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The Intricate Process of Implication

Most of us would agree that, in some appropriate sense, the world man has created is becoming ever more complex. Furthermore, many of us feel that the Internet marks something special in our cultural evolution. But what lies behind these vague intuitions? And how may we make sense of the evolution of complexity in our culture? Taylor, a cultural critic and philosopher, aims to illuminate these matters in his new book. He also applies his ideas to the important practical issue of education.

The most interesting and important facet of the book is the subject of the final chapter, the Global Education Network (GEN), a company of which Taylor is cofounder and whose goal is to provide university-level education via the Web. The basic model involves faculty members, universities, museums, and publishers from around the world, providing online courses to anyone anywhere. The intent is to be entirely different from, and to eventually supplant, the traditional university and college education model.

One great benefit I can see about a proposal of this general kind would be that educational systems like GEN could provide nearly unlimited diversity in the kinds of courses and majors offered. For example, in my own research I have found that the number of departments, and consequently the number of specialized courses, scales up as university size to the power of around 1/2 [1]. Students at larger universities therefore have more choices; e.g., a university with 50,000 students may have on the order of 100 departments. Because traditional universities are unlikely to get much larger than 50,000 or so, 100 departments may be the scaling limit in the number of departmental concentrations at traditional universities. Imagine, though, if a single virtual university possessed 50 million students, rather than 50 thousand. If the same scaling limit applied, over 3,000 departments would be possible, allowing each student a seemingly infinite array of choices.

THE MOMENT OF COMPLEXITY
by Mark C. Taylor,
University of Chicago Press,
Chicago, 2001 360 pp, $32.00
(US cloth cover)

Another positive aspect to e-education that I can foresee is an increase in academic freedom for professors. Taylor tells us that there is much resistance to his e-education ideas from professors and attributes some of this resistance to e-education being a threat to tenure and academic independence. Taylor is willing to accept that e-education may lead to the end of tenure, but even if this is so, it is not obvious to me that the result will be reduced academic independence, as Taylor seems to accept. Just as the Internet has allowed many individuals to start their own businesses—i.e., to become economically independent—it seems plausible that the Internet and e-education could give professors opportunities to fund themselves without having to be members of traditional, pigeon-holing departments and without having to rely on granting institutions, only interested in certain fashionable research directions. The traditional argument for tenure is that it is academically valuable because of the academic independence it enables; perhaps e-education will make academic independence possible without the need for tenure.

GEN seems to be different from traditional education in a number of obvious ways, but Taylor claims to see differences amounting to an entirely new regime of complexity in education (thus the "moment of complexity"). The key differences for Taylor may be

found in (i) the course structure and (ii) the organizational structure of GEN itself. On the course structure, courses offered by GEN are envisioned to be multimedia-filled, interactive, nonsequential, dynamically changing or evolving, and cross-disciplinary, with no clear boundaries between themselves and other courses. The other difference is that the organizational structure of GEN itself is to be more open-ended and network-like, rather than rigidly hierarchical, so that GEN is dynamically and unpredictably evolving in a self-organized fashion and is entirely interconnected to the rest of our culture, so that it is no ivory tower. This is where the bulk of the book comes in: the preceding seven chapters cover aspects of complexity developed in the twentieth century—including information theory, recursion theory, chaos, complex adaptive systems, and emergent phenomena, and it is these notions that are implicitly referred to when Taylor makes the above distinctions between GEN and traditional education.

Although GEN would indeed be different from traditional education, is it really different in these complexity-related ways? There would appear to be no course that could be given in GEN that could not, in principle, be given within any one university, so the course difference Taylor mentions does not appear to be a feature inextricably tied to GEN. As to GEN's structure, even traditional universities are, in fact, highly distributed, self-organized, differentiated organizations, with connections to industry and museums and publishers. For example, the scaling law I referred to earlier is very similar to the manner in which differentiation scales in organizations that Taylor believes have definitely passed into the regime of complexity: e.g., ant colonies, nervous systems, and organisms [1]. And even individual universities dynamically adjust their number of departments as a function of university size and thus seem to behave like a complex system of the kind Taylor attributes to GEN [1]. Traditional universities and GEN both appear to be highly complex in similar kinds of ways, and it is therefore not apparent whether the bulk of Taylor's book is actually relevant to understanding his educational ideas.

Might the rest of the book be useful on its own merits as an introduction to these complexity notions for nonscientists? Taylor does make some interesting analogies between the notions of complexity and aspects of our culture such as art and architecture. But analogies are all they can be, and Taylor seems to make more of it than that. The problem with the rest of the book is that Taylor's use and presentation of the complexity ideas are at best metaphorical and at worst not well defined. The book is aimed at laymen as well as academics, but this is no excuse for the dependency on analogies between rigorous ideas in mathematics and theoretical biology, on the one hand, and aspects of culture, on the other. For example, referring to a painting of a face whose large pixels are, themselves, small paintings, Taylor (p. 145) writes that such paintings,

> formed by paintings within paintings, resemble the squares in the Game of Life [of John Conway]. Each miniature painting functions like a cellular automaton with its own rules programmed to respond to surrounding squares. These local interactions generate global events. As the viewer moves closer or farther away, the painted surface is set in motion until it is teeming with mutating shapes. When the critical tipping point is reached, the resolved organic form of the face suddenly emerges.

Another problem is Taylor's many uses of etymological analysis to determine the meanings of words. For example, Taylor writes (p. 138),

> Etymologically considered, *complexity* derives from the past participle of the Latin *complectere, complexus,* which means to entwine together (*com-,* together + *plectere,* to twine braid). The stem *plek* (to plait) forms the Latin suffix *-plex,* which means to fold. Complexity, then, is formed by interweaving, interconnecting, and folding together different parts, elements, or components. Complexity not only harbors multiple implications but is actually an intricate process of implication; complication implicates and implications complicate.

While such analyses sometimes make nice stories and one may be surprised to find that a word's meaning still retains a connection to its etymological source, this is clearly not a valid guide to meaning determination. (One cannot be surprised to find that the etymology relates to the meaning unless one already knows the meaning.) These problems are made all the worse by Taylor's discussions being entrenched within continental philosophy, which makes much of the book impenetrable. I am unsure whether or not there *is* a sensible interpretation to much of the continental-speak (e.g., the final sentence in the previous excerpt); perhaps there is an interpretation decodable only by other continental philosophers familiar with this metaphorical style of speech.

Taylor may be onto something with his e-education initiatives, but his book as a whole is not well suited for arguing for his initiatives.

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