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3. Technology and Methodology

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The old adage "when the only tool you have is a hammer, everything looks like a nail" is more than a truism, it is a warning. It warns that it is easy to lose sight of the qualitative properties of a problem, when the tools available are not capable of addressing them. The tools at one's disposal determine not only the way in which one addresses a task but, also, the tools that are available determine the tasks that one might deem feasible to address. However, just as hammers were developed to facilitate the driving of nails, so too have video-computer systems developed to facilitate the work of observational psychologists.

3.1 Historical Context

Historically, observational research, especially in language acquisition, has made use of whatever technology was available at the time, and began with paper and pencil. The earliest practitioners of observational research. and some even today. were known to follow after children and earnestly write down every sound that the child uttered as carefully as possible, so as not to lose any information. The advent of the tape recorder was a boon for those interested in language acquisition and observational research, as it meant that researchers would no longer need to anguish over their ability to capture a child's utterance in correct IPA on the fly. Following Bloom (1970), observationally-minded language acquisition researchers generally recorded the context in which these utterances occurred. The functionality of the tape recorder meant that they could spend more time noting elements of the context in which utterances occurred.

After the tape recorder, the video-tape recorder was the next development in the technological revolution. Of course, film had long since been available: Gesell had used it (without sound) for what he called cinemanalysis by, at the latest, 1935. The five reasons that he gave for using film, which also hold for video today, are as follows.

1. Since the film is being propelled at a known speed, it minutely records time values and sequences.

2. Film records space relationships and configurations.

3. Film records temporal and spatial relationships as a series of discrete relations.

4. These relations can be reinstated at normal, retarded, and accelerated speeds.

5. Any single frame can be studied in terms of time and space, as a single phase of a behavior pattern or event (Gesell. 1935).

Film was an excellent medium for studying behavior but it was never affordable or convenient enough to find its way into the observationalist's arsenal. Videotape finally freed the language acquisition researcher from paper and pencil - at least during data collection. The tasks of transcribing and context coding could wait until after data collection. Videotape. like film, allows multiple passes through the data. One might look at one thing this year and another next year, or one researcher may code one thing and a second researcher another. And the data remain intact.

Paper and pencil transcription, as a practice, did not change appreciably when observationalists started using videotape. Researchers continued to record the dialog of the participants along with a running account of the context just as they had done before with audiotape (see, for example, Bloom, 1973, which was the first published report of video-recorded child language data). Those variables that could be more easily coded with visual support were enhanced but nothing really changed in the transcription. However, videotape allows one to not only transcribe actions but also to code directly with the awareness that variables can be recoded because the observation is preserved on the videotape.

Using paper and pencil (both with and without audiotape), the choice of variables (especially, nonlinguistic variables) for transcription and coding had to be made prior to the collection of data. This choice is much more significant than usually noted. Ochs (1979), for example, quite convincingly outlines the position that transcription itself is theory. Theory manifests itself in all aspects of transcription including decisions about page layout, participant columns. placement of verbal and nonverbal behavior, in addition to the problem of the choice of what to transcribe.

Videotape and film help somewhat in the choice of what to transcribe. Here is Gesell from 1935:

"... the operator may freeze or activate the behavior to suit his observational fancy (and obtuseness). The behavior record becomes as pliant to dissection as a piece of tissue. Any phase or strand of behavior may be exposed to view. If the view is an intricate one it may be repeated numerous times without in any way damaging the original record. Here the dissection of behavior forms has a striking advantage over anatomical dissection. Bodily tissue suffers from the scalpel. but the integrity and conformation of behavior cannot be destroyed by repeated observation. A behavior form can be dissected over and over again in increasing detail without loss of form (pg. 6)."

Thus, fifty years ago, Gesell described the properties of film and video that we exploit today with the techniques of microanalysis. Microanalysis of videotaped data added a new level of interpretation to observational research. Not only could many variables be examined, but the interrelations between many separately coded variables could be investigated.

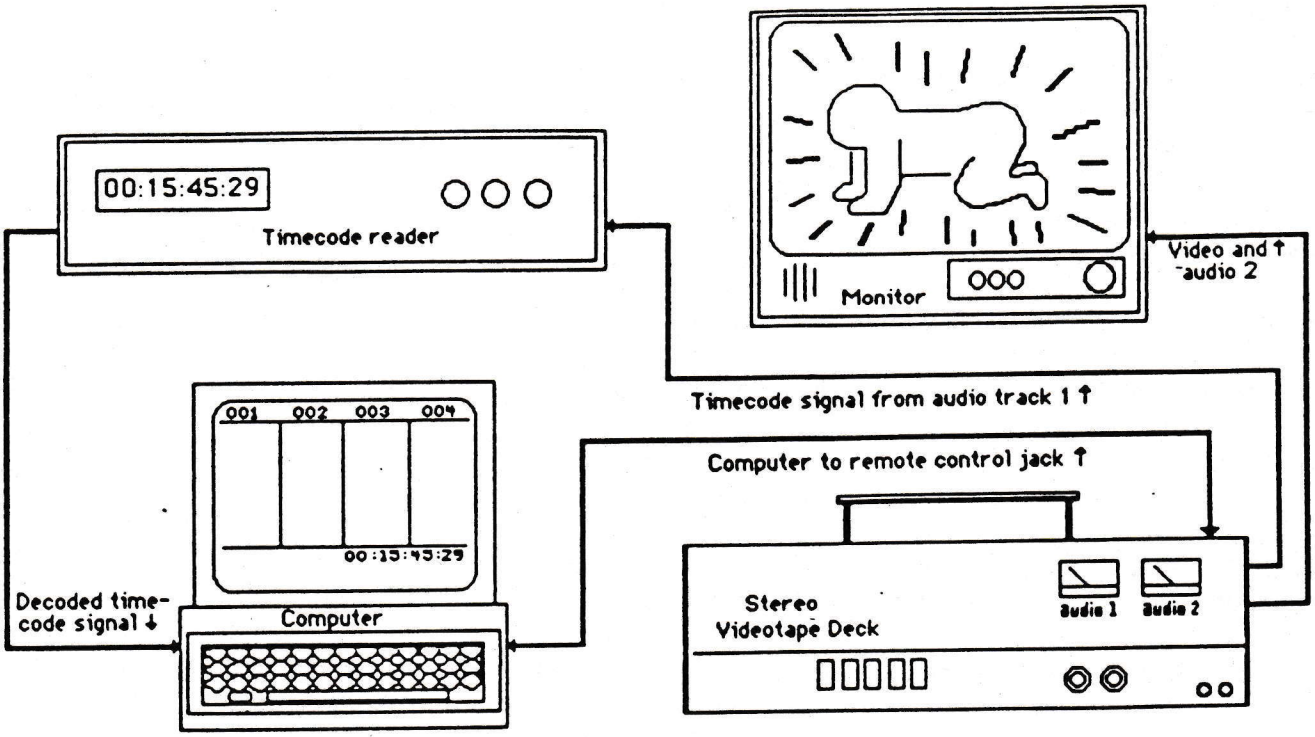
Ochs (1979) warns that a transcription should not have too much information, one must be selective. A transcript that is too detailed is difficult to follow and assess. The problems with transcripts that are too rich can reach epic proportions with videotape data because any particular videotape can be coded any number of times. This problem can be resolved by keeping the transcriptions from each data encoding pass separate, for example, on separate sheets. The researcher could then copy the separate analyses onto a final data sheet, and copy only those pertinent for the problem at hand. With the advent of date-time stamps the temporal succession of the data points from the separate analyses could be maintained by coding all data with the particular time of their occurrence. A date-time stamp generator superimposes a video image of a digital clock on the videotape. A different time appears on each of the thirty frames that are recorded for each second of real time. The merging of separate time associated data points can be done after several separate codings, allowing the merging of data coded by different coders at different times. With the data coded on paper, researchers must copy the data coded on the separate passes onto the master data sheets.

The advantages of a computer become obvious. Data stored in a computer with a timecode and a variable name, can be merged electronically. If the data are typed in once, they need never be written or typed again. The computer can store and manipulate them with a minimum of effort on the part of the researcher. The only necessity is a system capable of such a function.

3.2 Our Technology/Methodology

The system for coding videotape data that we developed uses state of the art (circa 1981) video and micro-computer equipment, and is similar to systems described by Adamson and Bakeman (1982) and Roth (1984). The system supports multiple pass analysis, allowing coders to code for one or more behaviors on each viewing of the videotape. It was designed with the goal of coding the temporal relationships between different modes of activity (for example, language, affect expression, action on objects, and gesture) by different interactants (in particular, mother and infant). These individual analyses can later be merged and analyzed by the microcomputer.

The hardware itself is, for the most part, commercially available. We use Apple II Plus computers, Sony stereo Betamax videodecks, audio signal timecode readers, and a simple multiplexing circuit made to interface the 32-bit timecode readers and the 8-bit Apples. An audio timecode is recorded onto track one of the stereo videotape while the audio signal from our data collection session is recorded onto track two. The timecode generator lays down a unique discrete audio signal thirty times every second, one for each frame of the videotape. Software and hardware connections allow control of the video deck from the Apple keyboard. This is schematized in Figure 1.



Coding station

The Apple can read the timecode as well as control the videodeck. This gives the Apple the ability to intelligently move the video tape to any time defined moment in the recorded observation. A coder sits at the Apple looking at the video monitor and decides when a behavior to be coded on that pass occurs. Using the Apple keyboard, the coder stops the tape and then must decide on which frame the behavior begins and/or ends. These particular frames are found by telling the computer to move the videotape forward or backward a specific number of frames and zeroing in on the desired frame. When the frame is found, the coder enters an edit mode and types in the data. Data can be entered as a string of up to 255 characters and can include anything that can be typed. Once entered the data are stored in files, ordered sequentially according to time code.

The transcript for analysis can be defined for output in a flexible manner. Since the data are electronically stored, they can be manipulated before being output to paper, so that transcripts can be set up in any number of ways. And, of course, since it is in a computer, the computer can perform many of the data analyses. In fact. we have also developed a system that allows us to run data manipulation programs such as could be written with any good data-base manager. We dump the data from our Apples onto an IBM-PC XT. The data are stored in a standard form – delimited ASCII – that allows access from any number of different programs.

Ellul (1967) has warned that the essence of technique is to make the qualitative quantitative. It is important to realize that some qualitative phenomena are immune to such transformation and. regardless of the state of technology, are likely to remain so. However, as technology advances and the number of possible quantitative analyses increases, we will see not so much a transformation as a supplanting of qualitative problems with never before imagined quantitative analyses.

References

Adamson. L.B. & R. Bakeman (1982). Affectivity and reference: Concepts. methods. and techniques in the study of communication development of 6- to 18-month-old infants. In T. Field and A Fogel (Eds.). *Emotion and early interaction*. (pp. 213-236). Hillsdale. N.J.: Lawrence Erlbaum.

Bloom, L (1970). *Language development: Form and function in emerging grammars*. Cambridge, Mass.: MIT Press.

Bloom, L (1973). *One word at a time*. The Hague: Mouton.

Ellul, Jacques. (1967). *The Technological Society*. (J. Wilkerson, Trans.). New York: Vintage Books.

Gesell. A (1935). Cinemanalysis: A method of behavior study. *Journal of Genetic Psychology. 47*(1), 3-16.

Ochs. E (1979). Transcription as theory. In E Ochs and B. Schieffelin (Eds.). *Developmental pragmatics* (pp. 43-72). New York: Academic Press.

Roth, P. (1984). Temporal and discourse properties in different styles of maternal speech to infants. Paper presented at the third International Conference for the Study of Child Language, July.