

in far more economic gains than losses, and fewer fatalities, than during other years because of the reduced number and intensity of landfalling Atlantic hurricanes and the record winter warmth in the Midwest.

Perhaps the book's most important message is that: "The solutions to serious environmental problems will elude us unless we are all aware of, and respect, the profound differences between the world of science and human affairs." This harks back to

C. P. Snow's lectures on the 'two cultures' but with a twist: whereas Snow viewed science and technology as a panacea for solving the world's great social problems, Philander recognizes that science and technology are only part of the solution. Effective use of scientific information to benefit society must also reckon with prevailing cultural values and political imperatives.

Our Affair with El Niño is a very readable, entertaining and instructive book that will

appeal to scientists and non-scientists alike. The author does not shy away from controversy in expressing his opinions about the sociological and political aspects of climate research. Whether or not you share his opinions, Philander unquestionably excels at describing the physics of the ocean, the atmosphere and El Niño in lucid terms. ■

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A helping hand

Hearing Gesture: How our Hands Help us Think

by Susan Goldin-Meadow

Belknap Press: 2003. 304 pp. \$29.95, £19.95, €27.70

Eve Sweetser

Over the past two decades, researchers have produced overwhelming evidence that the gestures we use as we speak are integrally connected to both our speech and our thought processes. Susan Goldin-Meadow has been at the forefront of this new scientific direction. In *Hearing Gesture*, she provides a synthesis of her decades of work on gesture studies. It is a welcome scholarly arrival for gesture researchers, and should be important news to social and cognitive scientists, who so far have paid little attention to the gestures that accompany speech.

Hearing Gesture is an engaging (even suspenseful) read and, with its clear and informal style, should be largely accessible to non-experts. It centres around four primary questions. First, is gesture really a window on thought? If it is, do most people (as opposed to just researchers) read gesture? Does gesture also help the speaker's own cognitive processes — and if so, how? And finally, what are the differences between the gestures that accompany speech and visual gestures used on their own? Goldin-Meadow examines these questions — her answer to the first three is 'yes', by the way — in the lab and in everyday settings such as the classroom. In so doing, she looks at the communication of infants, children and adults, including sighted and blind, deaf and hearing, and normal and cognitively impaired subjects.

Goldin-Meadow has pioneered ways of studying gesture, one of her signature methods being the comparison of 'matched' gestures, which overlap in meaning with the accompanying speech, and 'mismatched' gestures, which either complement or conflict with the linguistic meaning. With Breckie Church she observed children explaining their answers to piagetian conservation tasks (conservation of mass, number or volume when physical appearance is altered). Some children produce mismatched gesture-



Handy hints: gestures provide information that can make it easier to understand speech — or even replace it entirely.

speech pairings. For example, they say that a tall, thin container has a large volume "because it's taller", but simultaneously make a gesture indicating width; this shows awareness that the container's width, as well as its height, is relevant to the quantity of water it holds. These children, it turns out, are the ones who are most ready to learn about conservation, either by instruction or experimentation (*Cognition* 23, 43–71; 1987).

The contrast between matches and mismatches turns out to be a remarkable tool. Goldin-Meadow's later studies show that matched gestures lower the cognitive load on the speaker and speed the listener's comprehension, whereas mismatched gestures raise the load on both sides of communication, which makes sense because they bring in another cognitive model besides that presented in speech. However, Goldin-Meadow argues that mismatches are advantageous in other ways. Because hearers do 'read' gestures and process the information expressed (as also shown in earlier work by David McNeill and Adam Kendon), mismatched gestures not only allow speakers to express models that are inaccessible to speech but also give listeners access to those models, with the added advantage of providing potential feedback to speakers.

The use of the term 'mismatch' presents difficulties from time to time — it is regrettably not always clear which kind (comple-

mentary or conflicting) is most relevant in a given study. The author remarks that gestures rarely correspond precisely with words in meaning. Taken to its logical conclusion, this should mean that complementary mismatches, like matches but not like conflicting mismatches, show overlap between gestural and linguistic meaning — the boundary between matches and mismatches is perhaps presented as more tidy than it really is. However, there is careful differentiation in some crucial cases, such as the examination of cognitive load, and Goldin-Meadow comments that apparently conflicting mismatches often reflect different aspects of a potentially unified larger cognitive framework.

Another strand of Goldin-Meadow's work has been the examination of purely gestural communication, including that of deaf children with hearing parents. She compares their individual gestural systems with conventional signed languages and with hearing gesture that has taken over the communicative load. This provides rich evidence from several domains for McNeill's claims that gesture becomes 'language-like' when it takes on the primary informational load of communication. Gesture becomes conventionalized, segmented and even 'grammaticized' — the gestural systems of orally raised deaf children have a basic grammatical structure.

I have touched on only a few of Goldin-

Meadow's projects and methodologies. Readers will be impressed by her extraordinary combination of thoughtful insight, experimental ingenuity and immense persistence and dedication to the search for knowledge. She and her co-workers are currently researching such applied issues as the need to interpret children's gestures alongside speech in legal and psychiatric questioning, and also the degree to which adult questioners' gestures influence children's output.

Fully recognizing the vast unknown areas awaiting gesture researchers' attention, Goldin-Meadow presents multiple viewpoints where there is disagreement, in the examination of signed language gesture, for example, or the connection between gesture and lexical access. And she continues to push the boundaries of her field, raising new questions alongside the ones she answers.

Hearing Gesture stands beside McNeill's *Hand and Mind* (University of Chicago Press, 1992) and *Language and Gesture* (Cambridge University Press, 2000) as a milestone in the study of gesture's relationship with language and thought. It may help to reshape the basic premises and methods of psychologists, linguists and other social scientists. ■
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Bedside stories

The Body in the Library: A Literary History of Modern Medicine

edited by Iain Bamforth
Verso: 2003. 418 pp. £16, \$25

John Carmody

Ever since C. P. Snow's *ex cathedra* declaration of the constraining existence of two cultures — the unbridgeable separation of the sciences and the humanities — scientists have been forced on to the defensive. It rarely seems to matter greatly that 'liberal' and 'literate' people know little of science. And it rarely seems to be appreciated how creative and profound science can be — or how torpid and turgid many humanities texts are.

Medicine should stride both of Snow's cultures, binding them with imagination and the truest humanity. At its best it can do this: in the divine hierarchy of classical Greece, Apollo was a god of both medicine and music. Iain Bamforth is a medical doctor as well as an essayist and poet, and his new anthology, *The Body in the Library* — despite a title that suggests crime and malfeasance — is a superb reminder that the creativity of physicians flows beautifully beyond the consulting room or laboratory. Not all of the authors in his "history of medicine as told through literature" are doctors or medical scientists,

Exhibition

Living with luminescence

Frazzled by the frenetic lifestyle of the future? No problem, a luxury lounge bathed in soft, calming bioluminescence will soothe your worries away. That's the art concept created by Sydney-based microbiologist Kathy Takayama and artist John Nicholson, who unveiled their exhibit — entitled *LuxCorp* — at the Canberra Contemporary Art Space on 14 May.

With their prototype light-emitting furniture (right), they present a vision of a future in which human-bacterial interactions are taken to a new dimension. The light emitted is a simulation of the bioluminescent by-product of bacterial communication. The exhibit is part of *Metis*, the



Australian festival of art meets science, and runs until 18 June.
Carina Dennis

but I found the pieces that were written from the inside to be telling and touching.

Bamforth has confined his selection to material that was "produced after the event which turned medicine into a public utility — the French Revolution". Although the "modern medicine" mentioned comes from the nineteenth and twentieth centuries, Bamforth does seem to share my view that modern medicine really began in 1543 with the publication of the great anatomical text *De humani corporis fabrica* by Andreas Vesalius. More important, though, is the scope of Bamforth's trawl, which has gathered together some lovely work that would normally escape the attention of anglophone readers (or any who are monolingual). If I note a lacuna, it is a lack of direct, rather than narrative, writing about medical science: surely a Nobel prize address or two would have been worthy of our attention?

After an exhilarating and provocative introduction, and a debatable beginning with Dickens, this collection plunges us into a banquet of many delights. One of the earliest (from 1812) is an urgently written letter by Fanny Burney, recounting a dreadful operation. This is matched by the wonderfully ironic *The Cure* from 1810 by Johann Peter Hebel, and we are then brought abruptly to earth by the episode of the botched Talipes (club-foot) operation in *Madame Bovary*. The worldly wise Lytton Strachey shows us Florence Nightingale in her great days in the Crimea: it is chastening to be reminded of the old (but enduring) strife between doctors and nurses. Léon Daudet reverses that mirror to show us the *mélange* of the magnificent and the malicious in the nineteenth-century neurologist Jean Martin Charcot, putting me edgily in mind of one of my own pedantic and francophile clinical professors.

Not everything here is a success, though. There is a wooden-headed piece by G. K. Chesterton, a rather pointless letter by Anton Chekhov, some self-importance (*Illness*) from Virginia Woolf and vacuity from Alain, the pseudonym of philosopher Emile-Auguste

Chartier. Set against those stumbles are a surreal story by Franz Kafka, its tone utterly unexpected from its bland title, *A Country Doctor*; a chilling medical-social narrative commentary by William Carlos Williams (*Jean Beicke*), the droll *My Double* by Alfred Döblin and the dazzlingly cynical *Oedipus in Danger* by Robert Musil.

In *Irrationalism and Modern Medicine*, Gottfried Benn coolly and prophetically asks about the point of extending an unexamined and spiritless life. This, surely, is a daily question for contemporary medicine, but when we do die — no matter how long we delay that fatal event — is it important to do it "well"? Can we achieve that, and does it matter? After reading George Orwell's *How the Poor Die* we have to wonder about the manner of our death as a reflection or an inevitability of our life. Like Dezső Kosztolányi's *The Stranger*, Orwell's dispiriting story should refocus the physician's mind on to the challenge of thinking of the patient as a brother. For all his empathic fame, R. D. Laing's *Clinical Vignettes* made little impression on me and certainly did not achieve a comparable insight, in marked contrast to the honest human bewilderment of the extracts from Miguel Torga's *Diary*.

The episode that I treasure most in this inspiring and yet unsettling anthology is *Heart Suture* by Ernst Weiss. With the deftness of an accomplished surgeon, it whips us from the set-piece detachment of classical 'grand rounds' to an emotional wrench when a young anaesthetist realizes that the God-Professor's emergency patient is his former lover. The professional and the personal are balanced with admirable finesse, with a cogent resonance for the reader of bitter experience or the relief of a "There but for the grace of God..."

I am left, then, with an aphorism (which Bamforth quotes): "Perhaps one day we will realize there was no art but only Medicine." ■
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