Digital Deployment of the Signs of Ireland Corpus in Elearning

Lorraine Leeson, Brian Nolan

School of Linguistic, Speech and Communication Sciences, Trinity College Dublin
Centre for Deaf Studies, 40 Lwr. Drumcondra Road, Drumcondra, Dublin 9, Ireland.

Department of Informatics, Institute of Technology, Blanchardstown, Dublin, Ireland.

E-mail: leesonl@tcd.ie brian.nolan@itb.ie

Abstract

The Signs of Ireland corpus is part of the School of Linguistic, Speech and Communication Sciences' "Languages of Ireland" project. The first of its kind in Ireland, it comprises 40 male and female signers from across the Republic of Ireland, aged 18-65+, all of whom were educated in a school for the Deaf. The object was to create a snapshot of how ISL is used by 'real' signers across geographic, gendered and generational boundaries, all of which have been indicated as sociolinguistically relevant for ISL (cf. the work of Le Master; also see Leeson and Grehan 2004, Leonard 2005, Leeson et al. 2006). With the aim of maximising the potential of cross-linguistic comparability, we mirrored aspects of data collection on other corpora collected to date. Thus, we include the Volterra et al. picture elicitation task (1984), "The Frog Story", and also asked informants to tell a self-selected story from their own life. To date, all of the self-selected and a quarter of the Frog Story data have been fully annotated using ELAN.

Two institutions (TCD and ITB) have partnered to create a unique elearning environment based on MOODLE as the learning management system, funded under the Irish government's Strategic Innovation Fund, Cycle II. This partnership delivers third level signed language programmes to a student constituency in a way that resolves problems of time, geography and access, maximizing multi-functional uses of the corpus across undergraduate programmes. Students can take courseware synchronously and asynchronously. We have now built a considerable digital asset and plan to re-architect our framework to avail of current best practice in digital repositories and digital learning objects vis-à-vis Irish Sign Language.

This paper outlines the establishment and annotation of the corpus, and the success of the corpus to date in supporting curricula and research. This paper focuses on moving the corpus forward as an asset to develop digital teaching objects, and outlines the challenges inherent in this process, along with our plans and our progress to date in meeting these objectives.

Specific issues include:

- Decisions regarding annotation
- Establishing mark-up standards
- Use of the Signs of Ireland corpus in elearning/ blended learning contexts
- Leveraging a corpus within digital learning objects
- Architecture of a digital repository to support sign language learning
- Tagging of learning objects versus language objects
- Issues of assessment in an elearning context

1. Background

This paper outlines the establishment and annotation of the Signs of Ireland corpus, currently the largest digital annotated corpus in Europe insofar as we are aware, and the success of the corpus to date in supporting curricula and research. This paper focuses on moving the corpus forward as an asset to develop digital teaching objects. This paper outlines the challenges inherent in this process, and outlines our plans and our progress to date in meeting these objectives.

1.1 A Note on Irish Sign Language

Irish Sign Language is an indigenous language of Ireland. It is used by some 5,000 Irish Deaf people as their preferred language (Matthews 1996) while it is estimated that some 50,000 non-Deaf people also know and use the language to a greater or lesser extent (Leeson 2001). The Signs of Ireland corpus is part of the Languages of Ireland programme at the School of Linguistic, Speech and Communication Sciences, TCD. It comprises data from

Deaf Irish Sign Language (ISL) users across Ireland in digital form, and has been annotated using ELAN, a software programme developed by the Max Planx Institute, Nijmegan. The corpus is housed at the Centre for Deaf Studies, a constituent member of the School.

While technology has opened the way for the development of digital corpora for signed languages, we need to bear in mind that signed languages are articulated in three dimensional space, using not only the hands and arms, but also the head, shoulders, torso, eyes, eye-brows, nose, mouth and chin to express meaning (e.g. Klima and Bellugi 1979 for American Sign Language (ASL); Kyle and Woll

1985, and Sutton-Spence and Woll 1999 for British Sign Language (BSL); and McDonnell 1996; Leeson 1996, 1997, 2001; O'Baoill and Matthews 2000 for Irish Sign Language (ISL)) leads to highly complex, multi-linear, potentially dependent tiers that need to be coded and time-aligned.

As with spoken languages, the influence of gesture on signed languages has begun to be explored (Armstrong, Stokoe and Wilcox 1995, Stokoe 2001; Vermeerbergen and Demey (2007)), while discussion about what is linguistic and what is extra-linguistic in the grammars of various signed languages continues (e.g. Engberg-Pedersen 1993, Liddell 2003, Schembri 2003). While these remain theoretical notions at a certain level, decisions regarding how one views such elements and their role as linguistic or extra-linguistic constituents plays an important role when determining what will be included or excluded in an annotated corpus. Such decisions also determine how items are notated, particularly in the absence of a written form for the language being described.

2. ELAN

Originally developed for research on gesture, ELAN has become the standard tool for establishing and maintaining signed language corpora. ELAN (EUDICO Linguistic Annotator) is an annotation tool that allows one to create, edit, visualize and search annotations for video and audio data. ELAN was developed with the aim of providing a sound technological basis for the annotation and exploitation of multi-media recordings.. *(Source: ECHO Project - http://www.let.ru.nl/sign-lang/echo/index.html?http&&&www.let.ru.nl/sign-lang/echo/data.html)*

3. The Corpus

The corpus currently consists of data from 40 signers aged between 18 and 65 from 5 locations across the Republic of Ireland. It includes male and female signers, all of whom had been educated in a school for the Deaf in Dublin (St. Mary's School for Deaf Girls or St. Joseph's School for Deaf Boys). None were sign language teachers, as we wished to avoid the collection of data from signers who had a highly conceptualized notion of 'correct' or 'pure' ISL. All use ISL as their preferred language. While some of the signers are native signers insofar as they come from Deaf families, the majority are not. Several have Deaf siblings. All signers included use ISL as their first or preferred language, and all acquired it before the age of 6 years. The distribution of locations from where data was collected can be seen in Figure 1 below and a breakdown of the gender and age of participants is outlined in Figure 2.

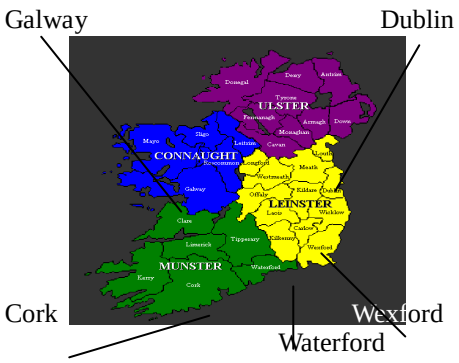

Figure 1: Sites for Corpus Collection (2004)

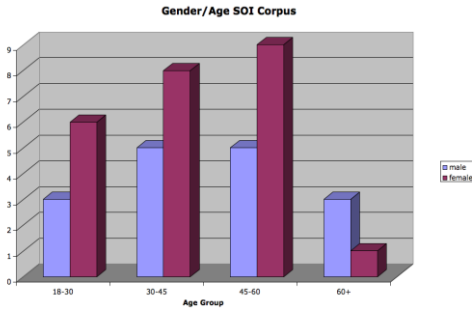

Figure 2: Preliminary gender breakdown within Corpus Collection (2004)

Data was collected by a female Deaf research assistant, Deirdre Byrne-Dunne. This allowed for consistency in terms of data elicitation. It also meant that, due to the demographics of the Irish Deaf Community, Ms. Byrne was a known entity to all of the participants, which is evident in some placed in terms of interaction on-screen between informants and data collector, allowing for some interesting sociolinguistic insights. The fact that Ms. Byrne-Dunne is herself Deaf, and an established member of the Irish Deaf community, meant that the potential for 'Observor's Paradox' (Labov 1969) while not reduced, took on a positive spin: knowing who the interviewer/ recorder of data was, and knowing their status as a community member, lent itself to the informants opening up and using their 'natural' signs rather than a variety that they might have assumed a university researcher would 'expect' or 'prefer'.

It also meant that the informants who knew Deirdre, either as a former class-mate or from within the Deaf community, code-switched to use lexical items that would not typically be chosen if the interlocutor was unknown. For example, some 'school' signs were used (BROWN). And in other instances, informants, telling stories that they had self-selected, referred to Deirdre during the recounting of their tales.

We have touched on the fact that data collected included self-selected narratives. We also asked participants to tell 'The Frog' story, which is a

picture sequence format telling the story of a young boy who, with his dog, searches for his frog, which has escaped from a jar. Informants were also asked to sign the content of the Volterra picture elicitation task, a series of 18 sets of paired pictures showing a series of situations that aim to elicit transitive utterances. Both the 'frog' story and the Volterra picture elicitation task have been used widely in signed language specific descriptions and in cross-linguistic comparisons, including ISL (e.g. Leeson 2001 for ISL; Johnston, Vermeerbergen Schembri and Leeson (2007) for Australian Sign Language, Flemish Sign Language and ISL; Volterra et al. 1984 for Italian Sign Language; Coerts 1994 for Sign Language of the Netherlands).

Funding permitting, we would like to expand the data on file to include renditions of Chafe's Pear Story and Aesop's fables, dialogues, and interviews with Deaf ISL users regarding how they view ISL in order to record the current status and usage of ISL. We would ideally also like to supplement this with register specific data, such as descriptions of occupational activities to elicit the range of register specific vocabulary available within the community at present. Additional gaps that need to be addressed include dialogues and ethnographic data, the inclusion of child language data and elderly signers. Further, there are a number of locations that we would also like to see represented as they represent particular sociolinguistic situations (e.g. the language situation in Northern Ireland, the Mid-West).

For example, the Mid-West School for the Deaf was established some 20 years ago, with the result that many children from the region were educated locally. This brought an end to the tradition for all Deaf children in Ireland to attend the Catholic Schools for the Deaf in Dublin. This shift in educational provision has also allowed for a 'regional variant' to have emerged, brought about by the relative isolation of signers in the Mid-West during their formative schooling years (Conama 2008). To explore this further, we are currently collecting data in the Mid-West region (Limerick, Tipperary, Clare).

4. Annotating the Corpus

One of the myths of annotating data is that the annotators are neutral with respect to the data and that they simply 'write down what they see'. But it is just that – a myth. As ISL does not have a written form, there is no standard code for recording it. While some established transcription keys exist (HamNoSys, Sign Writing, Stokoe Notation), none of these are compatible with ELAN and none are fully developed with respect to ISL.

Another issue is that these transcription systems are not shared 'languages' – that is, in the international sign linguistic communities, these transcription codes are not common place, and to use one in place of a gloss means limiting the sharing of data to an extremely small group of linguists. However, glossing data with English 'tags' is problematic too. Pizzutto and Pietrandrea (2001) point out the dangers inherent in assuming that a gloss can stand in for an original piece of signed language data. They note that "It is often implicitly or explicitly assumed that the use of glosses in research on signed [languages] is more or less comparable to the use of glosses in research on spoken languages … this assumption does not take into account, in our view, that there is a crucial difference in the way glosses are used in spoken as compared to signed language description. In descriptions of spoken (or also written) languages, glosses typically fulfill an ancillary role and necessarily require an independent written representation of the sound sequence being glossed. In contrast, in description of signed languages, glosses are the primary and only means of representing in writing the sequence of articulatory movements being glossed" (2001: 37). Later, they add that " … glosses impose upon the data a wealth of unwarranted and highly variable lexical and grammatical information (depending upon the spoken/written language used for glossing)." (ibid: 42).

Thus, the glossing of signed data is fraught with potential problems – even when a team is working very consistently and cross-referencing work in a diligent manner, as is the case here. The Signs of Ireland project appears to be unique in that *all* annotated data was verified by a Deaf research assistant who holds a masters degree in applied linguistics. All three annotators held masters degree qualifications in linguistics/ communications as well as Deaf Studies specific qualifications, making them uniquely qualified to work with this data.

While one of the most positive features of ELAN is the fact that the stream of signed language data runs in a time-aligned fashion with the annotations, the problem remains that any search function is restrained by the consistency and accuracy of the annotations that have been inputted and second-checked by the Signs of Ireland team.

For example, several ISL signs may be informally glossed in the same way, but the signs themselves are different, for example, HEARING [1] as used by older signers ("L" handshape at chin) and HEARING [2] ("x" handshape at chin) as used by younger signers. The fact that both of these signs are glossed in the same way demonstrates that any frequency count that would subsequently be carried out using ELAN would not distinguish between the two on the basis of the gloss, HEARING, alone. But the inclusion of both variants glossed in the same way does allow students to search for all possible variants of the signs and find relevant sociolinguistic information as to who typically uses the sign (gender, age, region) and whether it is a borrowed sign or seems idiosyncratic in some way.

HEARING [1]

HEARING [2]

This issue of tagging items according to grammatical function is yet another issue that poses challenges. We have not yet tagged data in this way because we do not yet know enough about the grammatical function of items in ISL to accurately code to that level. Despite this, our annotations do reflect assumptions about the nature and structure of certain items. We also take very seriously the concerns of linguists who have discussed the impact of early codification of signed languages like Flemish Sign Language (VGT) (Van Herreweghe and Vermeerbergen 2004).

Despite the fact that we wanted to avoid making assumptions about word class and morpho-syntax, the act of annotating a text means that certain decisions have to be made about how to treat specific items. For example, it is known that non-manual signals, articulated on the face of the signer, provides information that assists in parsing a message as for example, a question or a statement, or in providing adverbial like information about a verbal predicate (e.g. Leeson 1997; O'Baoill and Matthews 2000 for ISL, Sutton-Spence and Woll 1999, Brennan 1992, Deuchar 1984 for British Sign Language; Liddell 1980 for American Sign Language). When it comes to annotating such features, we had to decide if we would treat non-manual features as dependent tiers, relative to the manual signs that they co-occur with, or as independent tiers containing information that may be supra-segmental in nature. We decided to treat all levels as independent of each other until we could ascertain a relationship that held consistently across levels.

At the lexical level, there were decisions to be made as to what constitutes a word in ISL. While established lexical items that have citation forms in dictionaries or glossaries of ISL were 'easy' to decide on, there was the issue of how to determine if a sign was a 'word' or a 'gesture' or part of a more complex predicate form, often described as classifier predicates. The fact that some signers used signs related to their gender or age group challenged the annotators – they had to determine whether a sign that was new to them was a gendered variant (Le Master 1990, 1999-2000, Leeson and Grehan 2004), a gendered generational variant (Le Master ibid, Leonard 2005), a mis-articulation of an established sign (i.e. a 'slip of the hand' (Klima and Bellugi 1979), an idiosyncratic sign, a borrowing from another signed language (e.g. BSL), or a gesture. Our team's experience and qualifications helped the decision making process here. All decisions were recorded in order to provide a stable reference point for further items that challenged that shared characteristics with items that were discussed previously.

The use of mouth patterns in signed languages provide another challenge for annotators dealing with signed languages. Mouthings and mouth gestures have been recognized as significant in signed languages, and while mouthings are often indicative of the language contact that exists between spoken and signed languages, mouth gestures are not (for example, see Boyes Braem and Sutton-Spence 2001, Sutton-Spence 2007).

Given that the Signs of Ireland corpus will, in the first instance, be used by researchers looking at the morpho-syntax of the language, we opted to not annotate the mouth in a very detailed manner. Instead, we have provided fairly general annotations following from those listed in the ECHO project annotations list.

5. Use of the Signs of Ireland corpus in elearning/ blended learning contexts

The Signs of Ireland corpus has been piloted in elearning and blended learning at the Centre for Deaf Studies in the academic years 2006-7 and 2007-8 across a range of courses, but specifically, Irish Sign Language courses, an introductory course focusing on the linguistics and sociolinguistics of Irish Sign Language, and a final year course that focuses on aspects of translation theory and interpreting research. At present the corpus exists on each client-side computer. Students are provided with training in how to use ELAN in order to maximize use of the corpus. The implications of this are that, currently, students must be able to access the corpus in a lab. This presents a challenge for blended

learning delivery where students require internet access to the corpus. This also creates challenges in terms of data protection legislation, distribution, copyright and general access issues which need to be resolved as we move forward. For example, subsets of the data are already used as digital learning objects, but no decision has yet been made regarding optimal management and deployment of the corpus.

Examples of how we have used the corpus include the following:

We have developed assessments to Council of Europe Common European Framework of Reference level B1 (productive/ expressive skill) and B2 (receptive/ comprehension skill) level for ISL. This includes a receptive skills test which includes multiple choice questions linked to data taken from the Signs of Ireland corpus. The corpus data sits amid other test items, which are outlined in Table (1) below:

Test Item	Domain	Duration	Test Format
Multiple Statements	Life Experience	1 1/2 minutes video (10 minutes)	Visual images (10 items)
The Deaf Summer Camp (SOI)	Life Experience Travel Deaf Current Affairs	1 minute video (10 minutes total)	MCQ Paraphrase True/False Qs Pen & paper (10 items)
"My Goals"	Ambitions / Professional Focus	1 minute video (10 minutes total)	MCQ Paraphrase True/False Qs Pen & paper (10 items)

Table 1: Sample ISL Receptive Test Using Digital Objects

We also use the corpus as part of the continuous assessment of students in our Introduction to the Linguistics and Sociolinguists of Signed Languages course. For example, students are required to engage with the corpus to identify frequency patterns, distribution of specific grammatical or sociolinguistic features (e.g. lexical variation) and to draw on the corpus in preparing end of year essays.

In the Translation and Interpreting: Philosophy and Practice course, students engage with the corpus to explore issues of collocational norms for ISL, look at the distribution of discourse features and features such as metaphor and idiomatic expression.

6. Leveraging a Corpus and Digital Learning Objects

To optimally leverage the Signs of Ireland corpus within a learning environment, we will, in the initial phase of the proposed educational value chain begin by determining what are the actual functional requirements with respect to how the application will be used by both students and academics in the blended learning context.

At the moment we have Moodle populated with a wide variety of modules delivered within the suite of CDS undergraduate programmes. The Signs of Ireland digital corpus is tagged in ELAN. We have traditional classroom and blended delivery of content.

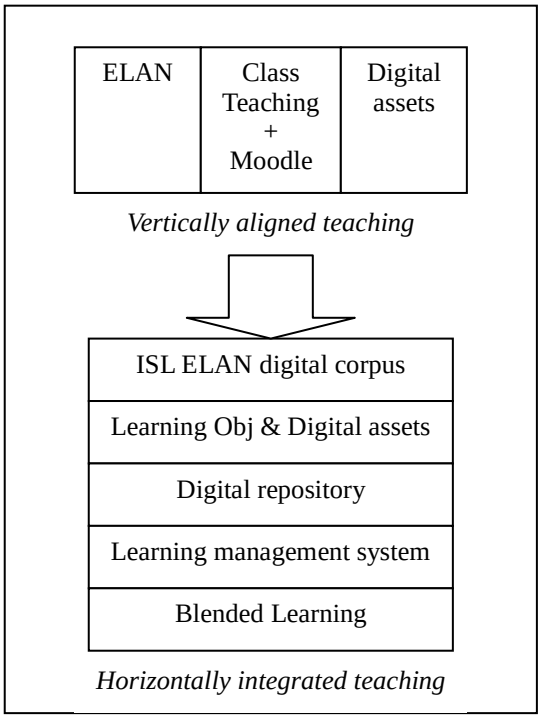

Figure 3: The integrated model

The present programme architecture is very vertical in orientation (Figure 3). The challenge is to achieve horizontal integration through the use of information technology, the Internet and a blended learning approach.

7. Architecture of a Digital Repository to Support Signed Language Learning

Planning is also required with respect to the overall architecture and framework. We are in the process of determining what profiling and other user related information we require to capture and tag data regarding the user environment and their interaction with the digital classroom and curriculum.

Additionally, we have started the analysis that will indicate what types of learning objects we need for each of the programme modules for each lecture, and

how many and of what type with the intention of making our blended learning Diplomas and Degrees available online from September 2009. We make the initial base assumption that the target client devices are browsers on internet aware laptops and desktops. This assumption can be expected to evolve, over time, into mobile devices such as the Apple iPhone, iPod Touch and similar computing appliances. This will deliver to us a plan for the capture and creation of the respective digital rich media that we intend to deploy within our learning objects.

We are designing and architecting our learning environment to situate the learning objects in a digital repository in such a way to easily facilitate their use in conjunction with a learning management system. The repository will be expected to link the learning objects to the learning management system in a horizontal integrated manner across the appropriate technology hardware and software platforms. We plan to facilitate for searching for learning objects by keyword through standards based tagging. For the associated technology platforms, we are investigating some open source software options, for example, FEDORA [FEDORA-a, FEDORA-b] the Flexible Extensible Digital Object Repository Architecture. We will also investigate the possible use and advantages that an XML ontology may deliver to the project, including the Protégé tools from Stanford University, which are also open source for educational use [Protégé]. Protégé can work with XML, RDF and has some smart visualisation tools built in. We are not certain yet as to the role the ontology might play.

8. Tagging of Learning Objects Versus Language Objects

Even today in the sector, it is an open question as to what are the current best practices in meta-tagging for learning objects. Not withstanding this, we are of the opinion that the SCORM v2 standard will be applied [SCORM]. We will link the SCORM standard in a way that is functional and optimal for our project.

As we create our rich media digital assets and leverage the ISL ELAN digital corpus, we are paying particular attention to the tagging of the digital assets to include, for example, some or all of the following, with some private and public user views according to access profiles (Figure 4).

These initial tag labels can be expected to mature and be fine-tuned following the completion of our programme learning outcome and learning object analysis.

9. Issues of Assessment in an elearning Context

We are also working on developing an assessment model, based on best pedagogical practice, that is appropriate to our online blended learning environment. From there, we will then as part of our design phase, determine how to implement this online. We will need to link, in a principled and structured way, the assessments to the learning outcomes of individual modules, for example, An Introduction to the Linguistics and Sociolinguistics of Signed Languages, and to a particular lecture's thematic learning outcomes as appropriate. We also consider the effectiveness of the assessment with students in a blended learning situation.

10. Moving Forward

Our Strategic Innovation Fund (SIF II) Deaf Studies project is scoped for a three-year window commencing in 2008-9. A challenging year one plan has been created that will yield infrastructure changes, achievements and digital assets as well as the approval of a four year degree in Deaf Studies; ISL Teaching, and ISL/English Interpreting.

1. Topic
2. Description
3. Sections
4. Media
    a. Source
    b. Options for reuse
    c. Context - 'where used now'
    d. Proof of availability
    e. Ownership
        I. Licensing
        II. Cost
        III. Payment Method
    f. Optimum speed of access and use
    g. Ability to apply style guide
    h. Types supported
6. Handle tags: Specific topics covered
7. Context
    a. Modality for delivery
    b. Format
10. Conversion speed
11. Assessment of topics
    a. Assessment of specific areas
    b. Depth of assessment
    c. Level of adaptability
    d. Feedback
16. Author
17. Version number
18. Date Created

Figure 4: Potential tags of interest

We are presently engaged in an analysis phase to identify for each of the curriculum modules in year one of the Diploma programmes offered by the Centre, the learning objectives of a particular lecture and its themes on a week-by-week basis. For example, week 1, lecture 1 has learning objectives LO1, LO2 and LO3, etc. Typically, this will broadly equate with a lecture plan that is rolled out over a semester. For example, the module 'An Introduction to the Linguistics and Sociolinguistics of Signed Languages' is delivered over two semesters totaling 24 weeks with 24 2-hour lectures over the academic year. We will need to make explicit the learning objectives of each of these lectures such that each objective may be supported by up to, say, four learning objects initially (Figure 5).

These learning objects are expected to form a composite unit, but will be made up of different media types. A composite unit, therefore, will be expected to include the lecture notes (.pdf or .ppt), Moodle quizzes and exercises, video data of signing interactions (in Macromedia Breeze, Apple QuickTime and/or other formats), and ELAN digital corpora. To make a composite unit, each learning object needs to be wrapped with proper tagging. This tagging will facilitate searches for these learning objects within a digital repository. We plan that this will be done for all modules across all weeks.

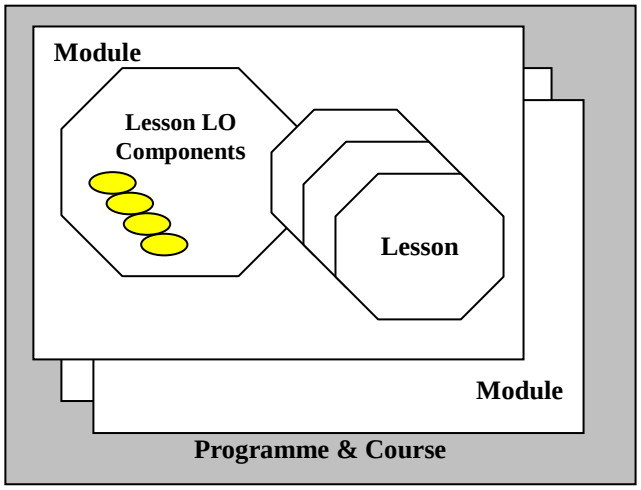

Figure 5: Learning object components as a unit within a module

We will identify and implement appropriate assessment models for a blended learning delivery of Sign Language programmes. In addition to an assessment model, we will need to devise a model for determining the overall effectiveness of the programme within the blended learning approach that will take a more holistic and pedagogical perspective to the programme objectives. We intend to deploy this programme nationally across the regions of Ireland following initial Dublin based trials. When this national deployment occurs these effectiveness key performance indicators will assume a greater importance that will enable us to determine the answer to the question: Are we successful with this programme and how can we tell?

Following an initial trial period in the Dublin area and once we have gathered a sufficiency of initial data, we will compare and contrast the assessments with anonymous (but marked for age and social background, gender, hearing status, etc.) and start to compare longitudinal figures with the initial first year outputs for this blended programme.

As this programme is to be modeled for a blended learning environment, we will need to build in a model of student support to include in an appropriate way, online college tutors, peer-learning and mentoring, in order to address any retention issues that may arise and provide the students with the ingredients of their learning success within a

productive and engaging community of practice.

We intend to create a website for this SIF II Deaf Studies Project with links to the learning management system/Moodle, other technology platforms including, for example, Macromedia Breeze, and the rich digital media assets as we determine to be useful in support of the teaching of Irish Sign Language within 3rd level education. We will also use this website to disseminate programmatic and research outcomes and other relevant information. We will address the technology related issues pertinent to the design and implementation of the framework for digital learning objects in a repository to facilitate access-retrieval, update, and search. We will determine the tagging standards that will operate across this.

While we will deploy the blended learning approach initially to the Dublin area, we will start planning for the national deployment. We will therefore pilot data in the Centre for Deaf Studies in Dublin from October 2008 as supplementary to traditional modes. We will capture feedback from students and analyse this critically. Following this, we will rollout in selected region/s across the country via local 3rd level institutes of higher education in 2009-10. We have agreements with many of these secured at this time.

In terms of the human resources required to build the framework and create the digital assets for the full programme, and the appropriate skill-levels required, we will shortly be seeking to recruit a number of individuals with postgraduate qualifications with a specific research focus. These individuals will be required to determine the appropriate assessment models and how this can be implemented for elearning, backed up by a digital repository of learning objects that leverage the Signs of Ireland digital corpus.

We will also be recruiting a co-coordinating project manager with a relevant post-graduate qualification with people-influencing skills who is bilingual in ISL/English and has good organizational and financial management skills who can leverage key community insights with empathy and diplomacy. We will recruit academic staff for local delivery of ISL in the regions, interpreting lecturer/s and also general Deaf Studies academic/s. We will recruit an elearning/ digital repository/ digital media specialist as well as ISL/English interpreters. We will recruit administrative support to the project.

To contribute to the research of the programme, we intend to recruit at Ph.D level to investigate the following research areas: 1) Assessment models appropriate to ISL in an elearning and blended learning context; 2) Developing and maturing the Signs of Ireland corpus, including meta-tagging and enriching the data; 3) Signed language/spoken language interpreting; 4) Design and build of rich digital media for Irish Sign Language

There are considerations regarding the cultural and work practice implications for academic staff delivering curricula in this manner. There are also corresponding implications for students receiving education in a blended learning approach via elearning technology. What will assume a greater importance immediately for academics and students is the minimum level of computer literacy skills and access to modern computing equipment and a fast broadband network required to engage in this kind of learning environment. We also plan, therefore, to devise a training programme for academic staff to induct them into the new teaching and learning environment and plan for a similar induction for students enrolled on the programme.

11. Summary

In this paper we have discussed decisions we have made regarding annotation of the Signs of Ireland corpus. We discussed ongoing work regarding mark-up standards and their application as we move forward. We outlined the range of applications currently made with respect to the Signs of Ireland corpus in elearning/ blended learning contexts. We indicated how we will leverage the corpus within a framework for digital learning objects situated in an architecture with a digital repository to support signed language learning. We outlined issues relating to the tagging of learning objects for deployment in a digital repository versus the tagging in ELAN of language objects for grammatical, morpho-syntactic and sociolinguistic phenomena. We noted that there will be challenges to representing these with a common notation that is digitally accessible. Issues of assessment in an elearning context were also addressed.

References

Arms, W. Y. (1997). *An architecture for information in digital libraries*. D-Lib Magazine, February 1997. http://www.dlib.org/dlib/february97/cnri/02arms1.html. Accessed March 2008.

[Digital Librarian]: http://www.dlib.org/dlib/november96/ucb/11hastings.html. Accessed March 2008.

Armstrong, D.F., W.C. Stokoe and S.E. Wilcox (1995). *Gesture and the Nature of Language*, Cambridge University Press, Cambridge.

Boyes Braem, P. and R. Sutton-Spence (eds.) (2001). *The Hands are the Head of the Mouth: The Mouth as Articulator in Sign Languages*. International Studies on Sign Language and Communication of

the Deaf, 39, Signum, Hamburg.
Chaudhry, Abdus Sattar and Christopher S.G. Khoo. (2006). *Issues in developing a repository of learning objects for LIS education in Asia.* http://www.ifla.org/IV/ifla72/papers/107-Chaudhry_Khoo-en.pdf. Accessed March 2008.
Coerts, J. (1994). Constituent order in Sign Language of the Netherlands, In M. Brennan and G.H. Turner (eds.) *Word-order Issues in Sign Languages – Working Papers*, The International Sign Linguistics Association (ISLA),Durham, pp 47-71.
[FEDORA-a]: http://www.fedora.info/. Accessed March 2008.
[FEDORA-b]: http://www.fedora-commons.org/. Accessed March 2008.
Emmorey, K. (ed.) (2003). *Perspectives on Classifier Constructions in Sign Languages*, Lawrence Erlbaum and Associates, New Jersey.
Engberg-Pedersen, E. (1993), *Space in Danish Sign Language*, Hamburg, Signum Verlag.
Janzen, T. (2005). *Perspective Shift Reflected in the Signer's Use of Space,* Centre for Deaf Studies, University of Dublin, Trinity College, Dublin.
Hastings, Kirk and R. Tennant. (1996). *How to build a digital librarian*. D-Lib Magazine. November 1996. http://www.dlib.org/dlib/november96/ucb/11hastings.html. Accessed March 2008.
Johnston, T., M. Vermeerbergen, A. Schembri and L. Leeson (2007). 'Real data are messy': Considering cross-linguistic analysis of constituent ordering in Australian Sign Language (Auslan), Vlaamse Gebarentaal (VGT), and Irish Sign Language (ISL). In: Perniss, P., Pfau, R., Steinbach, M. (Eds.) *Visible Variation: Comparative Studies on Sign Language Structure*. Mouton de Gruyter, Berlin. (41 blz.).
Klima, E. and U. Bellugi (1979). *The Signs of Language*, Harvard University Press, Harvard.
Kyle, J.G. and B. Woll (1985). *Sign Language: The Study of Deaf People and their Language*, Cambridge University Press, Cambridge.
Himmelmann, N.P. (2006). Language Documentation: What is it and what is it good for?, In Gippert, J., N.P. Himmelmann and U. Mosel (eds.), *Essentials of Language Documentation,* Mouton de Gruyter, Berlin and New York, pp 1-30.
Himmelmann, N.P. (2006). The challenges of segmenting spoken language In Gippert, J., N.P. Himmelmann and U. Mosel (eds.), *Essentials of Language Documentation,* Mouton de Gruyter, Berlin and New York, pp 253-274.
Labov, W. (1969). *The Logic of Nonstandard English*, Georgetown Univeristy 20th Annual Round Table, Monograph Series on Languages and Linguistics, No. 22.
Leeson, Lorraine, John Saeed, Cormac Leonard, Alison Macduff and Deirdre Byrne-Dunne (2006). *Moving Heads and Moving Hands: Developing a Digital Corpus of Irish Sign Language: The 'Signs of Ireland'* Corpus Development Project. Paper presented at the IT&T conference, Carlow.
Leeson, L. and C. Grehan (2004). *To the Lexicon and Beyond: The Effect of Gender on Variation in Irish Sign Language.* In M. Van Herreweghe and M. Vermeerbergen (eds.): To The Lexicon and Beyond: The Sociolinguistics of European Sign Languages. Gallaudet University Press, pp. 39-73.
Leeson, L. (1996) *The Marking of Time in Signed Languages with Specific Reference to Irish Sign Language*, Unpublished M. Phil Dissertation, Centre for Language and Communication Studies, University of Dublin, Trinity College.
Leeson, L. (1997). *The ABC of ISL*. Booklet to accompany the TV series. RTE/Irish Deaf Society, Dublin.
Leeson, L. (2001). *Aspects of Verb Valency in Irish Sign Language*, Unpublished Doctoral Dissertation, Centre for Language and Communication Studies, TCD, Dublin.
Leeson, L. and J.I. Saeed (2003). *Exploring the Cognitive Underpinning in the Construal of Passive Events in Irish Sign Language (ISL).* Paper presented at the 8th International Cognitive Linguistics Association Conference, Spain, July 2003.
Leeson, L. and J.I. Saeed (2004). The Windowing of Attention in Simultaneous Constructions in Irish Sign Language. In T. Cameron, C. Shank and K. Holley (eds.) *Proceedings of the Fifth High Desert Linguistics Conference*, 1-2 November 2002, Albuquerque, University of New Mexico.
Leeson, L. and J.I. Saeed (2005). *Conceptual Blending and the Windowing of Attention in Simultaneous Constructions in Irish Sign Language (ISL)*, Paper Presented at the 8th International Cognitive Linguistics Association Conference, Seoul, Korea, July 2005.
Leeson, L. and J.I. Saeed (2007). Conceptual Blending Blending and the Windowing of Attention in Simultaneous Constructions in Irish Sign Language (ISL), In Vermeerbergen, M., L.

Leeson and O. Crasborn (eds), *Simultaneous Constructions in Signed Languages – Form and Function*, John Benjamins, Amsterdam.

Le Master, B. (1990). *The Maintenance and Loss of Female and Male Signs in the Dublin Deaf Community*, PhD. Dissertation, Los Angeles, University of California.

Le Master, B. (1999-2000) Reappropriation of Gendered Irish Sign Language in One Family, *Visual Anthropology Review*, 15(2), pp. 1-15.

Le Master, B. (2002). What Difference Does Difference Make? Negotiating Gender and Generation in Irish Sign Language. In S. Benor, M. Rose, D. Sharma and Q. Shang (eds), *Gendered Practices in Language*, Centre for the Study of Languages and Information Publication, Stanford.

Leonard, C. (2005). *Signs of Diversity: Use and Recognition of Gendered Signs among Young Irish Deaf People*. Deaf Worlds, Vol. 21 (2), pp. 62-77.

Liddell, S.K. (2003) *Grammar, Gesture, and Meaning in American Sign Language*, Cambridge University Press, Cambridge.

Matthews, P.A. (1996). *The Irish Deaf Community- Volume 1*, ITE, Dublin.

McDonnell, P. (1996). *Verb Categories in Irish Sign Language*, Unpublished Doctoral Dissertation, Centre for Language and Communication Studies, University of Dublin, Trinity College.

McDonnell, P (ed.) (2004). *Deaf Studies in Ireland: An Introduction*, Doug McLean, Glouc.

McGreal, Rory (ed.) (2004). *Online education using learning objects*. Open and flexible learning series. London and New York: RoutledgeFalmer.

[Protégé]: http://protege.stanford.edu/. Accessed March 2008.

Meir, I. (1998). *Thematic Structure and Verb Agreement in Israeli Sign Language*, PhD Dissertation, Hebrew University of Jerusalem.

Mosel, U. (2006). Fieldwork and Community Language Work. In Gippert, J., N.P. Himmelmann and U. Mosel (eds.), *Essentials of Language Documentation,* Mouton de Gruyter, Berlin and New York, pp 67-86.

O'Baoill, D. and P.A. Matthews (2000). *The Irish Deaf Community, Volume 2 – The Linguistics of ISL*, ITE, Dublin.

Pizzutto, E. ans P. Pietrandrea (forthcoming). The Notation of Signed Texts, *Sign Language and Linguistics*, Vol 4, No. 1/2, pp29-45, 2001.

Roberts, G., W. A., Martin Feijen, Jen Harvey, Stuart Lee, and Vincent P. Wade. 2005: *Reflective learning, future thinking: digital repositories, e-portfolios, informal learning and ubiquitous computing.* ALT/SURF/ILTA Spring Conference Research Seminar. http://www.alt.ac.uk/docs/ALT_SURF_ILTA_white_paper_2005.pdf . Accessed March 2008.

Sallandre, M., Simultaneity in French Sign Language Discourse, In Vermeerbergen, M., L. Leeson and O. Crasborn (eds), *Simultaneous Constructions in Signed Languages – Form and Function*, John Benjamins, Amsterdam, (forthcoming).

Sandler, W. and D. Lillo-Martin, *Sign Language and Linguistic Universals*, Cambridge University Press, Cambridge, 2006.

Schembri, A., Rethinking 'Classifiers' in Signed Languages, In K. Emmorey (ed), *Perspectives on Classifier Constructions in Sign Languages*, Lawrence Erlbaum and Associates, New Jersey, 2003, pp. 3-34.

[SCORM]: http://adlcommunity.net/mod/resource/view.php?id=458. Accessed March 2008.

Seifart, F. Orthography Development, In Gippert, J., N.P. Himmelmann and U. Mosel (eds.), *Essentials of Language Documentation,* Mouton de Gruyter, Berlin and New York, 2006, pp 275-299.

Stokoe, W. C., *Language in Hand: Why Sign Came Before Speech*, Gallaudet University Press, Washington DC, 2001.

Sutton-Spence, R. Mouthings and Simultaneity in British Sign Language, In Vermeerbergen, M., L. Leeson and O. Crasborn (eds), *Simultaneous Constructions in Signed Languages – Form and Function*, John Benjamins, Amsterdam, (forthcoming).

Sutton-Spence, R. and B. Woll, *The Linguistics of British Sign Language*, Cambridge University Press, Cambridge, 1999.

Talmy, L., The Windowing of Attention in Language. In M. Shibitani and S.A.Thompson, (eds.): *Grammatical Constructions- Their Form and Meaning*. Oxford: Clarendon Press, 1997, pp235-287.

Tsunoda, T., *Language Endangerment and Language Revitalisation – An Introduction*, Berlin and New York, Mouton de Gruyter, 2005.

Wilbur, R., Eyeblinks and ASL phrase structure, Sign Language Studies 84: 221-240,1994

Van Herreweghe and Vermeerbergen 2004, Flemish Sign Language: Some Risks of Codification, In Van Herreweghe, M. and M. Vermeerbergen, *To the Lexicon and Beyond: The Sociolinguistics of European Sign Languages*, Gallaudet University Press, Washington DC, pp. 111-140, 2004.

Van Valin, R. D. and R.J. La Polla, *Syntax-Structure, Meaning and Function,* Cambridge University Press, Cambridge, 1997.

Vermeerbergen, M., L. Leeson and O. Crasborn, Simultaneous Structures in Signed Languages: An Introduction, In Vermeerbergen, M., L. Leeson and O. Crasborn (eds), *Simultaneous Constructions in Signed Languages – Form and Function*, John Benjamins, Amsterdam,

Vermeerbergen, M. and E. Demey (2007). Sign + Gesture = Speech + Gesture? Comparing Aspects of Simultaneity in Flemish Sign Language to Instances of Concurrent Speech and Gesture. In Vermeerbergen, M., L. Leeson and O. Crasborn (eds.), *Simultaneous Constructions in Signed Languages – Form and Function*, John Benjamins, Amsterdam.

Volterra, V., S. Laudanna, E. Corazza and F. Natale (1984). *Italian Sign Language: The Order of Elements in the Declarative Sentence*. In F. Lonke (ed.) Recent Research on European Sign Languages. Svets and Zeitlinger: Lisse, pp.19-48.

Wilbur, R.B. (1994). Eyeblinks and ASL Phrase Structure, In *Sign Language Studies* 84, pp 221-240.

Wilcox, S. (2004a). Gesture and Language: Cross-linguistic and Historical Data from Signed Languages, *Gesture* 43, pp 43-73.

Wilcox, S. (2004b). Cognitive Iconicity: Conceptual Spaces, Meaning and Gesture in Signed Languages, *Cognitive Linguistics* 15-2, pp 119-147.

Acknowledgements:

We are most grateful for funding that has been made available under the Strategic Innovation Fund, Cycle II programme for this for the Deaf Studies SIF II Project. Funding for the Signs of Ireland corpus came from the Arts and Social Sciences Benefaction Fund, TCD.