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Review:
Michael Giesecke, ***Der Buchdruck in der frühen Neuzeit***. Frankfurt: Suhrkamp, 1986.
Written for *McLuhan Studies*, Toronto, Vol. 2, (1992) but never published.

This book offers a magisterial review of the early history of printing in Germany, particularly vernacular texts, from the time of Gutenberg's initial experiments (c. 1440) until 1600. It is a fundamental contribution because it analyses in detail how printing changed western culture both in terms of social organization and through a transformation of concepts of knowledge.

Giesecke's point of departure is that societies depend on information systems and that these can be changed with the media for communication. He acknowledges McLuhan's ideas in this respect, but where McLuhan was intuitive and suggestive, Giesecke has spent nine years carefully reading both primary sources and secondary literature. Where McLuhan was anecdotal, Giesecke has produced a theoretical model to explain how and why Gutenberg's activities constituted a basic change. Section two demonstrates that the printed book required a complex network of both technological tools (paper, type, printing press) and social organization (typesetters, proofreaders and of course authors). He shows that this process was much more complex than one might have thought. The early printers included many traditional ligatures. For example, to print the 42 line Bible, Gutenberg included 299 forms rather than a simple alphabet of 52 forms (26 capital and 26 miniscule letters). Hence printed books were part of a complex information system and could be catalysts to changes in systems.

Giesecke is careful to note that this was not always the case. He reminds us that the earliest references to printing in Korea involved the *Dharani Sutra* (704 A.D.), that there was xylographic printing in China from the time of Ming Huang (712-756) and that there was a technical description of the construction of a temple as early as 1103. The function of these books was limited to increasing administrative efficiency and control, rather than to help the ordinary man. By contrast, in Germany there was, from the outset, a conviction that books would benefit everyone. Giesecke examines some of the early expectations and misgivings about printing (134-191): that it was God's last gift; a noblest Trojan horse, a devilish printing of God's truth and that it played a particular role in the development of a German "nation" (192-207).

Section three (209-328) examines in detail five kinds of materials that were published within Gutenberg's lifetime from 1440 to 1468. The first was in institutional information and communications systems, including new educational programs through the printing of Donatus; the rationalization of office communication within the church through the printing of indulgences; standardization of church liturgy and rituals and the printing of the Bible as a repository of Christian belief. A second type of material involved public communication including the printing of the so-called *Turkish Calendar* (1454-1455), a

warning to the whole of Christianity; printed campaign material for ecclesiastical elections (1461-1462) and printed matter for reform in the church. Giesecke traces how these publications entailed trends from open warning (*offentliche manung*) to public opinion (*öffentliche Meinung*) and from secret group to political party. Other materials examined include 3) private information; 4) fiction and entertainment (*Unterhaltungskunst*) and 5) the rebirth of the classics. He accepts a standard view (e.g. Bolgar) that the corpus of classical texts was published by 1520. This overlooks the classics in mathematics (other than Euclid) which only began to appear through Commandino's efforts at Urbino in the 1550's, a good century after Gutenberg, and continued into the seventeenth century mainly at Paris. Detailed charts which trace developments in these various materials confirm that the first generation of publishers focussed on standardizing existing knowledge.

Giesecke is particularly concerned with the ways in which the advent of printing introduced new knowledge and a redefinition of what constitutes knowledge. Section four (329-389) explores this problem through an analysis of the *Hortus Sanitatis* of Bernhard von Breydenbach, which entailed travel to different countries specifically with a view to acquiring first hand visual knowledge of medicinal herbs. This leads to consideration of some of the unexpected consequences of printing: a shift from institutional to economic networks; from a concern with community to an emphasis on the common man (*von der "gemaind" zur "gemain"*) which led in turn towards a new awareness of a German nation. These are not simply abstract claims. Giesecke traces in detail how the growth of printing was intimately linked with the development of German cities (e.g. Ulm, Cologne and Nürnberg) and the rise of networks with other cities (e.g. Eichstatt, Leipzig, Magdeburg, Erfurt) through new printing presses which served to reprint materials from the centres.

In a later section he considers how printed pamphlets, broadsheets and books served as instruments of social control (544-547). In Nürnberg, the number of such documents published suggests that effectively every household had someone who could read! Section five (393-497) examines further the structure of these printing networks and how they affected awareness of a German nation in the period 1520-1555. An excursus considers side effects such as censorship, data security and how a technical vocabulary (Kunstsprache) emerged to describe these new typographical communication systems.

Section six (492-696) focusses on the rise of technical literature (*Fachprosa*) and how to do it books, specifically a medical work for the poor (*Thesaurus pauperum*) and a book on the art of distilling (*Liber de arte distillandi*). Giesecke was particularly concerned with the ways in which the advent of printing introduced new knowledge and a redefinition of what constitutes knowledge. In earlier cultures, (both oral and manuscript), technical knowledge had been exchanged primarily through face-to-face situations. The advent of printing introduced a quest to convey knowledge directly in book form without the intermediary of an expert, master or teacher. This posed problems because the objects to be described were no longer present as in a face-to-face situation and thus required the development of a new type of artificial sight (*künstliches Sehen*) that became basic to scientific description.

The early texts in the field of technical literature (Fachprosa) had a new emphasis on true (*wahren*) and correct (*rechten*) description. This, claimed Giesecke, was no co-incidence. Printing introduced a new distinction betwen inner and outer vision, focussed attention on objects seen by the outer eye, (dismissing everything else as invisible), and systematized new methods that came through the discovery of linear perspective. Others had made general claims about the links between printing and perspective usually with respect to the appearance of perspectival illustrations in printed books (McLuhan, Edgerton). Giesecke was concerned, rather, with the way in which perspective made persons aware that they were viewing an object from a given point of view and that complex objects needed to be viewed and represented from a series of viewpoints to be seen accurately.

This led to the creation of multi-dimensional models which were then linked with geometry through Dürer's publications and in turn inspired a new type of verbalisation based on pictures which correlated a series of views. Hence perspective did much more than add a sense of space to illustrations: it introduced a systematic methodology for describing verbally the visual world which Renaissance scientists identified as true description because of its reversibility. While Leonardo da Vinci was the first to articulate this methodology, Giesecke claims that it required the standardizing effects of printing to become established. In this way printing introduced a theory of knowledge (*Erkenntnistheorie*) that has dominated the West since the Renaissance. Giesecke explored the consequences of these developments for a shift in emphasis within the trivium away from logic and rhetoric in favour of dialectic (630-635). In the final part of section six, Giesecke explored how this inspired trends towards accumulation of information; new emphasis on comparison and contrast; new knowledge and even a realistic extension of fiction.

Giesecke traced how these developments led to a redefinition of knowledge (*Wissenschaft*). In the mediaeval tradition knowledge of nature was very much linked with physical ability (cf. the Greek *techne* which as Panofsky pointed out explains the close connection in German between Kunst and *können*). This tradition, which led to artist-engineers, assumed that knowledge involved sensori- motor and muscular skill and dexterity, whence the mediaeval emphasis on experts, experience (*Erfahrnis*), practical wisdom (*Weisheit*), and a tendency towards secrecy (*Geheimnis, Arcanum*). By contrast, the new approach defined knowledge as: 1) won through regulated (*normierte*) processes of visual perception and description or representation by an external observer; 2) stored in print form and 3) spread through a free market, which secured a commitment to dissemination or even revelation (*Offenbarung*) as they termed it. This led (669) to a new distinction between use (*Brauch*) and understanding (*Verstand*) and a gradual supremacy of theory over practice. Giesecke shows (672-678) that these new ideals of knowledge applied even to traditional topics as in Libavius' *Alchemy*.

The rise of early modern science is frequently described as a new emphasis on observation. Giesecke's analysis showed that this is too simplistic; that it was rather a question of developing a systematic method of communicating results of observation indirectly, using descriptions that reflected the objective aspects of linear perspective. Giesecke showed that this led to new links between experimenting and idealising (620-

623), noting that this redefinition of (scientific) knowledge also entailed new emphasis on instruments (673).

This closely argued and carefully documented work led to dramatic conclusions that "knowledge" (*Wissen*) in its modern sense did not exist (677) and indeed was unthinkable (655) prior to the development of print culture as it evolved in Europe. Giesecke was very sensitive to the price that was paid to achieve this (650):

Authors of technical literature (*Fachprosa*) and particularly their most radical representatives, "scientists" (*Wissenschaftler*), are forced to uniocular perception, concentration on visible characteristics (*Gestaltmerkmale*) and thereby to suppress more complex organs of sense and perceptions.

This monosensual focus (653) of early modern science destroyed earlier notions of unity of the senses, and required an isolation of the sense of sight which, Giesecke suggested, needs to be transcended in light of the ecological crisis that this one-sense approach to knowledge has produced. New age concerns with body language, feelings, and new relations to nature could be seen as a contemporary expression of this quest to redefine the visual bias of our culture (653). By implication the origins of perspective and printing were intimately connected with a new approach to knowledge.

Giesecke has made this extremely rich and complex historical study the more provocative by challenging us to use the past revolution of print culture to reflect more critically on the present revolution of computer culture. He consciously cites McLuhan (822, note 2) to acknowledge the impossiblity of understanding fully a revolution in media while it is happening, but nonetheless points out how many of the claims for computers concerning universal access, freedom of information, democracy of knowledge etc. have striking Renaissance precedents. To provoke us he uses terms from the computer age such as software and storage system (*Speicher*) to describe sixteenth century events. Presented as it is with its subjunctives and layers of irony, this cannot be dismissed as anachronistic or naive.

Giesecke was very conscious that his telling of the story from a modern point of view meant emphasizing the new aspects of the process and that if one wished to compensate for this shortcoming one would ultimately need to retell the whole story using a mediaeval viewpoint (703). He repeatedly emphasized the gradual evolution of these developments and explicitly acknowledged their roots in mediaeval manuscript culture. He noted, for instance (668), the presence of striking morphological descriptions in the work of Albertus Magnus and Hildegard of Bingen. He accepted that there were numerous mediaeval examples of visual experience and even commitments to dissemination (677). In the case of Ortolf von Bayerland's medical book (*Arzneibuch*) he described (554-55) a fourteenth century treatise with over 100 manuscripts which explicitly set out to disseminate knowledge in clear tables. In analysing the nexus of perspective, geometry, model-making and systematic representation of knowledge, he repeatedly cited Leonardo da Vinci (e.g. 617, 624, 636, 658, 663). Giesecke did not pretend that printing started the process: he claimed, rather, that printing set in motion a

technological system of communication that standardized and spread the process through Germany, made it a European, and ultimately a world-wide phenomenon. This in turn raised new questions: If printing standardized a perspectival verbal description of visual situations in the how to do it books, what set this process in motion within the manuscript tradition?

This book is an example of interdisciplinary studies at its best. It draws on a wide range of fields: history of the book, linguistics, psychology, sociology, history, history of science, art and even religion. This leads to unexpected insights. Luther is universally famous for his religious reforms, as is Dürer for his innovations in art and geometry. Giesecke reminds us that Luther and Dürer were not only contemporaries, but closely linked in using printing to standardize usage of German terms in their respective fields.

As is the case with a major book, it has many implications and raises at least as many questions as it answers. What happened in other domains? Historians of art who have long been interested in changing relations of image and text need to reassess the role of printing. Historians of science have long been claiming that only printed sources are important for the history of science because manuscripts were not circulated. Giesecke's work suggests that the historians' claim may well have been right, but that their explanation was wrong: printing helped to redefine the actual criteria for scientific knowledge of the natural world. Historians of the book have traditionally focussed primarily on the medium. McLuhan suggested and Giesecke has demonstrated that the medium changed not just the message, but the meaning of knowledge itself.

Giesecke has made a case study of the German context. He traces the journeys of German publishers to Subiaco and Rome. We clearly need such studies for other European countries. Ultimately the challenge posed by this book which is as exciting as it is difficult, is the need for a complete reassessment of the history of printing not just as a breakthrough in technology but as a fundamental instrument of culture.
