Transcribear – Introducing a secure online transcription and annotation tool

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Abstract

Reliable high-quality transcription and/or annotation (a.k.a. 'coding') is essential for research in a variety of areas in Humanities and Social Sciences which make use of qualitative data such as interviews, focus groups, classroom observations or any other audio/video recordings. A good tool can facilitate the work of transcription and annotation because the process is notoriously time-consuming and challenging. However, our survey indicates that few existing tools can accommodate the requirements for transcription and annotation (e.g. audio/video playback, spelling checks, keyboard shortcuts, adding tags of annotation) in one place so that a user does not need to constantly switch between multiple windows, for example, an audio player and a text editor. 'Transcribear' (https://transcribear.com) is therefore developed as an easy-to-use online tool which facilitates transcription and annotation on the same interface while this web tool operates offline so that a user's recordings and transcripts can remain secure and confidential. To minimize human errors, the functionality of tag validation is also added. Originally designed for a multimodal corpus project CAWSE, this browser-based application can be customized for individual users' needs in terms of the annotation scheme and corresponding shortcut keys. This paper will explain how this new tool can make tedious and repetitive manual work faster and easier and at the same time improve the quality of outputs as the process of transcription and annotation tends to be prone to human errors. The limitations of Transcribear and future work will also be discussed.

1. Introduction

Reliable high-quality transcription and/or annotation (a.k.a. 'coding') is essential for research in a variety of areas in Humanities and Social Sciences which make use of qualitative data such as interviews, focus groups, classroom observations or any other audio/video recordings. With rapid developments in computer technology, much larger datasets of samples are generally expected for academic research, particularly in the area of Corpus Linguistics, where spoken corpora often have to be manually transcribed and annotated. According to a survey we conducted (which will be discussed in the next section), however, few existing tools can accommodate the requirements for transcription and annotation (e.g. audio/video playback, shortcut keys, annotation, validation) in one place so that a user does not need to constantly switch between multiple windows, for example, an audio player and a text editor. 'Transcribear' (https://transcribear.com) is therefore developed to cater for the need of an easy-to-use online tool that facilitates both the tasks of transcription and annotation on the same interface. This paper will introduce the functionality of Transcribear as well as the background to the development of this secure browser-based tool.

Many types of text data often need to be annotated for follow-up analysis, that is, adding interpretive information to the data by, for example, adding 'tags' (Leech, 2005, p. 19). Below (1) is an example of annotating an instance of a lexico-grammatical deviation (typically called 'errors' in second language research or learner corpus research) from an L2 multimodal corpus, Corpus of Academic Written and Spoken English (CAWSE) (Chen, Harrison, Oakey, Stevens, Yang, Ioratim-Uba, Zhou & Bruncak, 2018). This tagset of deviation is composed of an opening tag <dv> and a closing tag </dv> with the correction indicated in the curly brackets {}.

(1) *Maybe it's very bad for the* <dv>*economic*{*economy*}</dv> *to the country.*

Manually tagging a large amount of such data by keyboarding is prone to errors. For example, a transcriber may delete part of the tag by accident or misspell the code that indicates a specific feature. In the case above, the code <dv> indicates a deviation, and if misspelled, this instance would not appear in a query for this specific tag.

In the context of spoken data such as interviews or conversations, the audio or video recordings will also need to be transcribed. Although there are existing annotation tools where a user can select a tag for annotation from a menu, they do not always have the functionality for transcribing speech data, e.g. an audio/video player with a text editor, and the tasks of annotation and transcription, therefore, have to be carried out separately. This means that a tool may be used for playing audio/video files and transcribing speech at the first stage, and then data are annotated independently on the transcripts with or without another tool at the second stage. In our experience of building the L2 corpus, CAWSE (Chen, Harrison, Oakey, Ioratim-Uba, Stevens & Yang, under review), however, we found that it is more efficient to transcribe and annotate data simultaneously rather than treating them as two independent tasks. This is because L2 speech are often characterized with a large number of instances in codeswitching, hesitation (indicated by pauses), self-correction (indicated by truncation and/or false starts), unintelligible utterances, or deviations exemplified earlier. Those features occur so frequently that the transcribers often have to play the audio/video recordings back and forth multiple times in order to transcribe them as truthfully as possible, and it is therefore sensible to annotate those features at the same time while engaging with the task of transcription. See (2) and (3) below for the tagging of such examples of L2 speech in the CAWSE corpus (CAWSE hereafter), where codeswitching is indicated by the tagset of <cs></cs> with English translation in the curly brackets {}, unintelligible speech by <ut></ut> and timed pauses (in seconds) by parentheses () such as (1.4) indicating a pause of 1.4 seconds.

(2) *or maybe on some fa- some face* <cs n= "zh">表情怎么说啊{how to say 'facial expression' in English}</cs>

(3) *yeah and: it's a very convenient and very hh erm modern modern school small* <ut>x</ut> *and every* <ut>x</ut> *is very: hh* (1.4) *is very good and erm the:* (1.3) *people here is very friendly and: they are all they are all: very kind*

Note: For the detailed transcription conventions used for CAWSE, please see the project website https://www.nottingham.edu.cn/en/english/research/cawse/transcription.aspx.

The CAWSE corpus is designed in a way that users can access its plain text files with a corpus tool such as Wordsmith (Scott, 2008) or AntConc (Anthony, 2018). This needs a linear transcription and annotation system, instead of the multi-tier transcription that some tools offer (which will be discussed later). This type of notation system is closer to the transcription tradition of Conversation Analysis (e.g. see Jefferson, 2004; Swann, 2010), and such transcription data can be converted to XML format at a later stage, which is the same approach adopted by the new Spoken BNC2014 corpus (Love, Dembry, Hardie, Brezina, & McEnery, 2017). Transcription encoded in XML defined by TEI Guidelines (see http://www.tei-c.org/Guidelines/) is widely recognized in the field of Corpus Linguistics for data exchangeability and computer readability. Figure 1 below is an example of XML markup from the BASE corpus (Nesi & Thompson, 2000-2005), where similar instances of timed pauses and overlaps are annotated as well as truncated utterances and speaker turns. As can be seen, it follows a similar linear yet far more complex system and, as a result, could be unfriendly for human eyes. For our project, the XML format is therefore not considered for manual annotation because of its 'cumbersome format for direct data entry' (Love et al., 2017, p. 338).

```
  <u who="sm0188" trans="overlap"> i know </u>
- <u who="nm0187" trans="overlap">
    i'm not sure whether it's it's wheat or not but i mean
    <trunc>i</trunc>
    it it can be from the same family but there are
    <pause dur="0.3"/>
    quite a number of plant species certainly a number of the grasses
    <pause dur="0.3"/>
    that reproduce by stolons
    <pause dur="0.5"/>
    #
    <pause dur="0.2"/>
    the other way that you can get clonal crops of course is to take cuttings
  </u>
  <pause dur="0.4"/>
  <u who="sm0188" trans="pause"> just like apples yeah </u>
- <u who="nm0187" trans="latching">
    apples is a good example
    <pause dur="0.4"/>
    you take cuttings put it onto a rootstock
    <pause dur="0.7"/>
    and you can reproduce them
    <pause dur="0.4"/>
    #
    <pause dur="0.2"/>
    various ways as is say there are quite a lot of
    <pause dur="0.2"/>
    # things sugar cane
```

Fig. 1 An example of XML markup from BASE

We therefore conducted a survey of existing tools to identify if there was any integrated tool that could accommodate the requirements of both transcription and annotation in a linear system but unfortunately did not find any that fit the needs of our project. This survey, however, provided us with essential information to define the specifications when we later decided to develop the online transcription and annotation tool 'Transcribear'. Originally designed for our L2 corpus project, this browser-based application is now equipped with the facilities of customization, where users can change the settings of annotation scheme and corresponding shortcut keys for their own projects. With a user-friendly interface and built-in validation and spelling checks, Transcribear can also be used for Conversation Analysis or similar projects that require transcription and/or annotation. In the next section, we will summarize the results of the survey where existing similar tools were evaluated and compared in terms of available functionality. Then more detail will be provided regarding how the survey informed the design of Transcribear. The limitations of Transcribear and future work will also be discussed.

2. Survey of existing tools

In total twelve computer programs were chosen for the survey, and two types of tools were distinguished: one for transcription, particularly those featured with the technology of speech recognition, and the other for annotation, which refers to the addition of interpretive information into orthographic transcription by inserting defined tags. Some of the annotation tools, however, also include basic functions for transcription such as audio/video playback with a text editor. This survey provides an overview of available features, and the evaluation criteria used for the survey were developed from our pilot work of transcribing and annotating recording data in CAWSE. Those criteria include features such as audio/video playback, shortcut keys, speech recognition, spelling checks, data confidentiality, tag insertion or customization. Because a team of student interns, including both undergraduate and postgraduate students, were recruited to transcribe data for CAWSE in addition to a full-time assistant, our primary aim was to search for an easy-to-use tool which would not require extensive training while still achieving good-quality work without imposing additional costs.

The details of evaluation for the first type of tools (i.e. used for transcription) can be found in Table 1 and the second type of tools (used for annotation) in Table 2. In terms of the transcription tools, among the six tools that we surveyed (Table 1), four of them have the function of speech-to-text or dictation (*VoxSigma*, *Dragon, Transcribe* and *Express Scribe*), and most of them are commercial, which requires a subscription fee at the time of writing, except for the free-of-charge app *oTranscribe* and *Express Scribe* (which offers a free trial of basic functions). Two members in our team, one native speaker of American English and the other a fluent non-native speaker, then experimented with the dictation function available in some of the tools, i.e. by reading aloud. Although the applications with a speech-recognition engine seemed to have generally performed better with the native speaker, our conclusion was that the engines often responded slowly and inaccurately and it was therefore too time-

consuming and tiring to repetitively repeat and revise the machine-generated script. The automatic speech-to-text applications were also trialed, that is, we uploaded an audio file to a web application and a script was then generated. On average the accuracy rate reached approximately 30%, which was considered too low, because it would still require a large amount of effort to edit those scripts to acceptable standards. This might be relevant to the fact that our L2 data contains recordings of interviews or conversations involved with multiple speakers and that many L2 speakers in the data are not very fluent, hence the poor results. We therefore decided to still manually transcribe the audio/video recordings rather than using speech-recognition tools.

The tools described above, however, have a number of advantages identified during the survey. For example, the interface integrated with a text editor and an audio/video player is user-friendly, and some of the tools are equipped with the facilities of spelling checks and data confidentiality without audio/video files transmitted to a server although they operate on a browser. Some tools such as *Transcribe* also adopt the approach of keyboard shortcuts for audio/video playback to free up the use of a mouse, which is also deemed a useful design to improve efficiency since the keyboard can be used for the entire transcription process. Because those tools appear to have been designed for professions such as journalists or lawyers rather than linguists, transcription is the primary function, and thus no facility of annotation is found in those transcription tools.

Table 1 Transcription tools reviewed in the survey

Tool	Online or desktop	Fee (at the time of writing)	Audio/ video playback	Shortcut keys	Confidentiality and Privacy	Spelling checks	Speech recognition	Website
1. VoxSigma	Desktop and Online	For generic systems and large quantities, the price on the online order is 0.01 Euro (or USD$0.01) per minute. More detailed pricing needs to be discussed with VoxSigma.	Automatic transcription linked to the server		Not indicated	Not mentioned as presumably not needed. Supporting automatic speech to text.	Yes	http://www.vocapia.com/
2. Dragon	Desktop	USD$74-$500	speech recognition (speech to text)		Not indicated	Not mentioned as presumably not needed. Supporting automatic speech to text.	Yes	http://www.nuance.com/dragon/index.htm
3. oTranscribe	Online	Free	Yes	Yes	Yes. Audio files and transcripts stay on the user's computer.	Yes	No	http://otranscribe.com/
4. Transcribe	Online	USD$20/year for the integrated engine with a player, an editor and dictation. USD$6 for a 60-minute auto transcription	Yes	Yes	Yes. Audio files and transcripts stay on the user's computer.	Yes, but it seems to work only for a certain length of the transcript.	Yes	https://transcribe.wreally.com/
5. Inqscribe	Desktop	USD$99 full USD$69 education/nonprofit USD$39 student	Yes	Yes	Not indicated	No	No	https://www.inqscribe.com/
6. Express Scribe	Desktop	USD$25 -$159 Discount available	Yes	Yes	Not indicated	No	Yes. Speech to text requires a SAPI speech-to-text engine to be installed on the user's computer.	http://www.nch.com.au/scribe/

Table 2 Annotation tools reviewed in the survey

Tool	Online or desktop	Fee	Audio/ video playback	Spelling checks	Shortcut keys	Validation	Supporting XML	Tag customization	Website
1. VoiceScribe	Desktop	Free	Yes	No	Yes. A list for shortcuts available.	Yes. Yellow color indicates recognized tags.	Yes	No	https://sourceforge.net/projects/voicescribe/
2. EXMARaLDA Partitur-Editor 1.6	Desktop	Free	Can play each segment of the recording	No	Yes. Shortcuts for audio play, segments, etc.	Yes. An error list is available for structure errors, annotation mismatch, etc.	Yes. Some TEI-complied symbols (<dur=1>, {codeswitch}, etc.) can be selected.	Yes. Preferred symbols can be selected and used for annotation.	http://exmaralda.org/en/2017/04/27/new-official-version/
3. FOLKER 1.2	Desktop	Free	Can play each segment of the recording	No	Yes. Shortcuts for media play, segment selection, segment view, etc.	Yes. A red cross indicates incorrect syntax, etc.	Yes	Yes	http://agd.ids-mannheim.de/folker_en.shtml
4. ELAN 4.7.3	Desktop	Free	Can play each segment of the recording	No, but Version 5 seems to include this function.	Yes. Shortcuts for management of files, selection of segment, annotation, etc.	N/A	Yes	Yes. Available under Controlled Vocabularies, but it is saved in a different tier from speech transcription.	https://tla.mpi.nl/tools/tla-tools/elan/
5. Transcriber AG 2.0.0-b1	Desktop	Free	Yes	Yes	Yes. Shortcuts for audio play, selection, annotation, etc.	N/A	No	Yes. Available under Configuration.	http://transag.sourceforge.net/index.php?content=presentation
6. UAM CorpusTool version 3.3	Desktop	Free	No (as it is not designed for transcription)	Not needed as pre-defined tags are provided which can be selected from a menu.	No shortcut keys, but different functions can be selected from lists.	N/A	Yes. All annotation is stored in xml.	Yes. An easy-to-use interface is available to create and modify coding schemes.	http://www.corpustool.com/download.html

In terms of the second type of tools, they are primarily designed for annotation purposes, e.g. adding tags to a transcript, although basic functions of transcription such as audio/video playback are included in some of the tools such as *VoiceScribe* (see Table 2). All those tools are desktop apps that require users to install on individual devices. Among the six annotation tools that we reviewed, two were designed exclusively for a specific corpus: *VoiceScribe* for the VOICE corpus (a corpus of spoken ELF) (VOICE, 2013) and *FOLKER* for the FOLK corpus (a corpus of spoken German) although *FOLKER* is a simplified version adapted from *EXMARaLDA* (Schmidt, 2016, p. 407). Note that those tools are designed for different purposes, and it does not mean the evaluation results indicate any flaws of their design. For example, *UAM CorpusTools* is intended as an annotation suite instead of a transcription tool, hence the absence of an audio/video player and spelling checks.

One fundamental difference between the transcription tools described earlier (Table 1) and the annotation tools (Table 2) is that the latter often allows the addition of annotation notation from a pre-defined file of conventions while the former requires manual addition of such notations each time. Because the CAWSE corpus has its own unique transcription conventions, it is important for us to find out whether any of those annotation tools allow users to define their own markup systems for annotation rather than having to adopt existing conventions built in the tools. While some tools such as *ELAN* does provide this option (called 'Controlled Vocabularies', see Tacchetti, 2017), others require certain IT skills to rewrite the codes of the tools (e.g. *VoiceScribe* or *TranscriberAG*). It was also found that those annotation tools generally do not seem to support spelling checks (probably except for *TranscriberAG*), which is important in enhancing the accuracy and reliability of transcription work. Again, this is most likely due to the fact that many of the tools were designed for adding annotation from a menu of pre-established schemes, and it may not seem necessary for those tools to include the facility of spelling checks. One of the major issues, in

considering those tools for the CAWSE project, however, is that the current transcription and annotation system developed for the corpus is linear as discussed earlier, in the form of plain text files, which can be searched using existing corpus tools. Some of the annotation tools adopt a multi-tier annotation hierarchy system (such as *ELAN* or *TranscriberAG*; see Figure 2) and also have the issue of segmenting audio/video data, which appears rather complex for our purposes. Another issue is that *VoiceScribe* and *FOLKER* only support audio data in wav files while some of the data in CAWSE are currently saved in the format of mp3. While it is possible to convert the data format, this certainly adds more complexity to customizing an existing tool. Those annotation tools often have a variety of functions available such as XML support, and probably because of this, our perception is that they are more suitable for tech-savvy users or experienced researchers. The introduction of those established tools would therefore require extensive training, and yet many of our transcribers and annotators are student interns who did not work for the project for more than one year.

Fig. 2 A multi-tier annotation system from ELAN

The above survey indicates that some of the transcription tools are easy to use but do not provide certain facilities such as adding annotation, whereas most of the annotation tools are powerful but require a significant amount of training and experience for users to master them.

The results of the survey reported here informed the design of the new transcription and annotation tool 'Transcribear', which will be described in the next section. We also acknowledge that there may be many other relevant computer programs available, and the tools included in the survey here may be somewhat limited in terms of the scope. Those additional programs are perhaps designed for specific purposes such as *Praat* (for phonetic annotation) or *NVivo* (for qualitative textual and audiovisual data), and they therefore do not fit our purposes.

3. Developing the new tool 'Transcribear'

After experimenting with the tools reported in the previous section, it became clear that we needed to develop our own software as no existing tools could cater for our needs. Yet it has to be acknowledged that the survey provides essential information about possible utilities of a transcription and annotation tool required for a corpus-building project like ours.

Our decision was to opt for an online tool rather than a stand-alone desktop one because a browser-based tool does not require the administrator's right to install for institutional computers, which is often the case for universities. A web tool also allows constant updates to improve the functionality without the users having to reinstall the software repeatedly. Another advantage of a web-browser application is that it can be used across different operation systems such as Mac OS, Linux or Windows, and the development and maintenance costs would therefore be kept lower. On the other hand, being an online system does not mean the compromise of data confidentiality. For example, researchers may need to transcribe confidential data which is not supposed to be shared with third parties. We therefore took privacy and confidentiality into consideration in the design of the online application by choosing to use the programing language JavaScript. This means that when a user visits the website to access Transcribear, a Javascript application is downloaded into the

user's web browser which provides necessary functionalities for the user to transcribe the audio or video file, to insert tags into a transcript, or to have the transcript checked or validated real-time. When the online tool is operating, it therefore works offline, which means the application does not require a local computer to send any transcripts or audio/video files to the server to facilitate transcription or annotation. The whole process is thus private and can be used to transcribe or annotate confidential data.

It is also essential for the tool to have a built-in function of validation, i.e. automatically checking the tags on the basis of pre-defined tagsets. During the earlier stages of our project when data transcription had been carried out for several months without an exclusive tool, transcribing errors were often found in the incorrect use of tags, e.g. mis-formed tags. For example, it is possible that any component of a tagset such as (indicating 'overlap') might be accidentally deleted or misspelled by the human transcribers, and such illegitimate tags would be flagged now by the Transcribear tool. In addition, the functionality of spelling checks, which is important for transcription, is also included in the tool. The addition of the above functionality is in line with the principle of 'validation', emphasized multiple times across a number of chapters in the edited volume 'Developing Linguistic Corpora: A Guide to Good Practice' (Wynne, 2005) as accuracy and consistency are important criteria for evaluating the quality of transcription and annotation in any research project.

Based on the specifications discussed above, the online tool Transcribear is featured with the following facilities:

- A text editor integrated with an audio/video player which supports a variety of format including mp3, mp4, wav and ogg;

- Shortcut keys available for audio/video play, pause, slow, fast, fast-forward/backward, timestamp as well as frequently used tags;

- An offline mode to ensure data confidentiality;

- Customizable tags of annotation and corresponding shortcut keys for faster typing;

- The validation function to automatically identify mis-formed tags which do not conform to the pre-defined format.

A screenshot of Transcriber is presented in Figure 3 as well as an example of validation with the symbol of '/' missing in the closing tag in Figure 4, where the illegitimate tagset is highlighted in red by the engine.
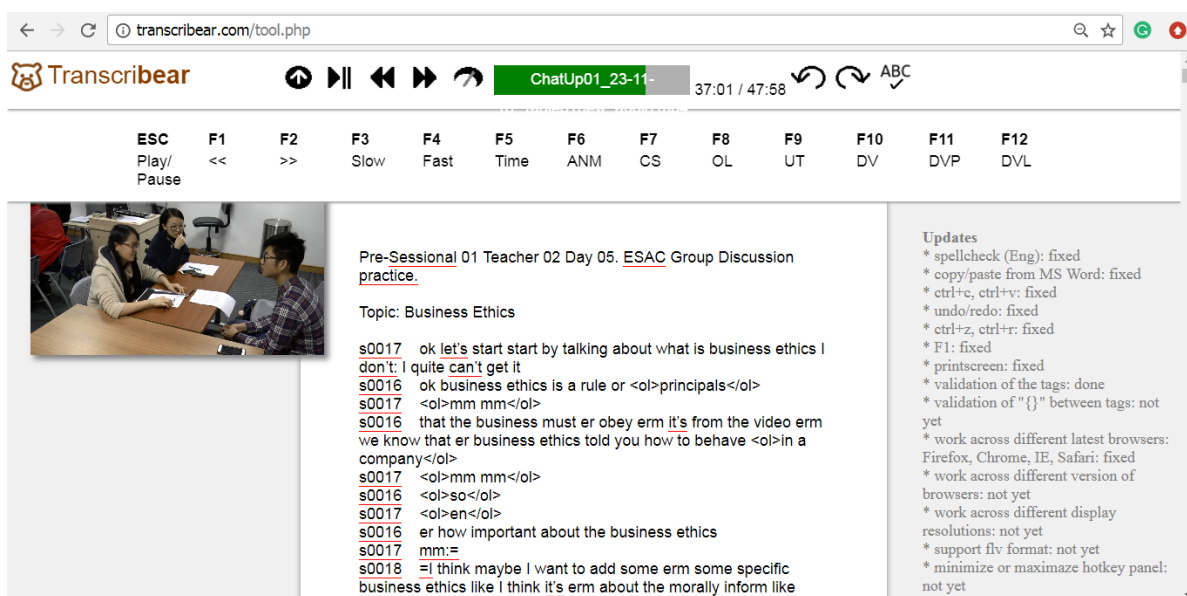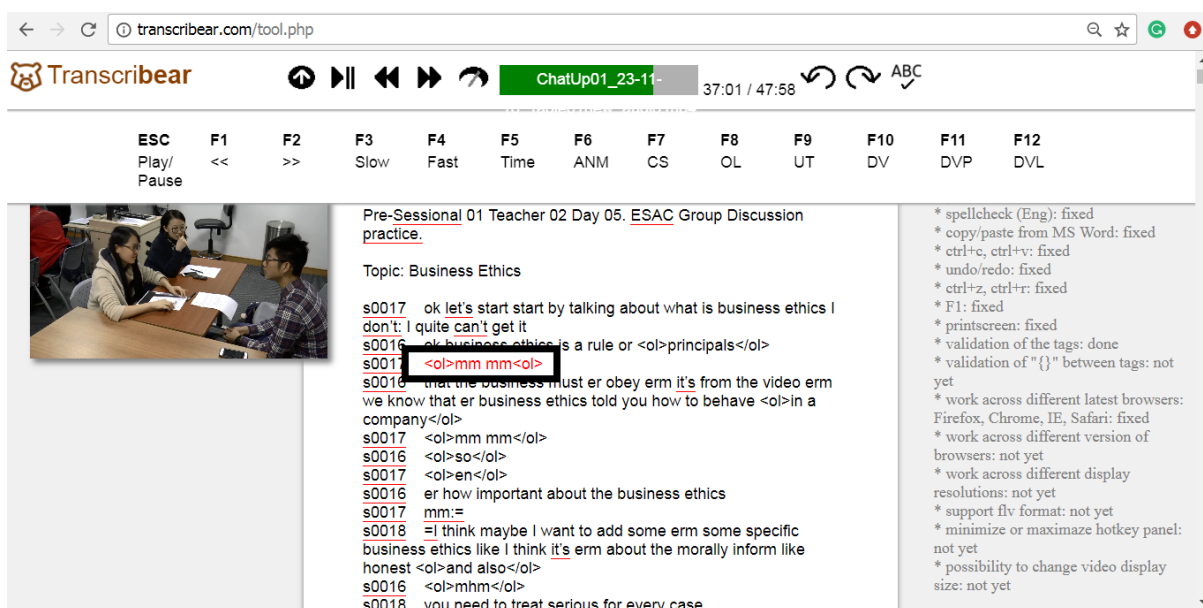

Fig. 3 The interface of Transcribear

Fig. 4 An example of validation where an illegitimate tagset is highlighted

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4. Conclusion

A good tool can facilitate the work of transcription and annotation as it is notoriously time-consuming and challenging to manually transcribe or annotate data. After the Transcribear tool was introduced to the CAWSE project, in the course of nine months, it has been used by more than ten assistants/interns in transcribing or validating thousands of scripts. On the basis of their feedback, it was estimated that the introduction of this tool saved approximately 15-20% of working time as a result of its design of shortcut keys and built-in validation and spelling checks. One of the team members also used the tool to double check the quality of transcripts prior to the use of Transcribear, and with the validation function, a large number of typing errors were identified and corrected. We concluded that Transcribear has considerably enhanced the productivity of the team as well as the quality of transcription and annotation outputs. The customizable settings of Transcribear also make it possible for any other projects which require transcription and/or annotation to take advantage of this tool.

Audio/video recordings are used in many disciplines in Humanities and Social Sciences because qualitative research often requires data transcription and/or annotation although they may be termed differently, for example, 'coding' (e.g. Charmaz, 2006; Strauss & Corbin, 1998) instead of 'annotation'. Even for the type of research which does not require transcription, the users can still upload their text to Transcribear to add their own annotation notations. For instance, any existing electronic text can be copied and pasted to the online interface, and a researcher can annotate target features in the text systematically on the basis of a framework defined in their own project (e.g. marketing strategies in a business study, types of feedback in educational research, or collocation errors in a second writing project). The Transcribear tool can therefore be used in a much wider range of contexts rather than just Corpus Linguistics, and based on our experience, the introduction of this new tool can make the tedious and laborious task of transcription and/or annotation easier and faster.

In terms of limitations of the current design, first of all, Transcribear does not support a multi-tier structure, which means all transcription and annotation tags are aligned on the same tier. This could be problematic for multimodal analysis because multi-tiers are essential to visualize the temporal coordination across modes. In addition, although this tool supports a range of media file types, more file types such as flv may be considered if such needs arise. For future development, the facility of speech recognition which can be used to speed up transcription may be introduced when this technology is mature for naturally occurring language data. The integration of XML format may also be considered at a later stage.

Currently Transcribear is freely available with CAWSE-specific transcription and annotation conventions as the default settings. The development of this tool is collaboration between a linguist (the CAWSE project director who designs the specifications of the tool) and a computer scientist (the developer who implements the design). While most of similar annotation tools appear to have been developed by academics and are often freely available (as can be seen in Table 2), presumably funded by their institutions or projects, the computer scientist who develops this tool, however, is not an academic and has been working on this tool voluntarily. The development and maintenance of this web tool involves recurring costs of a domain name, renting a server, a server certificate for secure communications between a user's web browser and the server via HTTPs protocol, constant updates and fixing bugs, among others, let alone the developer's assiduous (and unpaid) work for at least several months to get a beta version running. To make this tool sustainable and to constantly improve user experience as well as enhance the functionality, a small subscription fee may be considered in the future. Free trials, however, will be available for those who wish to experiment with the tool or those who may just need to use the tool for a shorter period of time.

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