The Usability of the Annotation

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Abstract

Several corpus projects for sign languages have tried to establish conventions and standards for the annotation of signed data. When discussing corpora, it is necessary to develop a way of considering and evaluating holistically the features and problems of annotation. This paper aims to develop a conceptual framework for the evaluation of the usability of annotations. The purpose of the framework is not to give conventions for annotating but to offer tools for the evaluation of the usability of the annotation, in order to make annotations more usable and make it possible to justify and explain decisions about annotation conventions. Based on our experience of annotation in the corpus project of Finland's Sign Languages (CFINSL), we have developed six principles for the evaluation of annotation. In this article, using these six principles, we evaluate the usability of the annotations in CFINSL and other corpus projects. The principles have offered benefits in CFINSL: we are able to evaluate our annotations more systematically and holistically than ever before. Our work can be seen as an effort to bring a framework of usability to corpus work.

Keywords: usability, annotation, signed language, evaluation, corpus, framework

1. Introduction

Annotation conventions have been developed in various corpus projects for different signed languages (e.g. Johnston, 2016 Australia; Crasborn et al., 2015 Netherlands; Wallin & Mesch, 2014 Sweden). The corpus project of Finland's Sign Languages (CFINSL) started in 2014 (see also Salonen et al., 2016, in this volume). New corpus projects start by getting to know what annotation conventions are already in use in corpus projects which are further on in the process. For this reason, the documentation of these processes and interaction between researchers working on corpora is important. Recently, the Dutch and British corpus projects have proposed the standardisation of annotation conventions in order to enable cross-linguistic research (Crasborn & Bank & Cormier, 2015). In the *Digging Into Signs* workshop in London [1] several projects compared their annotation conventions.

Different corpus projects have discussed the problems of annotation and solved them in their own, different ways. In our project we have noticed that we need to be more efficient in our discussion of the problems and their solution. Three problems have come up when reading various annotation guidelines and workshop presentations. First, the discussion is sometimes fragmented, e.g. some discuss problems to do with memory (e.g. Johnston, 2016: 18**;** Santoro & Geraci, 2015: 11), and some talk about the intelligibility of the annotation (Wallin & Mesch, 2015: 10). In this paper, annotation is considered holistically, which means in this context that we look at annotation both as a whole and in terms of the interaction between its different aspects. Annotation has users, and users have their own particular goals; annotation is also used in conjunction with other tools such as

ELAN [2] and Signbank [3]. The second problem is that different researchers use different terms for the same subject matter. In the Italian Sign Language (LIS) corpus project (Santoro & Geraci, 2015: 21–24), annotations are evaluated on the basis of whether they are simple or complex. These, however, are ambiguous concepts. Is it due to complexity that the user has difficulty remembering the conventions or that the convention is hard to find when someone tries to find it? Thirdly, it may be said that annotation is continuously evaluated but not clearly stated on what basis this evaluation is carried out. Is annotation evaluated intuitively or using a certain shared and established method?

From what has been said above, we see that what is needed is a conceptual framework which could be used to develop a more holistic and systematic way of considering and evaluating annotation conventions. With a framework we could develop our methods and talk about annotation using the same terms. In our experience the concept of usability is very useful because it makes reference to the basic problems of all corpus projects: how we can develop annotation that meets the users' needs and makes searching effective.

In this article, when we talk about annotation the focus is mostly on glosses, including the codes inside the annotation cell and not, for example, on the length of a sign or the annotation of non-manual features.

This article presents in Section 2 a usability framework, what it means, and how it could be applied to annotation. Section 3 introduces six principles which are tools for the

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[1] http://www.bslcorpusproject.org/events/digging-workshop/

[2] ELAN. Max Planck Institute for Psycholinguistics, The Language Archive, Nijmegen, The Netherlands. URL: *http://tla.mpi.nl/tools/tla-tools/elan*.

[3] "The FinSL Signbank has been developed on the basis of the NGT Signbank , which is a branch of the Auslan Signbank . The source codes for these three versions of Signbank are all available on Github (https://github.com/Signbank)."

consideration and evaluation of annotation practices. Section 4 presents an evaluation and comparison of different ways of annotating according to the six principles. In Section 5, the profile of the annotator is briefly discussed. The last section summarises what is dealt with in the earlier sections of this article.

2. The Relevance of the Usability to Annotation

Usability is a general term that can be applied to all kinds of products (see Figure 1): a product is usable if its users find it useful, easy and pleasing. Usability has three components: 1) the users of the product and their knowledge and skills, 2) the product itself as well as the functions and features it offers, and 3) the context in which the product is used and in which the users' functions and objectives when using the product are manifest. (Mäntylä, 2001: 128; ISO 9241–11, 1998.) Just as somebody designs, for example, a usable website, we are trying to design a usable annotation protocol.
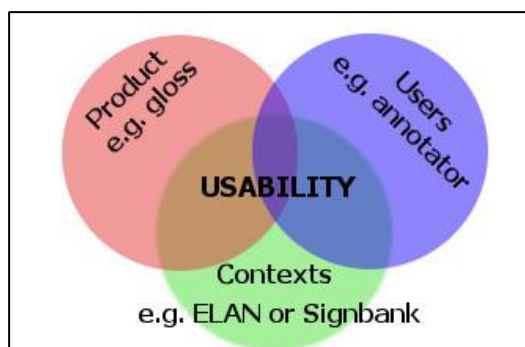

Figure 1: The aspects of usability

It makes sense to talk about the usability of annotation because an annotation has functions and features. As a product, for example, the letters of a gloss can be visually perceived; annotations connect a written word or other marks to a sign shown temporally in a video; annotations offer linguistic or phonetic information.

Thinking of the users of annotation, how well users can create or use annotations depends on the annotators' knowledge and skills. An expert annotator knows better about the possible uses of annotations and ELAN or Signbank than an inexperienced annotator. This raises two questions: one, of whether a native signer can annotate without any knowledge of linguistics (see Rutkowski & Filipczak & Kuder, 2015: 45), and two, of how well a sign language teacher without technological expertise knows how to use corpus material.

Annotation is always used in certain contexts. For instance, ELAN or Signbank– possible contexts of use – affect the annotation and the possibilities of how or what kinds of things are annotated.

Usability includes three elements: product, user, and context. The separate elements can be considered separately, but because the separate parts affect each other, the

relations between them also need to be looked at. Thus, when the aim is to consider annotation holistically, one needs to examine it in relation to the user and the context.

Usability is evaluated or measured in terms of how well users can learn to use the product, and how effectively they can use it in order to achieve their goals. The usability of any tool, machine, programme or device which a person uses can be evaluated. (see Nielsen, 1993: 24–26.) There are ready-made methods of evaluation but in a corpus project an economical way of beginning is to start with a checklist (see Whitenton, 2015; NASA/FAA, 2000: 70).

The discussion above shows that usability as a framework has potential because it is useful from at least three points of view. One of the benefits is that the usability of the annotation can be considered and evaluated holistically. The second benefit is that it offers a common language between corpus researchers: it enables discussions about certain topics using the same concepts and ideas about usability, like memory, readability and efficiency. The third benefit of the framework is methodological: we can take advantage of ready-made methods and apply them to an evaluation of the usability of the annotation. In the next section, we will present six principles for the evaluation of the usability of annotation.

3. Six Principles

The principles for the usability of annotations that we use and present here have gradually developed as a result of our experience and our reflections, as well as from a review of discussions held by other corpus projects. The principles are based on the attributes of utility, which are that it is easy for users to achieve their goals and that at the same time they should find the product pleasant (See also Nielsen, 1995; 2012). Is it pleasing to use corpus material if e.g. reading it is difficult or the one does not find the information one is searching for?

The Six Principles for Usability of Annotations
Equivalence of meaning
Findability
Readability
Intelligibility
Consistency
Computer-Readability

Table 1: The list of six principles

The principles for the usability of annotations are shown in Table 1. The principles can be seen as a checklist (see Whitenton, 2015; NASA/FAA 2000: 70). Our aim in presenting these principles is to establish the necessary qualities of an annotation and make it possible to consider and evaluate the usability of an annotation one principle at a time. In that way, we can achieve a more holistic and

systematic picture of the usability. We put forward the following principles concerning the usability of annotation.

The principle of **equivalence of meaning** means that the gloss and the meaning must be consistent, e.g. the gloss PALLO always refers to the meaning 'pallo' (ball). This principle concerns glosses written in capital letters.

Findability means that users can quickly and logically find the annotations for which they are searching. Weak findability makes the finding of the desired information slow or simply impossible. If annotations are designed and classified well, the search shows the desired information and filters out other, unwanted information (see an example in section 4).

Readability means that reading the annotation is technically easy and the annotation does not look messy. A readable annotation is clear, salient and distinguishable from another annotation. Readability helps one to read the search results because it means the results can be skimmed quickly and economically.

Intelligibility means that the meaning of the gloss is quickly identified. The user does not need to struggle to remember the system of annotation but can easily identify meaning (cf. Nielsen 1995).

Consistency means that the glosses are logical and comparable to each other. Johnston (2008) states that one can talk about a corpus only when the glosses and annotations are consistent and logical, and they consistently identify the signs. Different annotations and mistakes are a barrier to the functionality of a corpus. If the annotation practices are consistent, the glosses and the codes are always annotated in the same way and in the same order. For example, SSL corpus annotation (Wallin & Mesch, 2014) uses the symbol @ after gloss and after that the codes for linguistic categories.

Computer-readability refers to the need for the codes linked to the gloss to function technically without any problem with programmes such as ELAN and Signbank. Every programme has its limitations and advantages. Computer-readability is concerned with which codes are good for annotation from the point of view of the characteristics of the programmes with which they will be working.

The principles function as a tool for evaluating the annotation. Concerning usability, the basic idea is that *the more the principles are followed, the more usable the annotation will be*. Each annotation can be evaluated in terms of each principle, to see how and why any problems have arisen. This makes it possible to refine and improve the annotation.

4. Evaluating the Usability of the Annotation

In this section we introduce some examples of annotations. We use the above mentioned principles when we evaluate our own annotations and the annotations used in other sign languages. This section discusses different

problems which we have met in our annotation work and in other corpus projects we have encountered.

In different corpus projects, sign variants are marked in different ways, for example with a letter (SIGN-A) or number code (SIGN1) (see Crasborn et al., 2015: 5; Cormier et al., 2015: 6). In the corpus of SSL (Wallin & Mesch, 2015: 7) as well as in CFINSL, handshapes are used to mark sign variants. In CFINSL we have also used other phonological parameters: place of articulation and movement. There are three reasons for this.

Firstly, in CFINSL we annotate both phonetic and lexical variations because CFINSL also has a pedagogical aim (cf. Salonen et al., 2016, in this volume). Our aim is not to annotate phonological features per se, but we annotate the structural differences between signs which have the same meaning, using phonological parameters. Examples include a handshape e.g. 'run' JUOSTA(BB) and JUOSTA(SS); a movement, 'name of a city' TAMPERE(bouncing) and TAMPERE(sliding); and place of articulation, 'black' MUSTA(forehead) ja MUSTA(eye).

Secondly, with phonological codes the relationship between the gloss and the meaning can be better clarified. For example, the Finnish word 'puoli' means two different things, in English 'half' and 'side'. FinSL has separate signs for those two meanings. Therefore we differentiate between these two meanings with handshape codes PUOLI(GG) 'half' ja PUOLI(B) 'side' .

The third reason is the principle of intelligibility. When the sign variants are coded with letters or numbers (see Crasborn et al., 2015: 5; Cormier et al., 2015: 6) it causes a memory load, because the signs cannot be identified according to the numbers or letters of the alphabet. The annotator may be forced to look at the forms of the signs again and again e.g. in Signbank or wherever the descriptions of the signs are stored. The SSL project has also adopted handshapes to indicate variants because of intelligibility (Wallin & Mesch, 2015: 10).

The choice of a certain phonological code is based on the salience of the parameters in a sign. Handshape is often the most salient. If the handshape of two variants is similar, the code of another salient parameter e.g. movement or place of articulation is taken into consideration. To take an example, the sign KOSKAAN-EI 'never' can be produced in three different ways, and they all have the handshape (B). Thus, it is impossible to distinguish between the sign variants with a handshape code. Instead, the more salient parameter in two of the variants is movement. However, in the third variant of the sign the most salient parameter is place of articulation because movement is minimal. Therefore we decided to annotate the variants as KOSKAAN-EI(sliding), KOSKAAN-EI(circle) and KOSKAAN-EI(mouth).

In our annotation we still most commonly use handshape, because it works well in distinguishing between the sign variants in most signs. We do not add any phonological code unless they are phonetic or lexical variants.

Next let us look at annotation from the viewpoint of

readability. The annotation guidelines of the SSL corpus project show that before 2011 the annotation was, for example, (g-)LÅTA-VARA and after 2012 the order was LÅTA-VARA@g (see Wallin & Mesch, 2012; Wallin & Mesch, 2011;). The annotation guidelines did not give any reason for the change.

In CFINSL the order of elements in the gloss for such a sign is GLOSS@g because this order is more readable, especially in the list of search results. (We are still considering our use of the symbol @ because the annotation conventions of CFINSL are currently being reviewed). Another question is whether the symbol- @ or a colon (:) is more salient in the ELAN search list, e.g. ISÄ(S)@mon or ISÄ(S):mon 'father' . In SSL annotation @ has been used since 2011 because the symbol @ is more readable (Mesch, personal communication 17.12 2015).

To consider annotation from the viewpoint of findability, let us look at the sign for 'know'. We created the basic gloss TIETÄÄ 'know', plus an additional code in order to clarify the form and meaning of the sign. There are several glosses: TIETÄÄ(toisto) 'know', TIETÄÄ-PALJON 'know a lot' and TIETÄÄ-EI(55) 'not know'. This works well because in the search list the annotator can find several glosses that start with TIETÄÄ, and after the main gloss possible additional specifications. Earlier, misled by Finnish as a metalanguage, we used different glosses: TIETÄÄ 'know', TIETÄVÄINEN 'know a lot' and EI-OLE-TIETOINEN 'not know'. Those different glosses were difficult to remember and find because they were scattered in different places in the list of glosses.

Similarly, a few corpus projects (e.g. Johnston, 2016; Crasborn & Bank & Cormier, 2015) have decided to put the main gloss first and then any additional information e.g. KNOW-NOT because in the search list the annotator can find several glosses that start with KNOW.

Another example of a findability problem is the annotation of fingerspelling in the corpus project of Italian sign language (Santoro & Geraci, 2015: 23). The alphabet is annotated with hyphens, as in W-O-R-D. The problem is that the search cannot find all the fingerspelled glosses at the same time, because there is no categorising code for fingerspelling. In addition, it is difficult for users of the corpus material to search the finger alphabet if they must use the alphabet and hyphens. One solution is to add a code for fingerspelling to the gloss, as is done in the BSL corpus (FS:) (Cormier et al., 2015: 13) and in the NGT corpus (#:) (Crasborn et al., 2015: 17). Using the fingerspelling code it is possible to find all the fingerspelled glosses.

Another findability problem was found in the annotation of composed numerals in the NGT corpus project. They are annotated as numbers e.g. 128. The first problem is the lack of a code for classifying numbers. Another problem is that it is difficult to find large numbers like tens, hundreds or thousands etc. With the gloss for 128, for example, it is impossible to distinguish the 100 because the smaller number, 20, cuts across the hundred, and it is

impossible to find the 20 because the smaller number, 8, cuts across the twenty. To get round this problem, the BSL corpus project (Cormier et al., 2015: 6) and the LIS corpus project (Santoro & Geraci, 2015: 24) annotate numbers in words in one annotation cell; in the case of BSL e.g. [NINETEEN^EIGHT^NINE]; and in LIS e.g. [MILLENOVECENTOOTTANTANOVE]. In this way it is possible to search for composed numbers.

Next we will look at two examples from the viewpoint of consistency. In the SSL corpus annotation we find the glosses SOVA and SOVA(Jv) 'nukkua' (SSLCO2_331; SSL02_409). One of the synonym signs is without any handshape code and the other gloss has one. In the CFINSL project we are adding a phonological code consistently to every variant, e.g. 'sleep': NUKKUA(LL), NUKKUA(B^B^) and NUKKUA(BB). Consistency is particularly important to new annotators, as it makes it easier for them to learn to annotate. Another reason for consistency is that it presents all the sign variants of a sign as equal.

It is also worth considering computer-readability, because annotating and searching for annotations is done by computer programmes. How well the annotation works also depends on the characteristics, restrictions and flexibility of the computer programme. We have met problems in the search system of ELAN. Our aim was to search using the handshape code (B). When (B) was written in the search field, all the glosses with (B) in parenthesis appeared in the results, e.g. (B), (BB), (GB) and (SB). We could not restrict the search so that it gave only results with just (B). This shows that it is important to know the characteristics, restrictions and possibilities of programmes like ELAN and Signbank from the angle of how computer-readable the annotation is. In future, it would be worth considering computer-readability from the user-friendly perspective.

In this section we have considered the usability of each of the principles except consistency of meaning. The next section deals briefly with the profile of an annotator, especially from the cognitive point of view.

5.   Attention to the Annotator

When trying to create the ideal annotation, it is important to remember the question of the relationship between human beings and technology (Saariluoma et al., 2010). Human cognition causes difficulties which need to be identified. One of the difficulties is categorisation. Let us look briefly at how categorizing can be a problem, with reference to the prototype theory.

According to the prototype theory (Rosch, 1975), the prototype of a category represents culturally the most typical example of the category while the periphery represents a less typical example of the category. Cognitive categories are vague; i.e. how we categorise things fluctuates. The effect of a prototype is present also in language on all its levels: phonology, morphology, and syntax (Lakoff, 1987).

The prototype effect is present in linguistic annotation,

too. For example, discrimination of a phonological hand-shape variant can be problematic because the borderlines between handshapes are vague. We have considered whether it is essential to discriminate between e.g. variants of the sign ISÄ(Ax) 'father' and ISÄ(S), because the handshapes closely resemble each other (see Figure 2). However, in FinSL both handshapes appear frequently in the sign. Are they lexicalised signs? In our work, a third variant with the handshape (G) was more easily annotated as a separate gloss because this handshape was clearly different from the handshapes (S) and (Ax) and because annotators can identified the sociolinguistic feature of the sign ISÄ(G): older signers typically sign with handshape (G).

Figure 2: Handshapes (images from SUVI[4])

Additionally, the prototype of the category varies, depending on the context: as Labov (1973) puts it, the prototype is also context-bound. This makes categorisation more complicated and vague, and annotation decisions intuitive. Decisions about annotations can be difficult because different people have different intuitions and linguistic backgrounds, e.g. native signer with deaf parents or hearing parents, in different contexts. This shows that there is no such thing as perfect annotation; all we can do is to strive to achieve annotation that is as usable as possible, creating clear principles for the annotation in each metalanguage.

Even if the annotator has had training in linguistics and a lot of experience as an annotator, it is not possible to achieve perfect annotation. The question of how we categorise the world is also present in annotation work. The point of this section is to remind ourselves that annotators need to be aware that the human cognition affects annotation. With this awareness they will understand better why they sometimes have problems in the categorisation of signs and phonetic forms.

6. Conclusion

We have seen that usability as a conceptual framework allows us to consider annotation more systematically and holistically and therefore to better achieve the goals of the corpus. The framework sets the usability of the annotation in relation to the user and the context. Potentially, it also offers a common language to communicate using the same concepts and ready-made methods for working the usability of the product. Usability as the framework has potential to channel the discussion about problems with annotation into one and the same direction for all those

concerned.

We have created principles in the form of a checklist for evaluating annotations. These principles are based on our experience of annotation so far, and will develop further during our annotation work and through feedback from colleagues. Coherent principles with clear explanations help annotators in their work. For efficient annotation we need principles that are easy for annotators to learn and remember. This will reduce the number of mistakes made during annotation. An ideal annotation is easy to learn, easy to read, easy to find, easy to understand and remember. The user experience - useful, easy and pleasing- is one of the most important elements of usability.

Documentation of the decisions behind annotation conventions is important because such information can and should be made available to others, for example to those working on new corpus projects and struggling with the same sorts of problems. Documentation would make it possible to develop common principles for evaluation, which in turn would make cooperation and standardisation easier. Finally, human cognition and its effects on annotation are topics we should discuss together in the future.

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