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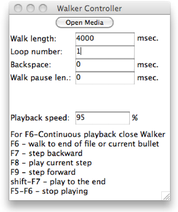
Computational analysis of AphasiaBank transcripts and video

Transcription

Interviews are transcribed in CHAT (MacWhinney, 2000) and linked to the video. The methods for doing this emphasize the production of high-quality transcripts that can be checked for accuracy and reliability. Both are explained below.

TRANSCRIBING WITH WALKER CONTROLLER



Walker Controller allows the transcriber to control the audio with computer keys for play, stop, rewind, and fast forward.

The controller also allows the transcriber to:

- set the duration (in milliseconds) of segments that will play when F6 (play) is pressed
- change the playback speed (faster or slower)
- set the audio file to automatically replay the same segment any number of times
- set the audio file to backspace any number of milliseconds before playing the next segment

LINKING THE VIDEO

Linking between the transcription and the audio or video record is done by replaying the recording (in F5 mode) and pressing the spacebar at the end of each utterance. This automatically inserts "bullets" at the end of the utterance, which correspond to where that utterance appears in the recording. Then, during playback, CLAN highlights the currently playing utterance.

All samples and data are from Participant descriptions of the "Cat in the Tree" stimulus picture (Nicholas & Brookshire, 1995).

```
1    @ID:    eng|Adler|PAR|80;11.|male|Broca|adler11a
2    @ID:    eng|Adler|INV||||adler11a|Investigator||
3    @Media: adler11a, video
4    *INV:   &=turns:page what's goin(g) on here ? •
5    *PAR:   oh ho [: no] [* p:w]  . •
6    *PAR:   &=points:cat oh no &=imit:meow &=imit:meow . •
7    *INV:   +< &=laughs (.) so there's a cat . •
8    *PAR:   yeah &=raises:arms &=gasps oh . •
9    *PAR:   oh daddy &=points:man &=points:ladder
10           &=ges:fall . •
11   *INV:   +< oh &uh so what happened here do you
12           think ?  •
13   *PAR:   &=points:ladder &=ges:fall &=imit:fall . •
```

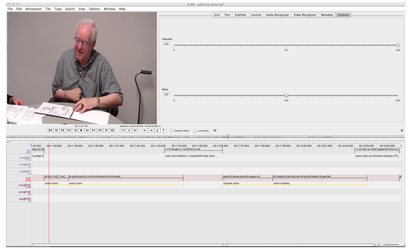
Note: Bullets can be expanded to show the exact temporal reference. For example:

```
9    *PAR:   oh daddy &=points:man &=points:ladder
10           &=ges:fall . •718494_723021•
```

Timelocked Display

AphasiaBank data can be further processed by the ELAN, Praat, and Phon programs for studying patterns of phonological disfluencies. Praat can be used to analyze, synthesize, and manipulate speech, and create high-quality pictures.

ELAN is a professional tool for the creation of complex annotations on video and audio resources. Transcripts in the CHAT format can easily be converted to ELAN using the following command: **chat2elan +emov *.cha**



Morphological Tagging

On the lexical level, we check for accuracy of transcription by running the transcripts through the filter of a morphological tagger (MOR). The morphological tagger and statistically trained disambiguator (POST) automatically compute a full profile of all major morphological and syntactic usage patterns.

MOR

- All possible parts of speech appear for each lexical item.
- CLAN command: **mor *.cha**

```
1    *PAR:   &=points:man this [/] this man he is
2            &=points:cat looking at the (.) cat .
3    %mor:   pro:dem|this^det|this n|man^co:voc|man
4            pro|he v:cop|be&3S^aux|be&3S
5            n:gerund|look-GERUND^part|look-
6            PROG^v:n|look-PROG prep|at^adv:loc|at
7            det|the n|cat .
8    *PAR:   and he is &=points:dog &=points:man <stuck
9            the man> [/] stuck the man &uh up the tree
10           . [+ gram]
11   %mor:   conj|and^coord|and pro|he
12           v:cop|be&3S^aux|be&3S
13           part|stick&PERF^v|stick&PAST det|the
14           n|man^co:voc|man prep|up^adv:loc|up det|the
15           n|tree .
16   *PAR:   &=points:dog it [/] it later &co comes
17           &=points:firemen the man in the (.) bottle
18           [: truck][* s:ur-ret] [//] &uh: (..) home
19           [: truck] [* s:ur-ret] [//] (.) &h truck .
20   %mor:   pro|it adv|later^adj|late-CP v|come-3S
21           det|the n|man^co:voc|man prep|in^adv:loc|in
22           det|the v|truck^n|truck .
```

POST

- Parts of speech are disambiguated based on context before and after the word.
- CLAN command: **post *.cha**

```
1    *PAR:   &=points:man this [/] this man he is
2            &=points:cat looking at the (.) cat .
3    %mor:   det|this n|man pro|he aux|be&3S
4            part|look-PROG prep|at det|the n|cat .
5    *PAR:   and he is &=points:dog &=points:man <stuck
6            the man> [/] stuck the man &uh up the tree
7            . [+ gram]
8    %mor:   conj|and pro|he v:cop|be&3S part|stick&PERF
9            det|the n|man adv:loc|up det|the n|tree .
10   *PAR:   &=points:picture_dog it [/] it later &co
11           comes &=points:firemen the man in the (.)
12           bottle [: truck] [* s:ur-ret] [//] &uh:
13           (..) home [: truck] [* s:ur-ret] [//] (.)
14           &h truck . [+ gram]
15   %mor:   pro|it adv|later v|come-3S det|the n|man
16           prep|in det|the n|truck .
```

MORTABLE

- creates an Excel spreadsheet listing frequences for all parts of speech and bound morphemes
- CLAN command: **mortable +t*PAR +u *.cex**

Gender	Aphasia type	ID	*:wh	adj,adj:*	adv,adv:*	aux,aux:*	cmpl	conj,conj:*	det
male	Broca	adler11a	0	0	0	0	0	0	0
male	Wernicke	adler23a	1	8	23	6	0	11	8
male	Anomic	williamson07a	0	6	14	2	0	7	27

inf	modal	n,n:*	neg	prep,prep:*	pro,pro:*	pro:poss, pro:poss:*	pro:refl, pro:refl:*	qn,det:num	v	v:cop
0	0	2	0	0	0	0	0	0	0	0
3	0	8	1	2	29	0	0	2	11	17
1	0	32	0	13	14	2	0	2	14	4

part|-PERF, part|&PERF	part|-PROG, part|&PROG	*&13S	*&3S	*&PAST	*-3S	*-PAST	adj|*-CP	adj|*-SP	n|*&PL, n:*|*&PL
0	0	0	0	0	0	0	0	0	0
0	7	1	21	3	1	1	0	0	0
1	3	1	4	2	10	0	0	0	1

n|*-PL,n:*|*-PL	n|*-POSS, n:*|*-POSS, pro:*|*, poss|*	part|*&PERF	part|*-PERF	part|*-PROG
0	0	0	0	0
1	0	0	0	7
1	0	1	0	3

Errors

An error coding system (available at the AphasiaBank website) was developed to capture errors at the word and utterance levels. After coding errors in the transcription, you can do a wide variety of error analyses. Here are 2 examples of CLAN commands analyzing **all word level errors** for the 3 participants describing the "Cat in the Tree" picture.

- Clan command: **freq +s"[* *]" +d6 +u *.cex**
- Provides frequencies for types and tokens of all error categories.
- Shows actual error production followed by target word in square brackets collaped across all 3 CHAT files

```
 2 [* n:uk]
      1 gʊtst@u [: x@n] [* n:uk]
      1 tɪŋ@u [: x@n] [* n:uk]
 3 [* p:w]
      1 hat [: cat] [* p:w-ret]
      1 try [: tree] [* p:w-ret]
      1 fog [: dog] [* p:w-ret]
 2 [* s:per]
      1 window [: branch] [* s:per]
 5 [* s:r]
      1 horsie [: doggie] [* s:r-rep]
      1 ocean [: fire] [* s:r-rep]
      1 she [: he] [* s:r-ret]
      1 horsie [: doggie] [* s:r-ret]
      1 woman [: girl] [* s:r-ret]
 3 [* s:uk]
      1 far [: tree] [* s:uk]
      1 along [* s:uk]
      1 figure [* s:uk]
 4 [* s:ur]
      1 water [: ladder] [* s:ur-ret]
      1 bottle [: ladder] [* s:ur-ret]
      1 bottle [: truck] [* s:ur-ret]
      1 home [: truck] [* s:ur-ret]
```

- Clan command: **freq +s"[* *]" +t*PAR +d2 *.cex**
- Creates Excel spreadsheet with frequencies of each error category for each file.

Gender	Aphasia type	ID	[* n:uk]	[* p:w]
male	Broca	adler11a	0	0
male	Wernicke	adler23a	1	8
male	Anomic	williamson07a	0	6

[* s:per]	[* s:r]	[* s:uk]	[* s:ur]	Types	Token
0	0	0	0	0	0
0	5	0	0	1	2
2	5	3	4	1	1

Gestures

Gestural communication can be studied through the method of nesting files, in which detailed coding files maintain their linkages to segments of the video.

File: adler11a.cha

```
721     *PAR:   &=head:turns &=breath:in &=imit:ripping
722             &=takes &=ges:away &=imit:crying
723             &=hand:flip okay . •
724     @G:  ripping •%txt:"5dress"•
725     *PAR:   &=sings &=turns:page . •
```

File: 5dress.cut

```
Sequence: 5A-5B-5C-5D-5E-5F-5G-5H

Segment   5A
Action    Left hand reaches across body
Face    Gaze toward dress on Cinderella, frown
Classification  Action depiction
Meaning   Regarding and touching dress

%pic:
```

```
Segment   5B
Action    Left hand crosses back to left
Face    Gaze toward dress on Cinderella, frown
Classification  Action depiction
Meaning   Further grabbing of dress and disregard

%pic:
```

For detailed guidelines, visit
http://talkbank.org/AphasiaBank/

References

Boersma, P., & Weenink, D. (1992-2009). Praat (Version 5.1.02). Amsterdam.

MacWhinney, B. (2000). *The CHILDES Project: Tools for analysing talk*, 3rd edition. Mahwah, NJ: Lawrence Erlbaum.

Nicholas, L., & Brookshire, R. (1995). Presence, completeness and accuracy of main concepts in the connected speech of non-brain-damaged adults and adults with aphasia. *Journal of Speech and Hearing Research*, 38, 145-156.