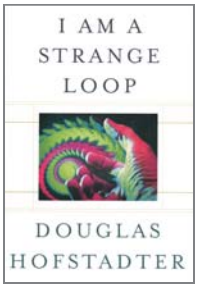
grained reality. In vivid imagery, Hofstadter describes such high-level brain activity as a dance of symbols. According to him, the essential feature of humans, as opposed to animals, is that this representational system is universal in the sense that any pattern can be simulated by the brain, including the "dance of symbols" itself. He sees a perfect analogy with Gödel's strange loop. However, that mathematical loop closes because the highest-level formulation reflects on the lowest level; but in the human brain, the highest level reflects on itself. Ironically, in scientific papers on neurons, the highest level, the dance of symbols does reflect on the lower one, the neuron itself—but such papers neither explain nor give rise to consciousness.



Hofstadter continues his analysis by claiming that the "I" conceived as a strange loop is actually a "hallucination hallucinated by a hallucination" (page 293). His claim hinges on the fact that the dance of symbols, and hence its self-reference, is a collective effect (philosophically an epiphenomenon, like temperature) that evaporates down at the neuronal level. In a similar vein, the high-level world of classical physics could be said to be a mirage created by the underlying low-level world of quantum physics. But it is hard to see what one gains by regarding epiphenomena as illusory. In any case, with that stance Hofstadter especially challenges Cartesian and modern dualism, and he insists on a monistic, purely physical description of consciousness.

The genre of the book is philosophy of mind. There is not a single reference to a serious laboratory experiment, and Hofstadter even claims that the physical structure of the brain is as irrelevant in the explanation of consciousness as the chemical composition of molecules in the air would be to the sensation of music. He thus makes no effort whatsoever to show how the brain is able to sustain his strange loop; he even blames neurobiologists for looking for the "I" at the wrong level.

Hofstadter's approach seems to turn vice into virtue. I regard the purely philosophical nature of the book, which is entirely based on analogies and metaphors, as a serious weakness. Also, apart from a sneer here and there to his intellectual antagonists and occasional praise of kindred points of view from other scholars, the author makes almost no attempt to relate the arguments to the pertinent literature. Admittedly, although Roger Penrose's book about consciousness, *Shadows of the Mind* (Vintage, 1995), also heavily relies on Gödel's work, it hardly overlaps with *I Am a Strange Loop*. But much more could have been said in Hofstadter's book in terms of relating his own ideas to others involved in mainstream philosophy of mind. Nonetheless, *I Am a Strange Loop* contains many profound and unique insights on the question of who we are. In addition, it is a delightful read.

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New Superconductors

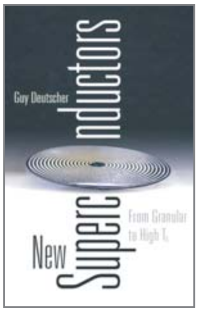
From Granular to High T_c

Guy Deutscher
World Scientific, Hackensack, NJ, 2006. $52.00 (222 pp.).
ISBN 978-981-02-3089-0

Superconductivity, a spectacular phenomenon known since 1911, has too many strands to be covered in any one book. This is especially true since the groundbreaking 1986 discovery by J. Georg Bednorz and K. Alexander Müller of high-T_c superconductivity in a novel class of oxides. The challenge of understanding the physical mechanism for high-T_c and recognizing the significant opportunities for technological applications of high-T_c materials has, however, prompted an audience willing to forgo comprehensive treatments for useful insights and alternative approaches. Those readers should be served well by Guy Deutscher's *New Superconductors: From Granular to High* T_c.

Deutscher correctly recognizes that high-T_c superconductivity can best be understood when compared against the backdrop of conventional superconductivity, as described by the Bardeen-Cooper-Schrieffer (BCS) theory. The book is thus launched with a discussion of the Landau criterion for the critical velocity of a superfluid. The discussion evolves into a clearly articulated comparison of the two modes of pair condensation: BCS, which takes place in conventional superconductors, versus Bose–Einstein (BE), which possibly occurs in the underdoped regime of the high-T_c superconductors.

Throughout the book Deutscher effectively uses the distinctions between BCS and BE condensation to highlight the link, anticipated by the book's title, between granular and high-T_c superconductivity. In the granular variety, regions of superconductivity in a material are spatially separated from one another. Deutscher, a professor in the school of physics and astronomy at Tel Aviv University in Israel, is eminently qualified to make the connection. He has had a productive research career focused on granular superconductivity and, more recently, on the high-T_c cuprates. Deutscher's presentation of the similarities and differences implied by the subtitle is set out in the first half of the book and is persuasive for readers who carefully follow the text. For example, the separation of temperature scales describing the respective onsets of intra- and inter-grain superconductivity is argued to be analogous to the high-T_c behavior in which pairs form at a higher temperature and then condense at a lower temperature.



In another example, small coherence volumes in high-T_c superconductors are compared to small grains in low-T_c superconductors; both dramatically enhance the effects of fluctuations, which are then linked to the phase diagrams of granular and high-T_c materials. Tuning the respective control parameters—intergrain coupling and carrier doping—to drive each system from a metal toward an insulating state leads to increased T_c in both systems. A compact treatment of Coulomb screening offers possible reasons for the increase in T_c and thereby sets the stage for a later, more detailed chapter on high-T_c mechanisms that rely, paradoxically, on enhanced Coulomb interactions. The chapter's message is double-loaded, convincing, and instructional.

The second part of the book explores in more detail the unique properties of the cuprates, such as structure, doping, transport, enhanced density of states, pseudogaps, and gap symmetry. Standalone chapters on the basics of vortices and vortex-lattice melting facilitate a smooth transition to the final two chapters. Those two chapters address the connection between fundamentals and applications and conclude with a rather detailed discussion of the relative advantages of magnet wires and tapes made of yttrium-barium-copper-oxide (YBCO) and the more two-dimensional bismuthates. The discussion on applications provides an opportunity for the author to speculate on how further fundamental understanding might increase the scope and impact of future applications. Graduate students and experts alike will benefit from the author's insights into fundamental questions addressing the limits of high T_c, the nature of unconventional pairing, the limits to critical currents, the relevance of a BCS to BE crossover, and the problems and opportunities associated with short coherence lengths. A particularly interesting conjecture on the relationship of inhomogeneous clusters of hole-rich regions to a high-T_c mechanism returns appropriately to the recurrent theme of connecting granular and high-T_c behavior.

Unfortunately, poor editing is a major blemish on Deutscher's book. Critical figures—for example, figure 1.2—are mislabeled, figure captions are sometimes irrelevant and misleading, equations are mistyped and incorrectly referenced in the text, and grammar errors give the impression that copyediting was bypassed. Nevertheless, readers of *New Superconductors* will benefit from the unusual and compelling insights of a researcher who has thought deeply about both granular and high-T_c superconductors. I recommend it as a self-study guide for students, instructors, and researchers who are looking for understandable and crisp material on the potential and promise of high-T_c superconductors.

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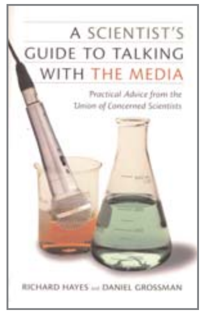
A Scientist's Guide to Talking with the Media

Practical Advice from the Union of Concerned Scientists

Richard Hayes and Daniel Grossman
Rutgers U. Press, New Brunswick, NJ, 2006. $60.00, $18.95 paper (200 pp.). ISBN 978-0-8135-3857-0, ISBN 978-0-8135-3858-7 paper

Last May NASA administrator Michael Griffin, a brilliant engineer who holds seven degrees, made the elementary mistake of replying to a radio interviewer's question by sharing thoughts that apparently just popped into his head. In short order, Griffin's comment on global warming was disavowed by the White House. Soon after, NASA issued a "clarification."

Griffin's faux pas is a classic example of what happens when an expert fails to heed the most important recommendation that authors Richard Hayes and Daniel Grossman offer in *A Scientist's Guide to Talking with the Media: Practical Advice from the Union of Concerned Scientists*: Respond live to an interviewer's questions with previously prepared answers. If you don't have a rehearsed answer for a particular question, reply with the rehearsed answer to a question that wasn't actually posed. Watch television talk shows. That practice is the modus operandi of every experienced politician and advocacy-group representative. And it will serve equally well the scientist who is briefly in the limelight.



Hayes, the deputy director of communications at the Union of Concerned Scientists in Washington, DC, and Grossman, a science journalist and educator, offer a fine introduction to the news media and give pointers on how scientists can interact effectively with them. The book is exceptional in its wide variety of comments, suggestions, and anecdotes from working scientists, not just from journalists and publicists. We scientists who have interacted with the media have our own favorite stories. Mine are from decades of media planning at NASA and at the American Astronomical Society. One involves a press conference rehearsal in Huntsville, Alabama. At the actual briefing, some reporters would be on hand while others would participate via satellite link. During rehearsal, a distinguished panelist faced the cameras when responding to questions from NASA staff impersonating reporters in the room. But he then turned and spoke over his shoulder toward a ceiling-mounted loudspeaker to respond to the simulated voice of a remotely located questioner. Further media training was in order.

On another occasion, a session chair prefaced the introduction of an invited speaker at an AAS meeting by revealing that the guest would be withdrawing his own discovery, which had just been published with great fanfare. He asked that reporters hear the expert out first before spreading the news. Almost immediately a man, crouching so as not to be too conspicuous, ran up the aisle and out of the hall. He was an ace reporter for the Associated Press, racing to the phone.

The authors have more in mind than explaining how to behave when the *Washington Post* calls. They encourage scientists to develop themselves as