Four Years of Progress with the Natural Learning Case Study Archives

After introducing ideas of the Natural Learning Case Study Archives as a poster demonstration at JPS,2010 in St. Louis(1), the web site design was advanced as a paper at Constructionism, 2010 in Paris(2). Later the Archives was converted from the HTML prototype to a Word-Press Content Management System(3).

Scope of the facility
Size: ~40 GB. Public word-press pages ~2200. Media library entries (~1000) are either pictures or pages scanned (to avoid rekeying older documents). The NLCSA video files are managed outside the Word-Press structure and its limits. Content includes videos filmed at the MIT Logo project (in LC1 and LC2) and videos filmed at various home locations (for LC3). Each video was a half hour, B&W reel-to-reel recording. There are over 300 of these videos, digitized and broken up into content defined episodes. Each video episode-collection is defined as a "panel." The video episodes are "panes" within the panels. Each panel typically contains 6-8 panes. Within panels, the panes are displayed 320 x 240. Each panel's panes link to pane "Clip Notes" where the video appears in larger display, 640 x 480. The Clip Notes are forms for transcribing content of the video panes when transcription is useful. This is the method chosen for proceeding with "variable depth transcription," i.e. transcribing only when data justify the effort, for clarity or lexical search.

Five Paths for Information Access
"Welcome" is the top level directory page. The horizontal "pull-down" menu at the top of the page reflects organization of material into 3 Learning Cases (LC1,2,3), with sub-ordinate focus on a). the child. b). analysis and appreciations of the cases, and c). the source material archives for the cases. LC0 is a separate category, materials produced by the case builder / site-designer.

The center-screen pictures and graphics activate links directly into Archives materials. Clicking on "Computer Experience and Cognitive Development" links to its top directory. In contrast, clicking on the picture of the two girls plays a movie made for French TV when in Paris.

The right margin lists links to materials, discussions, and information chosen by the website designer. LC1, LC2, and LC3 are posts trying to answer the question, "What is profound in this study?" The lists cover categories show by headings.

The left margin lists named "tags" identifying elements of information within individual source pages. The tag "w104" marks sources from week 104 in the life of the subject of LC3. The Tag "Lng" signifies that the page so tagged has bearing on the issue of language and its development. One can "intersect" tag categories. Finally, the search window permits locating sources relevant to a name or text string.

Searching for "Selfridge" will return links to sources where that name is mentioned.

Directions of Analysis

LC3 is the case now directly under analysis. The **locus** in the web-site where new work is undertaken and new developments posted is http://nlcsa.net/lc3c-ips/lc3c-analyses/. The **focus** of analysis is extension of the permanent object concept to cover the case of containment in concave objects. Children typically master this problem around three years. How is this learned through everyday experience? We are exploring in detail how one child learned such common sense knowledge first, with a set of 4 nesting boxes, then later with a set of 10 nesting cups. The path of analysis follows a proof method all mathematicians know: figure out what is to be proved; work backwards to determine what must be assumed true for the proof to be valid; proceed forward in deductive mode to construct the proof of the theorem.

Here is how we are applying this approach with everyday source materials. Define a time where the child exhibits mastery of inserting objects into nests of concave objects(4). Root through earlier source material for ALL interactions with the set of objects(5). Define a time where the task was insurmountable, although the opportunity was clearly present(6). Construct a threaded set of behavior examples that witness increasing competence along the path of learning. Provide an explanation for each incremental step along the path. How to do so is the constructive challenge for the problem of learning. Here's the approach.

In a talk at Purdue (1989) Oliver Selfridge(7) challenged students with a pregnant question: "How do we represent the world so learning is easy?" We are working to resolve that question with two sources of information: first is the case study video corpus; second is the use of computer based object modelling and machine learning procedures. We negotiate between simplest descriptions of objects and their relations and understood learning mechanisms to achieve a credible, simple balance. We proceed further by mining the collection of simple mechanisms in Minsky's "Society of Mind" and "Emotion Machine" books(8).

1.see JPS, 2010, poster 340. "Using case study archives to advance Piagetian theories."
2.see "With Heart Upon My Sleeve," presented at Constructionisn 2010, in Paris; accessible online at http://nlcsa.net/lc0a-rwl/lc0a-recent/LC0aR4/
3.the website Welcome page is accessible online at http://nlcsa.net/
4.see P146G: episodes E & F: http://nlcsa.net/lc3c-ips/lc3c-video/p146/P146G/
5.see index "Mastery of Nesting Boxes:" http://nlcsa.net/lc3c-ips/lc3c-analyses/LC3cA64/
6.see detail in "Backwards Events Analysis," http://nlcsa.net/lc3c-ips/lc3c-analyses/LC3cA61/
7.see video "On Learning" (by Selfridge) at http://nlcsa.net/lc0a-rwl/lc0a-video/LC0aVC6/
8.for a summary of my current research approach, see comments at the bottom of page "Five Pioneers Talk About Learning, AI, and Education:" http://nlcsa.net/lc0a-rwl/lc0a-video/lc0av/