POWERLESS IN THE FIELD: A CAUTIONARY TALE OF DIGITAL DEPENDENCIES

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The modern fieldworker is increasingly carrying more and more digital equipment into the field to conduct research. Digital devices and formats open up an exciting world of possibilities, potentially allowing a fieldworker to collect more and greater quality data, and to use and build upon this data in ways that were previously laborious or impossible. But while much of this equipment eliminates a number of problems with earlier analogue equipment, it also introduces a whole new set of problems and dependencies.

The previous model for fieldwork was to carry a notepad and pencil/pen, tape recorder and a box or two of tapes and alkaline batteries. This was a lightweight and robust setup. The power consumption on these old cassette recorders can be quite low, so a box or two of alkaline batteries could get you through an entire trip. Cassette recorders have rudimentary indexing capabilities, and extensive manual logging of data meant that an efficient fieldworker could achieve a lot with relatively little. The simplicity of the setup meant that there were few things that could go wrong, but if they did, it would quickly become difficult or impossible to continue work. A modern setup might seek to increase the quality of collected data in several ways, but it also increases the complexity of the chain of dependencies in a workflow, and the sensitivity of each component. If a part of this chain were to break, this could make it difficult or impossible to continue fieldwork.

During late 2005 to early 2006, with Fiona Blake from the University of Sydney I conducted five months of fieldwork in a moderately remote area in north-western Papua New Guinea, at Mori village in Sandaun Province. The work was a preliminary sketch of the language Fas, the largest language (about 1600 speakers) within a whole family of essentially undocumented languages. With children no longer speaking this language, it is possible that this language may no longer be spoken at all within fifty years.

The location was a classic example of a low power situation. First of all, the village had no ready source of electricity. It was difficult to carry in equipment and availability of technical equipment at the nearest town was sporadic. We knew this before we headed to the location, but working for a digital archive I was keen to employ a digital workflow, and so prepared as much as possible.

The problems began before we were even on the plane.

Backup Plans for Backup Plans

Papua New Guinea has a hot and humid tropical climate, not suited to sensitive electrical equipment. This means that all sensitive equipment needed to be stored in airtight containers. Many people still cart analogue equipment into the field, but this is fast changing. Analogue media, such as cassette tapes, are bulky and place an upper limit on the number and length of your recordings. Generally speaking, it is not a good idea to tape over old recordings either, so once you've used up your tapes, that's it.

We were doubly careful with equipment for storage of data, as this is the most precious of materials carried out from the field. These were stored in Tupperware containers with silicone moisture eaters. We had large Ziploc bags as a light-weight alternative backup should something go wrong.

We carried in a spare cassette recorder in case the digital recorder, and any of its various parts failed. The Marantz PMD222 cassette recorder has been a solidly reliable audio recorder for fieldworkers in these conditions for many decades. The Nagra ARES BB+ compact flash recorder is built for similar conditions, but was, as far as we knew, getting its first run in Papua New Guinea, so we wanted to be prepared should it fail.

We carried in a digital camera and a plain film camera in case the digital one failed. We chose not to take in a laptop, because we had been advised that it simply wouldn't stand up to the humidity.

We used a portable hard disk with memory card reader to back up files as we went. This was an additional backup audio recorder as well. With hindsight, taking only one hard disk was extremely foolish as we only had one copy of all our files. We had planned to transfer our recordings to minidisk and cassette tape in the field, but in practice this quickly became unmanageable due to power and time constraints.

In addition to all this we carried in a basic solar power rig: a flexible solar panel, small Sealed Lead Acid battery (SLA) and a charge regulator

(Honeyman, 2006).[1] The size of the panel was chosen based on the estimated power consumption of our equipment. We also carried spare parts and electronic equipment to diagnose or remedy any problems that might occur. These latter included a digital multimeter, a 10xAA battery holder (for building a 12-volt power source from rechargeable AA batteries), spare wiring with alligator clips, fuses for all equipment, a battery tester and so on. While all this seemed excessive at the start, in fact it turned out to be necessary and indeed critical.

Weight

The first complaint would have to be the weight of all the equipment. Because digital equipment often requires more power than analogue equipment, batteries of various kinds ended up taking the bulk of our weight allowance. This is amplified when working in a hot climate as batteries will discharge faster and require more power charge.[2] The one piece of equipment that we used the least—a digital video camera—weighed the most, and consumed the most power. Because video cameras are quite power-hungry, we chose to trade weight for power consumption. To avoid recharging the batteries in the field we carried in a couple of large 5-hour batteries into the field and only recharged when we went back to town.

Because all equipment had to be carried in, it needed to be able to be split into packages of 10kg or less, and for sensitive equipment, remain in airtight containers. This is difficult when you try to fit as much equipment as possible into sturdy and airtight Pelican cases.

It is a delicate juggling act between choosing the lightest possible equipment, and having sturdy enough equipment and a backup plan should anything fail. Add to this the fact that some digital devices are more power hungry than others, and you have a complex mix of competing factors to take into account: sturdiness, weight, power consumption and portability. And this is, of course, after considering recording quality.

In the past and even now, researchers have chosen light weight minidisk recorders for recording primary field data. These are not only light but also have relatively low power consumption, an ideal combination for most fieldworkers. However, these devices use either psycho-acoustic compression and/or methods to restrict the flow of digital files onto a

computer that cancel out these positive features. They have been strongly advised against by several audio recording specialists (Schüller, 1999).

Unexpected Problems

The recording of field data went relatively smoothly. One unexpected problem was that our backup method—a standalone hard drive/card reader—reset critical date-time file metadata on our recording files.

The weakest part of our planning turned out to be the most critical of all. The flexible solar panel we had purchased, which we had assumed to be the most robust of all equipment, turned out to simply melt in the Papua New Guinean midday sun. It failed in the first week of use, leaving us with no power source for the first month. With an almost entirely digital set up, this was just about the worst thing that could have happened.

Glass coated solar cells can be similarly fragile—that is why we chose the flexible panel—and are quite heavy.

Travelling back to town was not really an option. It is an expensive, and physically exhausting, two-day trip. Fortunately, we had purchased several D-Cell batteries in town for the people in the village, which we then had to use ourselves. Not so fortunately, the hot climate seems to destroy these batteries quite quickly. With a multimeter, tin foil from a chocolate wrapper and some gaffer-tape, I was able to chain enough of these batteries together to produce enough voltage to run or charge other equipment. This turned out to be our major power source for most of the trip, even though it is the one that most people warn against, because of the variable quality of disposable batteries in remote Papua New Guinea.

I became increasingly desperate for power as the trip progressed, and the villagers, keen to continue working, helped me out. In the third month, a broken petrol generator emerged from nowhere, and after some tinkering, this then functioned nicely for a month. A small solar cell emerged in the final month, but had too low a voltage for charging a 12-volt SLA battery, so I had to boost it with a pile of spent disposable batteries that I had lying around, and manually adjust the angle of the cell throughout the day to ensure I was getting the maximum amount of power out of it.

This was not the ideal way to have power in the field.

Outcomes

By carefully rationing power throughout the whole trip, we managed to record plenty of useful raw data. But reduced power did have several effects. What was sacrificed first was review time. For instance, reviewing video data would have drained my power too quickly, so I was limited to audio only. This was less than ideal when our primary area of linguistic research was in the spatial system of the language. The number of recordings we were able to make dropped, not only because sometimes we simply didn't have enough power, but also because we were sometimes too busy trying to get power in the first place.

The digital still camera turned out to be very useful. With plenty of space available for photos on our backup medium, and low power consumption, we were able to extensively photo-document the entire trip. The audio notes capability built into the camera allowed for the coupling of crude linguistic and reference data with images. For instance, plant names could be recorded with the photo of the plant. This provides excellent data for materials to give back to the community as well. All too often linguists end up with dictionaries full of plant names, with a gloss of 'plant species'. Using images provides a meaningful way for the speech community to interpret a lexical entry. The same can be true of cultural artefacts, which could possibly be better glossed with an image in context.

Conclusion

Several other fieldworkers have reported on successfully conducting digital fieldwork (Robinson, 2006; Lindstrom, 2004). However I wish to caution those who do wish to conduct fieldwork in a difficult area to consider backup plans should critical pieces of equipment fail.

Power sources, power consumption and weight are critical factors in a digital workflow. These factors operate in competition, so that unfairly focusing on one area can adversely affect another. Fieldwork in a low power area only exacerbates the issue. A digital setup is far more complex than previous analogue fieldkits, and because of this, there are more points in the chain of equipment for something to go wrong. While there are several reasons why digital fieldwork is a good thing, it still has a long way to go before it can be easily adopted in the more extreme field sites.

Endnotes

[1] For more information on solar setups see also Castle and Nathan (2006), Heilpe (1996), Lindstrom (2004), and Robinson (2006).

[2] For more on the properties of sealed lead acid batteries, including information on their performance in hot climates see Darden (2006).

References

Castle, T., Nathan, D. (2006). *Power solutions in the field: Using an accumulator*. Retrieved October 25, 2006, from http://www.hrelp.org/archive/advice/accumulators.html

Darden, W. (2006). *Car and deep cycle battery FAQ*. Retrieved October 25, 2006, from http://www.uuhome.de/william.darden/

Heilpe, P. (1996). *How to make a solar power generator*. Retrieved October 25, 2006, from http://www.rain.org/~philfear/how2solar.html

Honeyman, T. (2006). *Solar power in the field, part 1*. Retrieved October 25, 2006, from http://blogs.usyd.edu.au/elac/2006/08/solar_power_in_the_field_part_1.html

Lindstrom, E. (2004). *Eva's solar page*. Retrieved October 25, 2006, from http://www.ling.su.se/staff/evali/solar.html

Northrup, M. (2006). *N5ESE's portable solar charger*. Retrieved October 25, 2006, from http://www.io.com/~n5fc/solar.htm

Robinson, L. (2006). Archiving directly from the field. In L. Barwick and N. Thieberger (Eds.), *Sustainable data from digital fieldwork: from creation to archive and back*. Sydney: Sydney University Press.

Schüller, D. 1999. Minidisc for field recording? Applying archiving principles to data gathering. *IASA Journal, 14*, 35-40.