

Ausstellungen als Instrument der Wissensvermittlung

Exhibitions as a tool for transmitting knowledge

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Exhibitions of Science and Design Futures

Edinburgh, the city where I live and work, is home to the world's largest International Science Festival. Although smaller, and rather more local than the city's more established festivals, the aim of this two-week series of exhibitions, public lectures and interactive children's workshops is universal: "to inspire young people with a passion for science".¹ For this reason, my local Science Festival provides as good a starting point as any for asking why science expositions and exhibitions seem to have failed

I should say at once that this is not the view of the International Science Festival's sponsors, from British Nuclear Fuels to Glaxo, who see the Festival as a success. Sponsors are keen to burnish their image before impressionable young minds. My own institution, Napier University, is Principal Sponsor of the Festival and, naturally, we too promote ourselves. If we can inspire today's young people with a passion for science, we are in a good position to recruit tomorrow's science students. The puzzle is that Napier University is Principal Sponsor of an International Science Festival when, two years ago, it closed down its Faculty of Science, merging Biology with Nursing, and closing former departments of Maths, Physics and Chemistry.

This puzzle draws me into a deeper paradox. Crudely put, the paradox is that despite the apparent success of science festivals and expos, the promotion of science in the media (such as the *Discovery Channel*) or through university professorships in the Public Understanding of Science, despite the burgeoning number of national science museums, provincial discovery centres and science

adventure parks, and despite the extraordinarily innovative design and interactive displays assembled for these exhibitions –despite all this promotion over the past two decades, public attitude towards science have taken an seriously negative turn.

This is the underlying reason why my university closed its Science Faculty. British universities have seen a dramatic decline in their ‘customer base’ for science subjects. Closing a whole Faculty may seem an extreme reaction, but there have been wholesale closures of university science departments across the UK during the past few years, as well as the closure of key government laboratories. Less and less young people have been inspired with a passion to pursue science, whether at school, or university, or as a career.

Of course, paradoxical attitudes towards science are nothing new. Forty years ago, during the arms build-up that led to the Cuban Missile Crisis, the historian E.H. Carr closed his Cambridge Lectures with the “paradox that rarely has so much superficial talk been heard of the [scientific] changes going on around us. But the significant thing is that change is no longer thought of as achievement, as opportunity, as progress, but as an object of *fear*.”² Some years earlier CP. Snow’s famous *Two Cultures* lectures (*Cambridge Lectures*, 1959) had focused on the depth of scientific illiteracy in Britain. And over a century and a half ago Charles Babbage, grandfather of the computer, felt moved to publish his *Reflections on the Decline of Science in England*, which opens with the disclaimer: “that science has long been neglected and is declining in England, is not an opinion originating with me, but is shared by many.”³

However, the public’s attitude to science today is not just one of fear, or even ignorance, but also one of scorn and cynicism. The crisis was anticipated a decade ago in studies such as *British Science in Crisis* that reflected uniformly pessimistic views among scientists themselves, and negative attitudes to science among the public, government, business, the financial sector, and the media.⁴ More recently, pressure groups like Save British Science, professional bodies such as the Royal Society, and Government reports have each compiled yet more damning evidence of

our negative attitudes towards science.⁵ Such evidence is strikingly at odds with the confidence of sponsors, organisers and designers of science festivals and exhibitions that they are successfully ‘inspiring young people with a passion for science’.

If we took claims for the success of science exhibits over the past fifteen years at face value, then the present generation of 5 to 20 year-olds, brought up on a diet of well-designed, colourful, fun-filled, spectacular exhibits and dazzling interactive displays, should now be *over*-motivated towards science. They are not, and neither are their teachers. More than two thirds of all British children up to school leaving age are now learn physics from teachers with no physics qualifications. Into this vacuum have seeped eccentric ideas. One prominent media story of the moment is the paradox of a successful technology School, Emmanuel College in Gateshead, which teaches Biblical Creationism as part of Science lessons. Further up the educational system, applications to university departments of physics have fallen by two thirds over the past decade to just half of 1% of the total cohort.⁶ Where universities have retained science facilities the picture painted in a report released by the Government’s Office of Science and Technology a few weeks ago, is one of near bankruptcy and crumbling laboratories, with a £4bn backlog in maintenance repairs and under-spend in research equipment.⁷

In the wider world, the current of scientific illiteracy, fear and scepticism towards science runs painfully deep in Britain. Industry, education and government may even have contributed to this mood of scepticism. To return for a moment to the sponsors of my local international Science Festival, how many young people of the *No Logo* generation are likely to be inspired with a passion for nuclear power, after British Nuclear Fuels’ flawed claims about the safety of its plants, or trust that pharmaceutical multinationals work for the benefit of mankind, after Glaxo’s inglorious attempt to block cheap HIV/AIDS drugs to Africa? How many even trust assurances that their mobile phones are safe? Levels of trust in the objectivity of scientists have been undermined by the suspicion that intellectual honesty has been compromised by what George Monbiot has called the ‘sell out’ of university research to corporate industry.⁸ Even Government regulatory bodies, target-setting,

accountability and demands that public values be incorporated into scientific deliberations have further undermined faith in scientific judgement.⁹ As sociologists of 'Risk Culture' such as Anthony Giddens or Ulrich Beck point out, trust is only demanded where there is ignorance –yet ignorance always provides grounds for scepticism.¹⁰ More generally, who now trusts in the capability of technologically advanced nations to manage climate change? Who can trust Government scientists, after a succession of botched food scares, the influence wielded by biotech corporations and the GM food lobby, moral disputes over animal testing and stem cell research, and the débâcle of British science exhibited during the long-running BSE crisis?

These are not rhetorical questions. We know the answers –and to within a few percentage points. Media monitors in both Britain and Germany have tracked styles of newspaper science reporting over the past fifty years, revealing a clear statistical swing away from positive reporting to ambivalent and generally negative journalism.¹¹ For example, Britain experienced 36,861 cases of BSE in 1987; by 1996 the number had fallen to just 1 –yet that was the year of media panic. More recently, at the height of the recent MMR (Measles, Mumps, Rubella) vaccine scare concerning claims of a correlation between the childhood vaccine and a rise in autism, a cross-section of the British public were asked about their response to scientific information. Only 7-% claimed to trust scientists, and just 1-% said they trusted government advice that the claims were 'bad science'.¹²

That just 1-% of the British population trusts government scientific advice is not merely a cultural oddity –it has deadly consequences. Following the MMR media panic many parents refused to inoculate their children –with the result that, for the first time in forty years, Britain witnessed the first outbreaks of fatal children's diseases.

Paradoxical attitudes towards science now take a further twist. In the same poll, 87-% of the public looked to scientists to give 'agreed views' about science issues.

There is misplaced optimism here, as well as profound misconception about scientific method. No wonder many science exhibitions over the past fifteen years, perhaps inspired by La Villette's *Cité des Sciences et de l'Industrie* (1986), felt compelled to present story lines dramatising a positivist link between scientific research and economic well-being, represented in the form of desirable consumer goods. So despite, or perhaps because of these paradoxical attitudes, consumers remain fascinated with micro-electronic gadgetry and digital multimedia.

Back in the Eighties, when the present expansion of science festivals and museums commenced, the exhibitionary aims seemed straightforward. Following the crippling economic recession of the later 1970's, designers were contracted to 'rebrand' science, just as they had successfully rebranded business (which now provided extensive commercial sponsorship for science exhibits), as part of a policy to stimulate wealth-creation. Indeed, futuristic design exhibitions are closely associated with American strategies to reverse the Great Depression, the classic exhibition being the 1939 New York World Fair. This event fused together representations of a technological future with an ideal of democracy founded on the satisfaction of consumer desire, replete with futuristic products supplied by the Fair's sponsoring corporations. Inspired by Pragmatism, Taylorism and a curious blend of Freudian and behavioural psychology, American design of the Depression era was held to be 'consumption engineering', the scientific 'humaneering' of desire – a phrase chillingly reminiscent of current vogue terms for design such as 'emotional ergonomics'.¹³ During the Eighties, designers re-worked this 'futuristic' rhetoric to develop science exhibitions with ever more stupefying entrances, theming and interactives to promote the benefits bestowed by science.

Today, the political and economic policies that produced the great expansion in science centres during the earlier part of the eighties have passed into history. Where we once might have expected bold, triumphalist displays of space rockets and microwaves, we now expect complex, socially contextualised representations of genetics or ecology. The positivist chain of reasoning from science to wealth-creation now seems rather naïve and, in any case, the landscape of science has

changed. Increasingly, exhibitionary strategies have focused on incorporating the views or 'values' of the audience rather than seeking to marshal their emotions. In the words of Casson Mann, designers of the London Science Museum's Wellcome Wing, "the missing element in science exhibitions has been the voice of the visitor."¹⁴ This is precisely the concept behind contemporary science promotion, as in the British Government's latest Science and Innovation Policy, which recommends that the public, as 'consumers' of science, be involved in scientific decision-making, or the European Environment Agency, which recommends that scientists learn from lay opinion and wider social values.¹⁵

Perhaps the crude paradox with which I began can now be refined. Science festivals and exhibitions may indeed have failed to 'inspire young people with a passion for science', yet many have since transcended the limitations of their original aims and objectives.

Two decades ago, for example, it was widely believed that the purpose of a science exhibit was to 'transmit knowledge' (to quote the title of this Workshop), or at least instil in visitors some basic scientific concepts, models or principles. Today it is not just that we recognise exhibits are not very good at conveying cognitive knowledge, but our aims and objectives have shifted. The British psychologist Nicky Hayes, who has a special research interest in science communication and the design of interactive science exhibits, has ridiculed strategies to engage cognitive thought through exhibits before which most visitors spend less than a few moments. Instead she suggests tactics to engage the *conative* domain. For educational psychologists, 'conative' refers to those dimensions of our mental constructs associated with motivation, enthusiasm, volition, or goal-setting; it overlaps with the 'affective domain' of emotional feeling –but is apparently separable from the 'cognitive domain' of formal knowledge, method, theory or principle, the sort of knowledge required for examinations.¹⁶ In other words, we should not necessarily judge science exhibitions a failure just because audiences are unable to articulate specific scientific principles acquired during their visit.

More significantly, it may be argued that the early eighties' concern to inspire young people with a heady mix of science and entrepreneurship was driven by political anxieties about the so-called 'fiscal crisis of the state'. Under what came to be called 'Thatcherism' or 'Reaganomics' the policy was to liberate what was then seen as the productive sector of the economy (like manufacturing), and clamp down on what were seen as unproductive sectors (like the arts). But the economy took a different turn. Globalisation of production, post-Fordism, the knowledge economy, and the creative economy –with its close links to the arts, leisure, media and consumer services -have displaced earlier ideas of productive activity.

If science exhibits failed to inspire young people with a passion for hard science and heavy industry –for physics, maths, chemistry or industrial engineering –it was not so much design that failed, but politics and economics. Spectacular science shows at least inspired a generation with a passion for the consumer products that flowed from technology -and if consumption is the new economic imperative, then perhaps such exhibitions did promote economic growth. If their only effect was to inspire a generation with a passion for computer games well, at least they made an economic contribution through Lara Croft.

Certainly the popularity of science centres has boosted the development of multimedia design, providing a fascinating laboratory to test out radical, yet robust input systems and graphical displays for interactive devices. Many of the leading interactive design consultancies of the moment achieved prominence through science exhibition projects. The US consultancy Small Design devised *Human Genome*, the new centrepiece of the Institute of Chicago Museum of Science and Industry. The designers at Itch, now at London's Ideo, won their awards for *In Future* and *Comment* -a battery of 27,000 LED's allowing messages to be sent through a maze suspended over all four floors of the London Science Museum. Their latest work involves output devices in bowls of glass marbles -and even woolly hats. Tomato Interactive, currently showing *Reactive Spaces* in Singapore's Science Centre, output in water tanks. Tomato's creative director recently acknowledged that:

“in exhibitions I find the seeds of something a lot more meaningful than anything that’s going on with the internet, which is just a cheap international publishing tool, applied in a very banal way”.¹⁷

So science festivals and exhibitions have contributed to the growth of the consumer economy, to national promotion, Millennium events, regional tourism, or urban regeneration schemes, including the development of ‘creative cities’ or ‘Medienstadt’. Two decades ago science museums were criticised for being dull, unimaginative, paternalistic -for not having enough design; now they are criticised for having too much. We may deplore the tendency to design science exhibits in style of consumerist, fun-filled spectacle, since this tends to insulate science from context or analysis -the criticism made in Sharon Macdonald’s *The Politics of Display*.¹⁸ However, this criticism, drawing as it does on Adorno and Debord, might be levelled at design itself, in all its commercial manifestations. Accordingly, at this point I propose to turn my argument around.

Rather than dwell on the changing relationship between science exhibits and society, I should like to conclude by exploring the rather more specific relationship between science exhibits and design itself -in particular, the evolving idea of ‘design futures’.

There is not space here to consider the portmanteau term ‘design futures’ in any detail. It is a very mixed bag of ideas with the common distinction of seeking to transcend traditional practices. It includes what we may call *intangible* design, which seeks to transcend the 20thC focus on physical objects by drawing on new scientific paradigms such as complexity theory; *design process*, which, drawing on foresight strategies, attempts to provide a theoretical framework for intangible design; *critical* design, which addresses looming issues of globalisation and environmental devastation; *design convergence*, including interfaces with digital media, which has begun to dissolve professional boundaries and foster multidisciplinary practices; and *design foresight* which, among other things, models scenarios for design in the

context of emergent technologies and extrapolations of political risk or consumer markets.¹⁹

Taken together, these developments represent something of a 'sea change' in design practice. There has been a move away from some of the more self-regarding qualities of postmodernism towards new kind of engagement with scientific knowledge and understanding, embracing multidisciplinary team-work, the transformation of ideas as much as materials, and an enhanced, if equivocal engagement with cultural values and the political consequences of action.

I would argue that science expositions and exhibitions have played a key role in bringing about this 'sea change' in attitudes towards design. Exhibitions may be short-lived, yet they exercise a remarkable influence on design –an influence that quickened with the upsurge in exhibition practice towards the Millennium. Two decades ago exhibitions were considered a somewhat marginal activity for architects and designers, yet they grew to become something like finishing schools for a new generation of creative practitioners. Today, 99 out of the top 100 design consultancies in the UK now list exhibition work as a specialist expertise.²⁰ This year, for the first time, the Stirling Prize for British Architecture went not to a new building, but to *Magna* -a science adventure park created from a disused steelworks in provincial Rotherham.²¹

I have already highlighted the role that science exhibits, in particular, have played in the development of digital design. Convergence of media has also encouraged multidisciplinary practice. Again, science exhibits such as the London Science Museum's Wellcome Wing have been instrumental in providing new models for multidisciplinary creative practice. Although co-ordinated by architects Casson Mann²² the artists and designers, scientists and cultural critics, technologists and theatrical scenographers, architects and ecologists, film-makers and programmers invited to develop the exhibits' initial concepts were, in the memorable phrase of the

Science Museum's Design Director, like "the cast of a Fellini movie." This was not to the taste of established exhibit designers. Commenting on the Wellcome Wing's pre-publicity Neal Potter, Chartered Society of Designers' Chair of Exhibitions, questioned whether "exhibitions can really be created by different professionals, artists, architects and graphic designers working together" and "whether we, the design community, are to be branded forever as second class professionals behind artists and architects?"²³

As it turned out, the conventions of professional design were simply inadequate to manage, let alone resolve the problems posed by contemporary science exhibitions. Yet such exhibitions provided a unique laboratory for diverse designers to re-think their practice. This was not simply because science exhibitions demanded multidisciplinary practice (all large-scale projects are an amalgam of skills) , but also because designers were obliged to engage bodies of knowledge outside the narrow, self-regarding world of designers' journals and coffee-table publications. Engagement with contemporary science also raised questions about the future beyond mere 'futuristic' styling. These include the problems of working beyond solid objects and of rethinking the design process as one more concerned with content than surface -key elements in the idea of 'design futures'.

Designers cannot resolve these issues, particularly when major museums are cautious of controversy, and science itself is controversial.²⁴ As the Cambridge historian of science Simon Schaffer once noted, the troublesome questions posed by contemporary science exhibitions include radical uncertainty. Science presents conflicting ideas, indeed is a method for testing and contesting hypotheses, few of which ever survive. The classic dilemma is the Smithsonian's 'Cold Fusion' exhibit (1989), praised by physicists one month for being cutting-edge, and lampooned the next for lending credence to 'bad science'. Tellingly, not one of the 16 major European museums of science had the courage to represent the BSE crisis. But to engage contemporary science is to embrace scientific controversy, as well as public controversies over risk and environmental issues. This requires curators, interpreters

and designers to abandon professional pretensions to sell the future, and instead engage contested policy, politics and values -and to do so in what Karp and Lavine have called the 'contested' spaces of public exhibitions.²⁵

Science exhibits pose many such troublesome problems for designers. For those trained to think in terms of selling a message to 'target markets' or 'lifestyle groups', science exhibitions present the daunting challenge of presenting meanings contested between scientists, and between scientists and the public. Interactive installations are now expected to genuinely foster social co-operation, engage constructive memory, question their own representations of scientific authority, and the relationship between scientific and cultural values. Equally, designers more used to manipulating solid objects in environments measured by square metre, now confront the problems of representing fourteen mathematical dimensions, the minute scale of nano-technologies, particles that exist for a fraction of a millisecond, and objects of a literally astronomical order of magnitude

More insidious problems for designers engaged in science exhibits include the difficulty of negotiating epistemological debates between 'realists' and 'social constructivists'. This is not merely a matter of negotiating the public's appetite for 'agreed facts' and scientists inability to provide them, or of simplifying abstruse disagreements between experts, but confronting postmodern notions²⁶ of science as narrative, or 'text' susceptible to any number of creative interpretations. Since it is scientific nonsense to claim that Biblical Creationism and Neo-Darwinism are both equally plausible readings of the archaeological, genetic and astronomical evidence, designers have learned to treat postmodern relativism with caution. Given that the theoretical component of most contemporary design education relies heavily on a small number of postmodern texts, the challenge for science exhibit designers is to think forward, or back to other historical moments when science, rather than scholasticism, inspired design.

I am not suggesting that science exhibitions alone have provoked a sea change in design, or that designers have a privileged insight into the future, or that science exhibits are necessarily more advanced than those in other kinds of museums. Focus on technology-centred science exhibits may lead us to overlook equally interesting science exhibits that form part of zoological parks, nature centres, environmental or archaeological sites, or botanical gardens such as the UK Eden Project.²⁷

Nor would I suggest that all trends in science promotion promote critical reflection in design. Science promotion policy in Britain, and in Europe, frequently lapses into the rhetoric of consumerist display, showcasing meretricious innovations like TV's on wristwatches, the internet on microwaves, DVD players on fridges, and web-enabled toothbrushes. As one recent compilation of such products, *Designing the 21st Century* puts it: "Cognitive of the fact that the emotional content of a design can determine its ultimate success, the general view among the majority of participating designers is that it is now important to fulfil the consumers' desire."²⁸ This is little more than 'humaneering', even if dressed up in new terms like 'emotional ergonomics'.

However, I would submit that the developments in science exhibits have been intimately linked to more progressive developments in design practice. To recapitulate: during the past two decades science exhibits have transcended crudely positivist, entrepreneurial policies that sought to 'transmit knowledge' or 'inspire passion', first by engaging more complex forms of 'conative' motivation and, more recently, by embracing models of 'contested knowledge and values'. Correspondingly, science exhibitions have acted as laboratories in the development of 'Design Futures', inspiring designers involved in these projects to re-assess their discipline. Science exhibitions may have failed to 'inspire young people with a passion for science', but they have certainly inspired a new generation of designers.

Notes

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- ¹ *Edinburgh International Science Festival, 2002 (10+1 Club Aims)*
- ² E.H.Carr, *What is History?*, Macmillan, 1961
- ³ Charles Babbage, *Reflections on the Decline of Science in England and on Some of its Causes*, 29th April, 1830, Gutenberg Project #1216
- ⁴ Clive Rassam, *The Second Culture: British Science in Crisis* (Aurum 1993); Martin Bauer's *Resistance to New Technology*, Cambridge UP, 1996.
- ⁵ House of Lords *Science and Technology Third Report* 23 February 2000.
- ⁶ Institute of Physics *Report*, 2001:25-26
- ⁷ *Guardian*, Saturday March 30, 2002
- ⁸ George Monbiot, *Captive State: The Corporate Takeover of Britain*, MacMillan, 2000.
- ⁹ Bill Durodié, 'The Demoralisation of Science', Paper at Cardiff University 5-6 April 2002. www.cf.ac.uk/socsi/news/dmap.html See also Onora O'Neil, BBC Reith Lectures 2002, *A Question of Trust*, which examines the failure of 'hyper-accountability'. Slavov Zizek, in his *Sublime Object of Ideology*, Verso, 1989, describes how "fear of error becomes fear of truth itself".
- ¹⁰ Ulrich Beck, *Risk Culture: Towards a New Modernity*, Sage, 1992
- ¹¹ John Durant, *THES* 19/01/96; see also: D. Murray, J.Schwartz, S.Lichter, *It Aint Necessarily So: How Media Make and Unmake the Scientific Picture of Reality*, Rowman, 2002
- ¹² MORI *Omnibus Survey* of 1,987 adults, interviewed in 193 UK constituency-based sampling points, conducted face to face in respondents homes between 7th and 11th March 2002.
- ¹³ Jeffrey Meikle, *Twentieth Century Limited: Industrial Design in America 1925-39*, Temple UP, 1980:70-72. The contemporary phrase 'emotional ergonomics' has been adopted, indeed copyrighted, by the Seymour-Powell consultancy; see: Design Museum, *Design Progress*, 1999:12
- ¹⁴ Dinah Casson, 'Behind the Scenes at the Museum', *FX Magazine*, February 2002: 78-80)
- ¹⁵ British Government White Paper 2000, *Excellence and Opportunity: A Science and Innovation Policy for the 21stC*; and European Environment Agency Report, *The Precautionary Principle*, Copenhagen, 2001. As reviewed in *Science and Public Affairs* October 2000 pp.12-13 the 'Science and Innovation Policy for the 21st Century' recognises the relationship between science and the public must change, but adopts a market-orientated approach, with the public represented as consumers. It recognises the need for public involvement in decision-making but gives little clue as to how this will be achieved.'
- ¹⁶ Nicky Hayes, 'The Psychology of Interactive Exhibits', Paper to *the 2nd World Congress of Science Centres*, Calcutta, January 1999.
- ¹⁷ Neil Churcher, *Design Week* 28/03/02:17
- ¹⁸ S. Macdonald (ed.), *The Politics of Display*, Routledge, 1998, & *Behind the Scenes at the Science Museum*, Oxford, 2002.
- ¹⁹ 'Futures' studies are accessed most directly from journals such as *Futures* and *Journal of Futures Studies*. The *Institute of World Futures* and *Australian Foresight Institute* provides links to some 30 'global programmes' in Foresight/Futures Studies, many of which have close links to governmental or commercial bodies engaged in futures. In recent years the specific term 'Design Futures' has been adopted by a great many exhibitions, design programmes, research projects, commercial organisations and creative practitioners. Key links here

include the conferences *Four Dimensional Design* (www.cvr.uci.edu/dzmura/4D/;) and *Designing Interactive*

Systems (British Museum June 02 (www.sigchi.org/DIS2002/index.html); the consultancy *Design Futures*

Council (www.greenwayconsulting.com/designfuturescouncil), and postgraduate Design Futures programmes

at Goldsmiths's (www.goldsmiths.ac.uk/pgprospectus/programmes/des-madf.html) and Royal College of Art

(www.crd.rca.ac.uk/research/main.html).

²⁰ *Design Week Consultancy Survey*, 2001

²¹ www.magnatrust.org.uk

²² www.cassonmann.co.uk/folio_museums

²³ Neal Potter, 'Britain Should be Proud of its Exhibition Designers', *CSD#1* 1999,p.19, and review of the Dome

in *CSD#5* 2000)

²⁴ Steven C. Dubin, *Displays of Power: Controversies in the American Museum*, New York UP, 2000.

²⁵ Karp, I and S. Lavine, *Exhibiting Cultures*, Smithsonian Institution Press, 1988/93

²⁶ Most notably, from J-F Lyotard's *Post-Modern Condition: A Report of Knowledge*, Paris 1979

²⁷ www.edenproject.com/

²⁸ Precisely such 'cutting edge' products were used promote the UK's 2001 Virtual Interdisciplinary Research

Centre (vIRC), which brings together firms such as IBM, Dyson and Hotpoint with a selection of universities,

including Cambridge and Surrey. See also Charlotte and Peter Fiell (eds.), *Designing the 21st Century*,

Taschen, 2001.