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Subject: Annenberg project on **Creativity and Visualization**

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Preliminary Draft

Here are thoughts on a possible Annenberg proposal. As I recalled from our conversation, you may have had a demonstration project in mind, whereas this is coming out more as a course development project. These notes are very preliminary in the guise set forth here. I think we are now situated where we can bring off a rather ambitious proposal and I think the topic is one that merits an ambitious effort.

Creativity and Visualization. Intellectual innovation in modern history has been closely associated with changes in the capacity to visualize and represent things. For example, the Renaissance is linked to the introduction of perspectival representation. (Edgerton, 1975) The rise of early modern science depended in part on the ability to reproduce and disseminate conceptual drawings representing new theoretical perspectives accurately, and it was greatly stimulated by the extensions of the power to visualize the phenomenal world engendered by telescope and microscope.(Eisenstein, 1979, vol 2; Sydenham, 1979)) The break with the traditional medicine of Galen coincided with the development of much more realistic anatomical drawings. The age of exploration is also the start of modern cartography.(Bagrow, 1985; Eisenstein, 1979; Robinson & Petchenik, 1976) In premodern culture, pictures aided memory; in modern culture they come to be ways of significantly representing the phenomenal world to the thinking mind.(Yates, 1966)

This close link between visualization and creative thinking has continued through the past 500 years.(Ivins, 1969) Examples abound. One of the most important features of the *French Encyclopedia* was its excellent plates, particularly those illustrating the technology of the time. The development of probabalistic and statistical reasoning has been closely associated with discoveries in the techniques of graphical representation.(Bertin, 1983; Stigler, 1986; Tufte, 1983) In field after field, science and technology have prospered where new techniques and instruments allowing new phenomena to be visualized in new ways have been developed. Where would medicine be without its vast array of medical imaging techniques? Where would astronomy be without imaging? Where, even, would chemistry, in which taste, smell, and touch have been traditionally important, be without spectroscopy? For that matter, would acoustics be much of a science without the oscilloscope and other means of visualizing the actions of sound waves?(Sydenham, 1979; Darius, 1984; Ackerman, 1984)

Yet, despite the evident linkage between the progress of culture and the power to visualize phenomena, and despite a rich literature that documents it, without perhpas explaining it, visualization has not been used well as a tool in advanced education. In

the eighteenth century the well-educated person studied drawing, not as a prelude to an artistic career, but in recognition that a person needed not only to speak, read, and write well, but also to represent the world visually in effective sketch, much as court reporters now do where TV cameras are not permitted. The practice of including a visual training in general education has died out. Only in art history and art appreciation courses does the educational system now recognize that the development of visual powers is important for anyone except the prospective artist, and these courses primarily stress the history of taste and styles. We propose to develop an experiemental course on visual thinking in modern Western history that will be an interdisciplinary, general education offering on the undergraduate level, one designed to help students master their powers of visualization as resources in creative thinking and problem solving.

In developing the materials for this course, we will concentrate on four interrelated topics: changes in the techniques used to represent visualized phenomena (e.g., introduction of perspective, representation through graphs, use of cutaway drawings representing the internal appearance of things, etc.); changes in the instruments available for making phenomena visualizable (e.g., telescope, microscope, photography in its various forms, X-ray's, etc.); changes in the conceptually powerful visualized images that characterize the leading edge of culture (e.g., the kaleidoscope of fashion and style; the escarpment of a clock in the late-eighteenth century, the steam turbine and electric generator in the late-nineteenth, the full earth looking back from outer space in the late-twentieth) ; changes in the cognitive capacity to visualize phenomena (e.g., greater capacity to judge intuitively the relative motion of large, rapidly moving bodies elicited by the pervasive use of cars, etc.).

We propose to make our heritage of visual thinking accessible in a new way, fully using the capacity of multi-media workstations, and computer aided design systems, all served by a digitally stored and managed database of unprecedented scope. The project will be managed through the Institute for Learning Technologies at Teachers College, Columbia University, and a number of other institutions will collaborate, among them, the Smithsonian Institution, the Metropolitan Museum of Art, WNET/Channel 13, the Museum of Modern Art, the Museum of Broadcasting, and the Massachusetts Institute of Technology. [These are of course tentative -- I am quite sure of being able to arrange for the collaboration of the Smithsonian and reasonably sure of the Met; I think Jay Iselin could bring in WNET, MOMA, and the Museum of Broadcasting; Ben Davis from Project Athena wants to have a continuing relationship here and this project would be right up his ally....]

I would propose going after resources to develop a two term course: the first concerning **Visualization and Thought in Western Culture, 1400-1900**, and the second **Visualization and Thought in Western Culture, 1900-2000**. The course should draw together what is known about visual cognition from psychology and related disciplines; what can be learned about visualization and thinking from the history of science, technology, art, architecture, cartography, and the like; and what is evident about the topic from the creative design work of the 20th century in the visual media.

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