERA

*Acadinnet Education Services India
Private Limited,
Bengaluru, India
e-mail: rajendrabera@yahoo.com*

CURRENT SCIENCE

Display Advertisement Rates

India		Tariff (Rupees)*						
Size	No. of insertions	Inside pages		Inside cover pages		Back cover pages		
		B&W	Colour	B&W	Colour	B&W	Colour	
Full page (H = 23 cm; W = 17.5 cm)	1	18,000	30,000	25,000	40,000	35,000	45,000	
	2	33,000	55,000	47,000	76,000	65,000	86,000	
	4	62,000	1,05,000	92,000	1,46,000	1,25,000	1,65,000	
	6	90,000	1,50,000	1,25,000	2,00,000	1,75,000	2,25,000	
	8	1,10,000	1,87,000	1,68,000	2,65,000	2,30,000	3,00,000	
	10	1,35,000	2,25,000	1,98,000	3,15,000	2,70,000	3,60,000	
	12	1,80,000	3,00,000	2,50,000	4,00,000	3,50,000	4,50,000	
Half page (H = 11 cm; W = 17.5 cm)	1	10,000	18,000	Quarter page (H = 11 cm; W = 8 cm)	No. of insertions	Inside pages		
	2	19,000	33,000			B&W	Colour	
	4	35,000	62,000					1
	6	50,000	90,000			6	30,000	60,000
	8	60,000	1,10,000			12	60,000	1,20,000
	10	72,000	1,35,000					
	12	1,00,000	1,80,000					
Other Countries		Tariff (US \$)*						
Size	No. of insertions	Inside pages		Inside cover pages		Back cover pages		
		B&W	Colour	B&W	Colour	B&W	Colour	
Full page (H = 23 cm; W = 17.5 cm)	1	300	650	450	750	600	1000	
	6	1500	3000	2250	3500	3000	5000	
Half page (H = 11 cm; W = 17.5 cm)	1	200	325					
	6	1000	2000					

*25% rebate for Institutional members

Note: For payments towards the advertisement charges, Cheque (at par/multicity) or Demand Drafts may be drawn in favour of 'Current Science Association, Bengaluru'.

Contact us: Current Science Association, C.V. Raman Avenue, P.B. No. 8001, Bengaluru 560 080 or e-mail: csc@ias.ac.in

Last date for receiving advertising material: Ten days before the scheduled date of publication.

[The jurisdiction for all disputes concerning submitted articles, published material, advertisement, subscription and sale will be at courts/tribunals situated in Bengaluru city only.]