For the human sciences to develop, an average person will have to become knowledgeable about the human sciences."

Here, surely, we have a *reductio ad absurdum* of the author's rather grandiose view of the human sciences. For him, the answer to cultural relativism is to overcome the pluralism of different points of view and to look to the whole. But there is no reason to think that here — any more than elsewhere — looking at the same thing requires that it be looked at in the same way. There is good reason to think that, while we can settle matters of detail in the human sciences, it lies in the nature of things that consensus on most of the big questions is bound to elude us.

Mazlish's book is impressively learned and wide ranging in its information. It also offers many instructive observations and interesting insights. Nevertheless, it seems to be methodologically flawed, so that it fails to realize its goal of clarifying the sort of knowledge human sciences provide. □

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# Non-sectarian structure

**The Structure of Materials**
by Samuel L. Allen and Edwin L. Thomas
*Wiley: 1999. 447 pp. £32.50*

**Richard A. L. Jones**

The strength of materials science arises from the way it crosses the boundaries between chemistry, physics and engineering. But if it has a weakness, it is a tendency to a tribalism based on classes of materials. Metals, ceramics and polymers at first sight look very different, and they are processed and used in very different ways. But the physical and chemical principles underlying their structure and behaviour are the same, even if an equation will often appear in two different guises as applied to, say, metals and polymers. So it is refreshing to see a textbook, written by a metallurgist and a polymer physicist, which sets out to discuss the structure of materials in an explicitly non-sectarian way.

In the past, a book on the structure of materials would have been dominated by crystallography. The treatment here is certainly quite complete, occupying a long, central chapter, but this book places an unusual strength of emphasis on other ways of describing structure. The emphasis on crystallography in materials science has in the past reflected the importance of materials that are fully crystalline, usually metals and ceramics. But important classes of materials are only partially crystalline, like some polymers, while others — liquid crystals and glasses — are not crystalline at all. Structure in these materials must be described in other ways. For glasses we need pair-distribution functions, for liquid crystals the classification of mesophases and orientational order parameters, while for some disordered materials — soot, for example — the language of fractal geometry may be appropriate. These other types of description should also take their place in a textbook of materials structure. The result may be less appealing to tidy minds than a focus on pure crystallography, as these other descriptors vary greatly in their completeness and precision. But this is a fair reflection of the complexity of materials. After all, even in crystals, departures from perfect crystallinity, in the form of dislocations and point defects, can dominate properties, and it is quite right that this book takes almost as much space to discuss such defects as it devotes to the perfect crystal.

Where the book does follow materials science convention is in a rigid separation between the structure of materials and their dynamics. This is mostly for the best, but the separation does lead to some uncomfortable moments. For example, the distinction between a liquid and a glass is fundamentally one of dynamics rather than structure, though the authors attempt to make a structural distinction through the rather tricky notion of "free volume". By the final chapter, the distinction between structure and dynamics starts to blur; here an excellent discussion of structures on a hierarchy of lengthscales takes examples from polymers, composites and metals. Necessarily, this treatment must begin to discuss the kinetics of the phase changes that lead to these non-equilibrium states.

This is an attractive, and brief, book, which describes the structure of matter without artificial distinctions between different classes of materials. The point is made unobtrusively but nicely in the cover design. This shows two images, one a perfectly periodic array, which one might take to be a high-resolution lattice image of a crystal, and the other an attractive random pattern that a casual glance might mistake for an optical micrograph of a liquid crystal. Actually, the periodic pattern is a block-copolymer mesophase and the random pattern is an alloy defect texture. A textbook should bring out what different classes of materials have in common as well as identifying their differences; this book does that very well. □

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**Also**
**Polymers at Surfaces and Interfaces**
by Richard A. L. Jones & Randal W. Richards
*Cambridge University Press, £29.95 (pbk)*

## Keeping it under wraps

**It took the artists Christo and Jean-Claude 24 years to develop the "Wrapped Reichstag" project (shown above). Mountaineers worked to cover Berlin's Reichstag with 100,000 square metres of silvery polypropylene secured with 15,600 metres of blue rope. It was finished in June 1995 and dismantled two weeks later. Christo rubs shoulders with fashion designers, textile artists, electroacoustic clothing and more in *Techno Textiles: Revolutionary Fabrics for Fashion and Design* by Sarah E. Braddock and Marie O'Mahony (Thames & Hudson, £16.95).**