ARTT – A TOOL FOR TRANSCRIBING AND ANALYZING VIDEORECORDED INTERACTION

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ABSTRACT

Background: This paper discusses a tool for analyzing video data utilized in a research project on interaction and learning in instrumental teaching. The paper will discuss the design of the research methods in the project, focusing on close-up transcription of multimodal (Kress & van Leeuwen, 2001; Kress, Jewitt, Ogborn & Tsatsarelis, 2001) teacher-student interaction and systematic analysis of patterns of interaction and learning.

Aims: In the main study, 12 hours of video recorded interaction in instrumental lessons in high schools and teacher-training colleges in Sweden will generate three levels of results. A detailed microlevel transcription of speech, music and gestures will be analyzed, for interpretation on a macrolevel. Theoretical concepts from different, yet compatible, fields will be applied on each level.

Main Contribution: The large amounts of data generated, together with a systematic representation, description, analysis and interpretation create the need of an efficient tool to handle the data. The tool will render it possible to view the digital video on the computer screen, synchronised to a spreadsheet containing connected fields for transcribing and coding interaction in different modalities. The spreadsheet will be programmed to facilitate the recognition of patterns in the interaction, as well as more quantitative modes of output.

Implications: An ambition in the project is to make the research process transparent, in order to facilitate critical reading, as well as reproduction of the study. This also reflects an ethical ambition to aid in following the transformation of the actions of the informants through the processes of transcription and analysis, to the presentation of results and discussions of implications for practitioners. Another ambition is to make research related methods accessible to teacher-training programs, professional development programs in schools, as well as to practitioners and an interested public. This is an important reason for developing a tool for analysis utilising widespread office software, rather than a dedicated video analysis software package.

1. INTRODUCTION

The interaction between teacher and students has consequences for each student's opportunities to learn. Teacher-student interaction and implications on musical learning is brought into focus in a Swedish study of instrumental teaching. This paper discusses a software tool developed to facilitate the processes of transcription and analysis of the large amounts of video data generated in the Swedish research project. The design of the research methods in the project focuses on close-up transcription of videotaped multimodal teacher-student interaction and systematic analysis of patterns of interaction and learning. Transcription and analysis of video data is a time consuming task, and with a planned corpus of 12 hours of videotape an efficient way of handling the data was needed. The tool renders it possible to transcribe and analyze the entire body of video recordings at a microlevel within reasonable time.

The current study is divided into three different theoretical levels – description, analysis and interpretation – each with their own research problem, methods and theoretical framework, discussed in a separate paper. These levels represent a continuous movement from the close-up description of how teachers and students act and interact, over a systematic analysis of the patterns of interaction, and finally move on to an interpretation on a macrolevel of why they were interacting the way they did. The question of how different patterns of interaction affect the student's opportunities to learn is discussed on the analytical as well as on the interpretative level.

2. KEY FINDINGS

The project was challenged with finding a way to handle the large amounts of video data systematically and transparently utilizing a combination of commonly used office software. The software tool developed renders it possible to view the digital video synchronized to a spreadsheet containing connected fields for transcribing and coding interaction in different modalities, all on a single computer screen. The spreadsheet is programmed to aid the recognition of patterns in the interaction, as well as more quantitative modes of output.

3. CONTEXT

The main object of the study is to transcribe and analyze the processes of teaching and learning systematically in order to increase our knowledge about how different interaction patterns during instrumental music lessons affects the students' opportunities to learn. The lessons are recorded in Swedish high schools with a special instrumental music program as well as in Swedish colleges with an instrumental teacher-training program. The results of the analysis are discussed and interpreted within a wider historical and sociological perspective.

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4. METHODOLOGY AND METHODS

Instrumental lessons are videotaped using a digital camcorder. The recorded lessons are then transcribed and analyzed in full at a detailed microlevel.

Participation in the study is voluntary and the informants are well informed about how the video material will be used. A written consent is required of the participants or their parents if they are under 18. A research assistant place a small digital (mini-DV) camcorder (Panasonic NV-MX 350) with a wide-angle lens and a built in microphone of good quality on a tripod so that it will capture both the teacher and the student(s). The assistant leaves the informants by themselves in the room after starting the video recording, to reduce the affect on the tuition. Immediately when the lesson is over, the participants are invited to watch the video on a laptop computer (Macintosh PowerBook G4) connected to the camcorder by FireWire (also known as iLink, or IEEE 1394 Standard). After this they have the opportunity to opt out of the study, in which case the tape is immediately erased. A small questionnaire captures background data of the participants.

The large amounts of data generated, together with a detailed systematic representation, description, analysis and interpretation have created a need for efficient data handling. The tool consists of two commonly used software packages, connected through a third software that makes it possible to program simple strings of code to control the system software to enable the different software programs to interact. The digital video runs in Apple QuickTime Player and the transcript chart runs in a spreadsheet on Microsoft Excel.

The spreadsheet contains connected fields for transcribing and coding separate modes of interaction, and is programmed to facilitate the recognition of patterns in the interaction, as well as frequency calculations of several aspects of interaction. The Excel spreadsheet is programmed so that it can calculate the time code format with hours, minutes, seconds and frames per second. There are several shortcuts to display different combinations of data in the complex transcript and coding chart. It is also programmed to make automatic statistical calculations.

Both QuickTime and Excel are controlled through AppleScript, a simple programming language used to write script files for the Macintosh operative system, which automates the actions of the computer and the applications that run on it. Scripts are used to facilitate transcription and coding in several ways. One script lets the QuickTime Player be controlled with functions similar to a dictating machine, for example starting the video at an earlier point to where it was last stopped. A more complex script formats the time code in the video, copies that code to the computers' clipboard, pastes it into the active cell in the Excel spreadsheet, then starts an Excel macro that activates the following cell, and finally backs the video to play the last three seconds earlier before continuing to play, all at a single click on the mouse. This script also compensates for the delay in response time of the operator.

To import the video to the computer from the camcorder we use Apple iMovie, an easy to use video-editing program that automatically detects if the camera is connected to the computer. For more advanced video editing and time code manipulation the more complex Apple FinalCut Pro is used. Video data requires lots of memory space on the computer, and to be able to work with all of our video material in a single data file, we used the upgraded version QuickTime Pro to save the video in the compressed MPEG-4 format. This renders it possible to have the entire video material connected to a single spreadsheet, accessible for both qualitative and quantitative analysis. These large files can be stored together on a hard disc or on a single DVD-R.

All of the software is commonly used, and requires a minimum of additional programming. Microsoft Excel is a part of the standard Microsoft Office package; QuickTime Player is a free standard program for running video on the computer. These are available for a variety of operating systems, including Microsoft Windows and Apple Macintosh. AppleScript and iMovie is preinstalled in the Macintosh system. An important reason for developing a tool for analysis utilizing widespread office software, rather than a dedicated video analysis software package, is to make research-related methods accessible to teacher-training programs, professional development programs in schools, as well as to practitioners and the interested public.

5. DESCRIPTIVE LEVEL

The first level consists of 12 hours of videotaped lessons, the transcription charts of the multimodal communication, and concludes with a chronological narration of the events and actions during the lessons.

The vertical columns in the spreadsheet are used to register speech, music and gesture. In the horizontal rows these actions are divided into communicative units, or utterances separated by changes in prosody, gestures or music (Green & Wallat, 1979; 1981). Time is registered for each utterance.

The representation of spoken language is based on the differentiation of message units, symbolized with a new cell in the transcript chart. The musical events during the lessons and the way teachers and students play is also analyzed in a parallel way, where each new sequence is described in a new cell. For example how, and in which manners they play, or which genres were played (Rostvall & West, 2001).

A narrative description of the tuition also contains extracts from the transcriptions. The combination of different forms of representation enables the reader to follow parallel actions in different modalities; teacher and student speech and music performance, as well as other forms of actions like gestures and eye contact.

6. ANALYTICAL LEVEL

On the second level of study, the transcriptions of the multimodal communication were analyzed using theoretical concepts to differentiate and systematize patterns of interaction in the teaching and learning process. The analytical concepts in the study are developed from educational genres of speech and music use (Rostvall & West, 2001). This provides a multimodal analysis of the use of speech, music, gesture and method books according to a perspective based on traditions and needs in the specific music-educational setting.

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We differentiate between separate educational functions of speech and music and gesture during the lessons. The transcription chart has columns where the utterances are coded according to these functions. The coding cells have an automatic function that assigns a color to each of the functions. This facilitates fast recognition of patterns in the usage of music, speech and gesture.

There are also columns in the transcript for describing where the teacher and the student respectively focus their attention (Treisman & Davies, 1973; Schaffer, 1975). In combination with cognitive concepts of experiencing and learning music by developing internal schemata (Bartlett, 1932; Arbib, 1995), we compare the focusing of attention on different concrete targets and different forms of knowledge during the music lessons, with different ways of using language, music and gesture in interaction. Color-coding of the cells in the transcript also facilitates this comparison.

7. CONCLUSIONS

An ambition in the project is to make the entire research process transparent, in order to facilitate critical reading, as well as reproduction of the study. This also reflects an ethical ambition to aid in following the transformation of the actions of the informants through the processes of transcription and analysis, to the presentation of results and discussions of implications for practitioners.

The question of how different patterns of interaction affect the student's opportunities to learn is discussed on the analytical as well as on an interpretative metalevel. The 'Analyzing and Reporting Transcription Tool' - ARTT - makes this feasible even with very large amounts of video data.

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