Using Digital Technology in the Field: Report on Folklore Research in Ukraine.

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Since our last report on digital techniques ("Living in the Virtual Material World, SEEFA Journal, 9, no. 2) we have had the opportunity, and pleasure, of taking another research trip to Ukraine. Two major changes have taken place since our last research experience: the weight of computers with CD-Write capability has decreased and electricity in Ukrainian villages has become much more reliable. This has made the film camera quite obsolete. Film is always at risk of bad processing. It does not travel well if undeveloped. Per exposure it is more expensive than digitally stored images made at reasonable resolution.

The "digital age" does, however, have one very severe limitation – permanence. The Rosetta Stone was written in three languages and is still readable after 2000 years. Computer files stored on 5 1/4 inch floppy disks formatted with one of the early operating systems (CP/M, TRSDOS, etc.) or sound recordings made on wire-recorders are not readable after twenty to fifty years. The permanence of digital data of any type is a major dilemma for archives. Those interested in this complex topic can search the Web. Incidentally, web-links are one of the most transitory of storage media.

For us, the types of information which we would want to record on a folklore expedition include: two-dimensional artifacts such as pieces of paper or ritual towels (*rushnyky*), sound recordings, and three-dimensional objects from decorated eggs (*pysanky*) to village houses and other examples of vernacular architecture.

On our trip to Ukraine in July 2005, the following was packed into a small backpack (this is not meant as an endorsement, but to show what can be taken): a Dell Inspiron 700m computer, a Sony PC350 Handycam, a Nikon Coolpix 8700 camera, a Canon Powershot 330 camera, an Olympus DS2200 digital sound recorder, and a 0-360 Panorama Mirror. All of these had their own accessories: batteries, card-memories, and power converters. Because the various pieces of equipment had different card memory storage types we also took a "multi-format" card-reader which allows all data to be downloaded to the computer. In addition we had, packed elsewhere, a tripod, CD and DVD disks, and DV tapes.

Recording Manuscripts and Other Two-Dimensional Objects.

To the folklorist or scholar, making copies of two-dimensional information has always been possible. Even medieval monks were adept at this, although, with handwritten copies, one always worried about errors in transcription. The advent of film made reproduction more reliable, with the caveat of permanence. The invention of the xerographic recorder (Xerox et al.), made the copying of manuscripts much easier, provided one had access to such a machine. When Kononenko went to Kyiv in 1998, 99 and 2000, she would buy toner cartridges for the unused copiers in the archive of the Academy of Sciences Folklore Institute in exchange for the ability to copy needed manuscripts. Of course, when one is in a small village, there are no copiers.

Fortunately, we discovered on this trip that quite readable copies of notebooks can be made with a digital camera. (Figure 1).   The original color image of the notebook, when viewed on a computer screen, is much easier to read than the small, printed, black and white reproduction shown here. On the computer screen, colors can be easily reproduced and the blue writing stands out against the grayish background with its black horizontal and vertical lines. Using a digital camera is also gentler on the original manuscript than using a copy machine. The digital camera has a greater depth of field so that text on the curved portion of the page near the binding can still be read. For this section to be reproduced on a copy machine, the book would have to be pressed down, with possible damage to the binding. Of course large colored items such as *rushnyky* can only be reproduced with the digital camera; Xeroxing a *rushnyk* is out of the question. The quality of a photographic copy of a ritual object such as a *rushnyk*, even one produced in a hurry and under less-than-ideal circumstances is excellent. On the original image of the *rushnyk* shown in Figure 2, it is possible to see the individual stitches. These types of results are very important to us as they taught us what can be achieved when images have to be made quickly. We had no time to set up special lighting or copy-stands. Villagers are busy people. We were grateful to them for sharing their time with us. Thus, when they allowed us to make copies, we did this as quickly and as unobtrusively as possible. Notebooks were photographed near a window or with the camera flash and the *rushnyky* were placed on the floor and the photographer stood on a chair, if need be. On this expedition, we photographed over two hundred *rushnyky* and costume pieces and over sixty pages of villager's notebooks, not including items photographed in houses and churches for Panorama Movie production discussed below.

If the researcher does know in advance that large numbers of manuscripts need to be copied, a simple wire stand could be taken to hold the camera in a copying position. If reasonable care is taken in the photography, the resultant photograph can even be subjected to Optical Character Recognition (OCR) to produce text that can be edited. Figure 3 shows part of a page photographed from a book and Figure 4 is the output from an OCR program which was run on the photographed text, not the original in the book. The only error is in the last word.
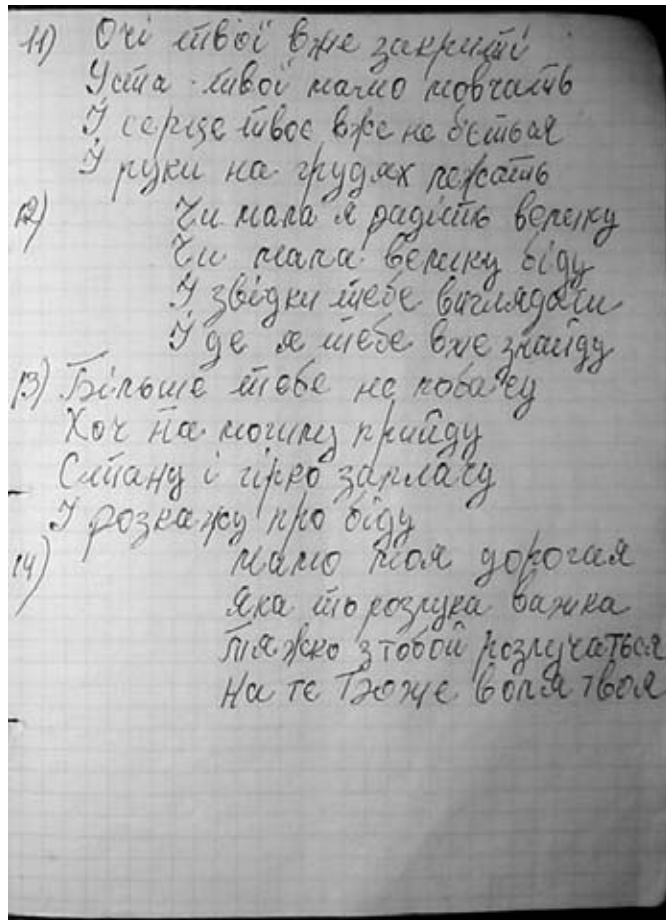
Figure 1

Figure 2

Figure 3

Сучасна світова фольклористика виявляє особливий інтерес до матеріалів максимальної автентичності. Поняття автентичності тлумачать набагато ширше, аніж просту точність і бездоганність фіксації словесного тексту. Наука наново усвідомила та навіть дещо переосмислила істотність "людського чинника" у фольклорному процесі. Неабиякий інтерес нині становить реалізація виконавцем надбань. трад:рції,

Figure 4

Recording Sound

From the very early days, sound recordings have been particularly important to the folklorist. A variety of media have been used in the past: wax cylinders, wire, or tape. Portable battery-powered cassette tape recorders have been used extensively in the recent past. These have several disadvantages: the tapes are quite large and therefore difficult to carry in the field. It is difficult to transcribe from tapes and cassettes. It is possible to overwrite the tape or cassette in error. A few years ago, mini-disc recorders appeared on the market. We used one on our previous trip to Ukraine and took one with us this time. Mini-disk recorders are indeed smaller and much lighter than tape or cassette recorders, but in our opinion, it is even easier to overwrite a recording, as we discovered to our chagrin. The mini-disc, like the cassette tape, is also difficult to work from when transcribing a text. A very simple and inexpensive improvement to both of these tools is the addition of a cable which connects from the "earphone output" of the recorder to the "line-in" plug of a computer sound card. Commercial software of various types allows a tape or mini-disc to be saved on the computer. WavePad is a free program which allows the recording to be saved as a compact mp3 file. Such a file will occupy approximately 1 mega byte per minute so that a CD would hold almost 12 hours of recordings. Such mp3 files have the advantage that the recording can be moved forward, or backward, instantaneously with the computer mouse and the precise location of a section of interest can be identified on the computer to a fraction of a second. In this way the researcher, or another person using a different computer, can return to this location of the sound file immediately. A program such as WavePad also allows the researcher to copy sections of interest to a new file if needed. Such sound samples are useful in lectures and in classroom presentation when a sample or other illustration is needed. Although this markedly improves the usability of the sound recordings, it is quite laborious to digitize a tape or mini-disc. The sound file must be entered into the computer at the same speed as that at which it was recorded. Thus, a forty-five minute tape takes forty-five minutes to digitize.

On our recent research trip, for the first time, we took a digital sound recorder. On the recommendation of the technical staff at the University of Alberta, we chose an Olympus DS2200. This tiny recorder has <u>none</u> of the problems of tape and disc recorders. It measures: 4 cm x 1.5 cm x 11 cm. It records thirty five hours on a 512 mega byte xD-Picture card and will record for 12 hours on two rechargeable AA batteries. Each time the record button is pressed, a new sound file is recorded. It is impossible to record over a file and it takes a conscious effort to erase a file. The recorder connects to a computer with the supplied USB cable and then appears as another drive to the computer. The computer then "sees" it as another drive. This means that a sixty minute sound file can be moved to the computer in seconds. The files are saved in a proprietary format but a free program called "Switch" will convert them to mp3 files. The upper range of the frequency response is only 8,000 Hz, but this is quite adequate for speech and low fidelity music. The recorder will accept external microphones and will record in stereo. We recommend this technology highly.

Once a sound recording is obtained, it is only useful if items of interest can be located within it. The classic solution to this is to transcribe the recording and to work from this transcription. Even with the digital age and with the possibility of doing word searches, we still need to transcribe and turn sound into text before this is possible. Full transcriptions have been done as part of large group projects, for example the British

National Corpus (BNC). The BNC is a 100 million word, searchable, collection of samples of written and spoken current British English. Such an endeavor is impossible for individual researchers. Also, unless the transcription is extensively annotated, speech nuances or emphases are lost. This type of annotation was in fact done in the book <u>Prose Folklore of Ploske, a Village in Chernihivshchyna</u>, reviewed in this issue of <u>Folklorica</u>. A less labor-intensive, and perhaps better, approach is to index the original sound file and to indicate where certain topics or keywords occur. As noted above, digital recordings have precise timing associated with them and so the section of interest in the recording can be located immediately. This process can be automated and made into a computer-searchable library of sound recordings.

At the University of Alberta, thanks to the Text-Analysis Portal for Research (TAPoR), we are working on indexing our sound files and we will make available recordings which have been annotated by searchable keywords. On the TAPoR web site it will soon be possible to enter a keyword and retrieve a series of short sound files which contain that keyword. Clicking on a selected short sound file will make the full sound file available for listening. The Ukrainian component of this project is currently being undertaken by Svitlana Kucherenko and Natalie Kononenko, with the assistance of the local director of TAPoR, Terry Butler.

What is <u>not</u> available yet in the area of sound recordings, and may never be, is a universal "sound to text" transcription program, that, is a program that will take any sound file and render it as text. For an idea of the possibilities here, check out www.speechbot.com. This commercial site has digitized over fifteen thousand hours of United States radio programs and converted them to text files with a "speech recognition" program. These text files can, of course, then be searched for a "keyword" very quickly. The web-site then goes back to the location in the original sound file and plays back the original sound file. Speechbot is nowhere near one hundred percent accurate, but does give a tantalizing view of what is possible.

Recording Three-Dimensional Objects

The web-site which grew out of our last trip to Ukraine, www.arts.ualberta.ca/uvp/, has a number of examples of three-dimensional objects: *pysanky*, clothing, houses. We feel that three-dimensional computer representation of such objects is mandatory for a full appreciation of them. A *pysanka* has a design written on a curved surface that flows around the whole egg. It cannot be appreciated from a single "face-on" view. Ideally, it should be held in the hand and examined from all sides. A person wearing a village costume is never looked at in a stationary "face-on" view. As the person approaches the viewer, subtle changes in angle show slightly different aspects. Perhaps the costume is meant to accentuate a particular part of the body, say the hips, which may not be obvious from the chosen angle. If only the view could be changed slightly by the viewer moving to one side. A room in a house is never looked at with a fixed gaze, one wall, then the next, then the next. You look around, seeing how the light from a window illuminates a picture on a wall, or how an icon corner is always opposite from the door. This can now be done on the computer. The term is Virtual Reality (VR). A simple, free, program: Apple QuickTime Viewer, can open a VR Movie and let the observer do exactly what we just described. The movies are not "movies" in the classical sense. They do not "move" in a linear fashion when viewed. Instead, they allow the viewer to "move" their eyes where they want them to. When a VR Movie

is opened, the viewer sees a stationary scene: front view of a *pysanka*, or person, or a wall of a room. When the computer "mouse" is "clicked" and moved the egg or person rotates or another wall slowly becomes visible. The viewer has complete control of the scene; they can move the object, or their view, back and forth at will.

Three-dimensional objects can be conveniently divided into two categories: small and large. When a small object, such as a *pysanka*, is examined, it is held in the hand and rotated: you are looking in at it. When a large object, such as a room, is examined, one stands in the centre of the room and turns around: you are looking out at it.

Small objects are rendered on a computer by placing them on a turntable and taking a series of separate photographs as the turntable and object are rotated by small amounts. Usually, thirty six photographs are taken, one every ten degrees as the object is turned a complete revolution. Software, such as VRWorx, can then generate a QuickTime Object Movie out of these images. In our previous report, we showed how a person wearing a costume can be captured as an Object Movie which can be viewed with the free program QuickTime. Two of these costume movies are shown on our web-site, together with Object Movies of fifteen *pysanky*. In the past, we used a home-made turntable which was rotated in ten degree steps by hand. We have now obtained a motorized turntable from Kaidan Corporation. This turntable rotates slowly while a digital video is made in the space of twenty to thirty seconds. Software then extracts images from this video and generates an Object Movie again. We are currently using this system to make Object Movies of several hundred *pysanky* in Edmonton. A graduate student, Mariya Lesiv, has been assigned to this task. Data will be saved at each step of the process. The original digital videos, continuous thirty second movies of *pysanka* after *pysanka*, will be archived. Individual high resolution movies of each egg (with written documentation shown at the start of each small movie) will be saved. The final (lower resolution) rotatable Object Movies will be placed on a web site. The motorized turntable can hold objects up to nine kilograms. The included software, however, limits its usefulness. It will work only on sixty cycle AC power (North America). Other software can be purchased for fifty cycle AC power, the kind available in Ukraine and Russia. We did not take this equipment to Ukraine.

Large objects, such as rooms, are made into Panorama Movies. These have tremendous potential for accurately reproducing the room as photographs, movies, or sound recordings can be embedded in the original panorama. When viewers "enter" the "virtual room," they can look around, look at enlarged pictures, turn objects, or listen to sound commentaries. Our web-site has two of these movies. They are of Ukrainian village houses and can, again, be viewed with QuickTime. These two houses were made by an extremely laborious technique. The houses were generated on a computer using a Computer Assisted Design (CAD) program (Strata). The bare items: walls, furniture, hanging pictures and so forth generated in Strata were then "covered" on the computer with actual photographs taken in the houses. With practice, a simple house can be generated in approximately one hundred hours. Another technique for generating Panorama Movies involves taking eight to ten digital photographs in the room, with the camera being rotated approximately forty-five degrees between photographs. The overlapping images are then "sewn" together, either manually or with software. The software subsequently generates the Panorama Movie. VRWorx will perform both these operations. For our research expedition this year we used a newer technique. This technique is much faster than either of the previous two

techniques and utilizes a parabolic mirror mounted on top of a digital camera. We used the mirror from the company "0-360." The set-up is shown in Figure 5. When a single digital photograph is taken, it records 360 degrees horizontally and 115 degrees vertically. In a room, all walls are captured, as is most of the floor and ceiling. The image is very much distorted, but free software generates a panorama, which can be made into a Panorama Movie. Figures 6 and 7 show the original image generated with the parabolic mirror and the resultant panorama. With an 8-megapixel digital camera, this panorama is 2959x868 pixels. An idea of the detail which can be captured is shown in Figures 8-10. Here the top, central and bottom 15% of a section taken from Figure 7 are shown. Again, enlarged images and so forth can be embedded in the Panorama Movie. We used this equipment extensively this summer and took the necessary photographs to make Panorama Movies of four village churches, four village house types, and a Kyiv apartment. First drafts of these nine Panorama Movies have just been placed on our web site. Interestingly, Panorama Movies made using parabolic mirrors are used extensively by realtors for selling houses on-line.

Figure 5

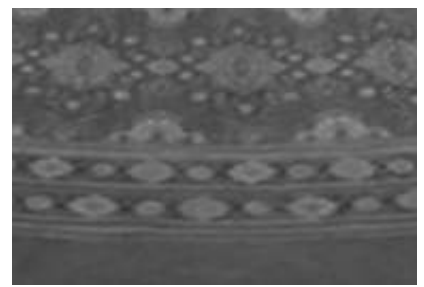Figure 6

Figure 7

Figure 8

Figure 9

Figure 10

There are a few caveats in using the panorama mirror: the digital camera must be one of the newer, larger types (eight mega pixels is ideal). A sturdy tripod is required and this can add weight to the equipment carried into the field. Focusing on a parabolic mirror requires some practice – preferably not in the field! With a camera recommended by the company which supplied the mirror, focusing is done on a small portion of the whole scene and, from bitter experience, we know that this zone must be well lit and have some texture or detail in it. We had great difficulty photographing an upper floor of an old village church, until the sun shone through a broken window and made a very bright pattern on the floor. Manual focusing could probably be done, but this was not the time to learn how to do this. When conditions are good and lighting is not a problem, panorama photography is not time-consuming. One beautiful village church in Dobranychivka, Iahotyn region, Kyiv province was photographed in approximately one hour. Eleven panorama photographs in four rooms, and outside, were taken, together with sixty-three photographs of icons and *rushnyky*. This has now been converted into a, first draft, Panorama Movie with: five individual panoramas and thirty-five embedded detail photographs. Even with the new panorama mirror, the generation of the final product on the computer is still quite labor-intensive. If a detail of an icon draped in a *rushnyk* is required, for example, the digital photograph of the icon and *rushnyk* must be cropped to the desired area. This is then copied-pasted onto a pre-generated white rectangle (1280x960 pixels), shrunk to fit in the rectangle, and saved. This "picture in a white rectangle" (screen proportions, or the image will be distorted) is imported into the worksheet of VRWorx and linked to the desired room-Panorama-Movie. The "room-panorama" must then be pre-viewed on the computer to place the "clickable hot spot" over the correct icon. When the icon in the room is then clicked, an enlarged image appears. When this image is clicked in turn, the observer returns to the original room looking at the correct wall where the icon hangs. For each "icon" or other imbedded image, the production process takes approximately three minutes.

This report is definitely a "work in progress." The digital sound recordings have yet to be listened to systematically and indexed. Some of the one thousand general digital photographs, those not related to a specific house or church, will be used in University of Alberta courses this fall. The first drafts of the Panorama Movies of the four churches, four houses, and the apartment will also be used in teaching, and these Movies have been placed on our web-site.