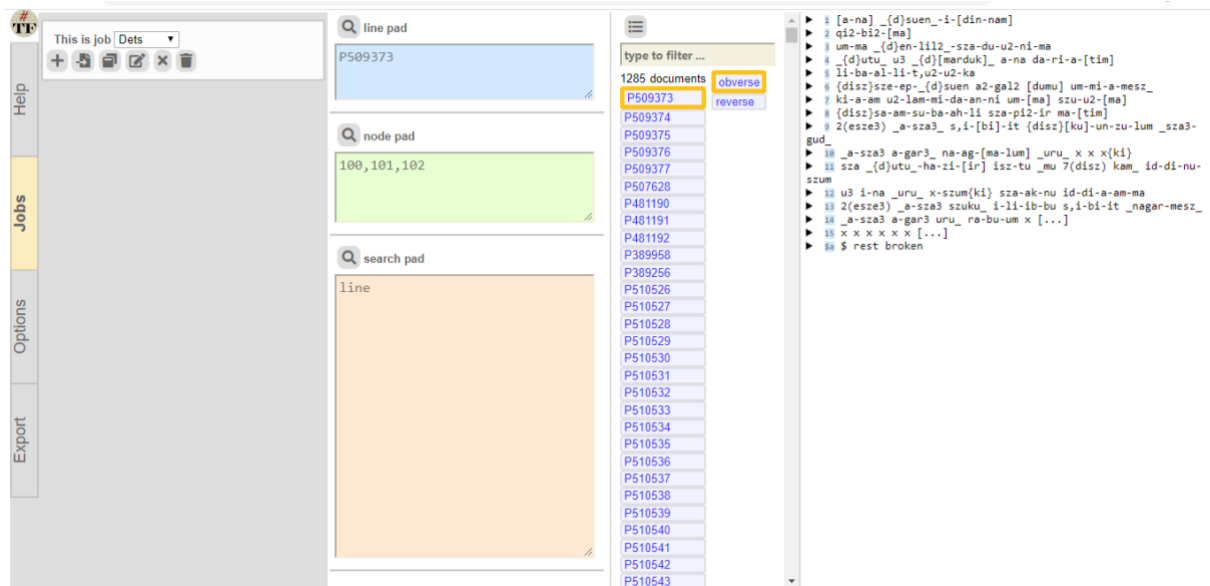


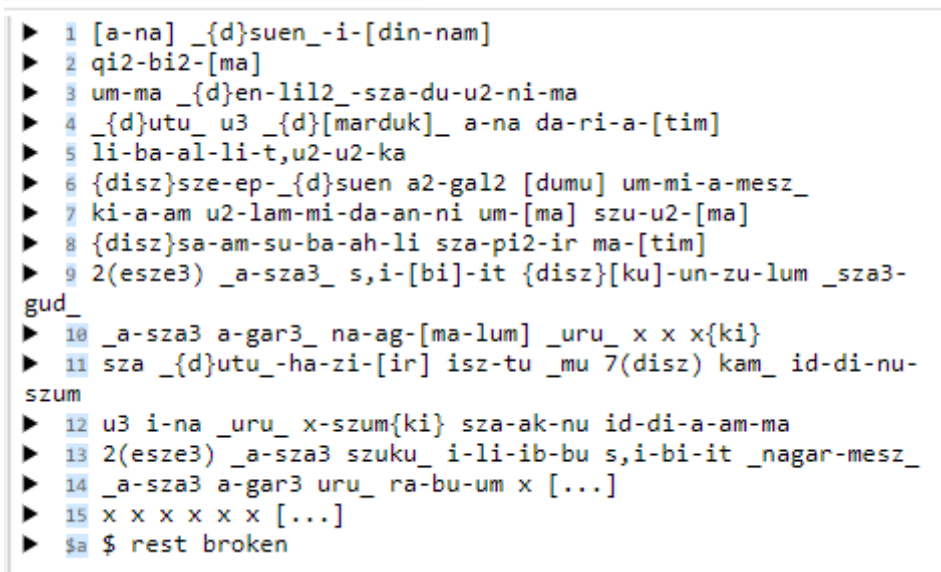
Rundown of Alba de Ridder's short presentation in the Lorentzworkshop 2020.

The goal of a short sprint in the summer of 2019 was to tag parts of speech in a corpus of Old Babylonian letters. Present were Ernst Boogert, Cale Johnson, Martijn Kokken, Alba de Ridder and Dirk Roorda.

## Part 1. The Basis



1 A Babylonian text in TF



2 Above, enlarged

Here you see an example of a Babylonian letter. We tried to use orthographic shortcuts to pinpoint Parts of Speech. Here are some examples of how we did that.

## Part 2. Determinatives

Note the {d}, {ki}, {disz} parts: these are determinatives. They indicate personal names, place names, deity names and materials of which an item is made (think of reed, wood and clay). These determinatives stand next to nouns. Dirk Roorda used a script to find these determinatives and made them possible to search for them in the TF browser.

This is job: Dets

line pad  
P509373

node pad  
100,101,102

search pad  
line  
sign det=1

20 results per page

Total 6796

|      |      |      |
|------|------|------|
| 2000 | 2900 | 2990 |
| 2100 | 2910 | 2991 |
| 2200 | 2920 | 2992 |
| 2300 | 2930 | 2993 |
| 2400 | 2940 | 2994 |
| 2500 | 2950 | 2995 |
| 2600 | 2960 | 2996 |
| 2700 | 2970 | 2997 |
| 2800 | 2980 | 2998 |
| 2900 | 2990 | 2999 |
| 3000 | 3000 | 3000 |
| 4000 | 3000 | 3000 |
| 5000 | 3100 | 3001 |
| 6000 | 3200 | 3002 |
| 3300 | 3030 | 3003 |
| 3400 | 3040 | 3004 |
| 3500 | 3050 | 3005 |
| 3600 | 3060 | 3006 |
| 3700 | 3070 | 3007 |
| 3800 | 3080 | 3008 |
| 3900 | 3090 | 3009 |

| n | line | sign   |
|---|------|--|
| ▶ | 2990 | P365970 obverse:3 _2(d)isz) ma-na ku3-babbar_sza i-na {kusz}tu-uk-ka-ni ka-an-ku-u2   {kusz} |
| ▶ | 2991 | P365970 obverse:4 tu-sza-bi-lam {d}suen-e-ri-ba-am sza _nagar_   {d}                         |
| ▶ | 2992 | P365970 obverse:5 {na4}ku-nu-uk-ki-szu u2-sze-ep-ti-szu-ma   {na4}                           |
| ▶ | 2993 | P365970 reverse:3 {na4}ku-nu-uk-ki-ia ad-di-in-szum-ma   {na4}                               |
| ▶ | 2994 | P365970 reverse:9 _iti udru{duru5} u4 1(u)-kam_ku-un-kam szu-bi-lam   {duru5}                |
| ▶ | 2995 | P365971 obverse:10 a-na babila2{ki} ta-al-li-a-am   {ki}                                     |
| ▶ | 2996 | P365971 reverse:2 i-nu-ma a-na babila2{ki#} [ta-li-a]-am   {ki#}                             |
| ▶ | 2997 | P365971 reverse:7 a-na babila2{ki} li-i-b-lam   {ki}   |
| ▶ | 2998 | P479921 obverse:1 a-na ARAD2-{d}suen   {d}   |
| ▶ | 2999 | P479921 obverse:4 {d}utu u3 {d}marduk li-ba-al-<li>-t,u2-ka   {d}                            |
| ▶ | 3000 | P479921 obverse:4 {d}utu u3 {d}marduk li-ba-al-<li>-t,u2-ka   {d}                            |
| ▶ | 3001 | P479921 obverse:8 ma-har sza-pir zimbir{ki}  |

3 Determinatives in TF

| n | line                    | sign   |
|---|-------------------------|--|
| ▶ | 2990 P365970 obverse:3  | _2(disz) ma-na ku3-babbar_ sza i-na {kusz}tu-uk-ka-ni ka-an-ku-u2   {kusz} |
| ▶ | 2991 P365970 obverse:4  | tu-sza-bi-lam {d}suen-eri-ba-am sza _nagar_   {d}                          |
| ▶ | 2992 P365970 obverse:5  | {na4}ku-nu-uk-ki-szu u2-sze-ep-ti-szu-ma   {na4}                           |
| ▶ | 2993 P365970 reverse:3  | {na4}ku-nu-uk-ki-ia ad-di-in-szum-ma   {na4}                               |
| ▶ | 2994 P365970 reverse:9  | _iti udru{duru5} u4 1(u)-kam_ ku-un-kam szu-bi-lam   {duru5}               |
| ▶ | 2995 P365971 obverse:10 | a-na babilā2{ki} ta-al-li-a-am   {ki}                                      |
| ▶ | 2996 P365971 reverse:2  | i-nu-ma a-na babilā2{ki#} [ta-li-a]-am   {ki#}                             |
| ▶ | 2997 P365971 reverse:7  | a-na babilā2{ki} li-ib-lam   {ki}  |
| ▶ | 2998 P479921 obverse:1  | a-na ARAD2-{d}suen   {d}   |
| ▶ | 2999 P479921 obverse:4  | {d}utu u3 {d}marduk li-ba-al-<li>-t,u2-ka   {d}                            |
| ▶ | 3000 P479921 obverse:4  | {d}utu u3 {d}marduk li-ba-al-<li>-t,u2-ka   {d}                            |
| ▶ | 3001 P479921 obverse:8  | ma-har sza-pir zimbir{ki}  |

4 Above, enlarged

### Part 3. Logograms

The words encased by \_'s are so called logograms: signs used to express words in the Sumerian language, instead of being written syllabically in Akkadian. In the Old Babylonian letter corpus these logograms are used solely to express nouns.

### Part 4. Prepositions

Words following prepositions ana, ina, eli, isztu, itti and arki are nouns. Roorda tagged the words following these prepositions as nouns.

The screenshot shows the TF browser interface. On the left, there are three search pads: 'line pad' containing 'P509373', 'node pad' containing '100,101,102', and 'search pad' containing a list of signs and readings: 'line', 'word', '=: sign reading=a', '<: sign reading=na', and '=:'. On the right, a list of results is displayed with columns for 'n', 'line', 'word', 'sign', and 'sign'. The results are numbered from 280 to 290, with a total of 4072 results. The sign 'ana' is highlighted in yellow in the results.

5 Proposition ana in TF

This is an enlarged view of the TF browser results for the sign 'ana'. The table shows the following entries:

| n   | line               | word                        | sign              | sign                                  |
|-----|--------------------|-----------------------------|-------------------|---------------------------------------|
| 280 | P510591 obverse:18 | sze-a-am                    | a-na              | dumu#?_ a-ab-ba-a                     |
| 281 | P510591 reverse:6  | i-na pa-ni                  | a-na              | _zimbir(ki)_ a-la-ki-ma               |
| 282 | P510592 obverse:1  | a-wi-lim sza                | {d}marduk         | u2-ba-al#-la#-t,u2-szu                |
| 283 | P510592 obverse:7  | szu-ul-mi-ka                | asz-pur-ra-am     |                                       |
| 284 | P510592 obverse:11 | {d}utu-da-a-a-an            |                   | _dumu_qu2-ra-ad-dingir                |
| 285 | P510592 obverse:16 | {d}i-szum-ib-ni-szu         |                   |                                       |
| 286 | P510592 reverse:8  | _gu4 hi-a_sza#              | x x x [x x (x)] x |                                       |
| 287 | P510592 reverse:11 | szu-nu-ti                   | a-na#             | ma#-as,-s,a-ar-tim-ma                 |
| 288 | P510593 obverse:1  | a-wi-lim sza                | {d}marduk         | u2-ba-al-li-t,u2-szu                  |
| 289 | P510593 obverse:8  | i-na pa-ni-tim i-nu-ma      | a-na              | tam-li-tim a-na e2-duru5-bi2-sa3(ki#) |
| 290 | P510593 obverse:8  | i-na pa-ni-tim i-nu-ma a-na | a-na              | tam-li-tim a-na e2-duru5-bi2-sa3(ki#) |

6 Above, enlarged

## Part 4. Prelude to verbs

We did not get around to tag verbs yet. Here I will present some methods to identify verbs using the TF browser.

Words starting with the sign u2 are verbs in the D or Š stem.



This is Job: Dets

line pad: P509373

node pad: 100,101,102

search pad: word =: sign reading=u2 <: sign reading~[^aiue][aiue]

| n  | word               | sign                       | sign     |
|----|--------------------|----------------------------|----------|
| 1  | P509373 obverse:7  | u2- lam- mi- da- an- ni    | u2- lam- |
| 2  | P509373 reverse:14 | u2- lam- ma- du- u2- ma    | u2- lam- |
| 3  | P509373 reverse:16 | u2- sza- ab- ba- x         | u2- sza- |
| 4  | P509374 obverse:16 | u2- na- hi- i- id- ka      | u2- na-  |
| 5  | P509376 obverse:3  | u2- na- ah- hi- id- ka     | u2- na-  |
| 6  | P509377 obverse:6  | u2- na- ah- i- id- ka      | u2- na-  |
| 7  | P509377 obverse:7  | u2- sza- bi- la- ak#- kum# | u2- sza- |
| 8  | P509377 reverse:3  | u2- ne- eh- [...]          | u2- ne-  |
| 9  | P510527 obverse:14 | u2- da- an- ni- na- am- ma | u2- da-  |
| 10 | P510527 reverse:4  | u2- sza- ab- ba- lu- nin   | u2- sza- |
| 11 | P510527 reverse:6  | u2- la- am- ma- ad         | u2- la-  |
| 12 | P510527 reverse:10 | u2- sza- ab- ba- lam       | u2- sza- |
| 13 | P510528 obverse:5  | u2- de- ek- ki- ma         | u2- de-  |

7 Words starting with u2

| n  | word               | sign                       | sign     |
|----|--------------------|----------------------------|----------|
| 1  | P509373 obverse:7  | u2- lam- mi- da- an- ni    | u2- lam- |
| 2  | P509373 reverse:14 | u2- lam- ma- du- u2- ma    | u2- lam- |
| 3  | P509373 reverse:16 | u2- sza- ab- ba- x         | u2- sza- |
| 4  | P509374 obverse:16 | u2- na- hi- i- id- ka      | u2- na-  |
| 5  | P509376 obverse:3  | u2- na- ah- hi- id- ka     | u2- na-  |
| 6  | P509377 obverse:6  | u2- na- ah- i- id- ka      | u2- na-  |
| 7  | P509377 obverse:7  | u2- sza- bi- la- ak#- kum# | u2- sza- |
| 8  | P509377 reverse:3  | u2- ne- eh- [...]          | u2- ne-  |
| 9  | P510527 obverse:14 | u2- da- an- ni- na- am- ma | u2- da-  |
| 10 | P510527 reverse:4  | u2- sza- ab- ba- lu- nin   | u2- sza- |
| 11 | P510527 reverse:6  | u2- la- am- ma- ad         | u2- la-  |
| 12 | P510527 reverse:10 | u2- sza- ab- ba- lam       | u2- sza- |
| 13 | P510528 obverse:5  | u2- de- ek- ki- ma         | u2- de-  |

8 Above, enlarged

Using the browser to search for verb patterns using a i-CV-VC-CV-VC gives verbs in the G durative. This can be extended to other verbal forms as well.

This is job: Dets

line pad  
PS09373

node pad  
100,101,102

search pad

```
word
= : sign reading=i
< : sign reading~^[^aiue]
[aiue]$
< : sign reading~^[aiue]
[^aiue]$
< : sign reading~^[^aiue]
[aiue]$
< : sign reading~^[aiue]
[^aiue]$
```

expand all lines  
expand all nodes  
expand all results

30 current position  
20 results per page

Total 58

| n  | word                | sign | sign | sign | sign  | sign |
|----|---------------------|------|------|------|-------|------|
| 20 | P313308 reverse:17  | i-   | ga-  | am-  | ma-   | ar-  |
| 21 | P313312 reverse:1   | i-   | na-  | ak-  | ku-   | ud-  |
| 22 | P313317 reverse:8   | i-   | ha-  | al-  | li-   | iq-  |
| 23 | P313318 obverse:8   | i-   | ka-  | al-  | lu-   | u2-  |
| 24 | P313360 obverse:13  | i-   | da-  | ab-  | bu-   | ub-  |
| 25 | P313365 obverse:8   | i-   | da-  | ab-  | bu-   | um-  |
| 26 | P313373 reverse:7   | i-   | pa-  | ar-  | <ri>- | ik-  |
| 27 | P275095 obverse:9   | i#-  | pa#- | ar#- | ri#-  | ik#- |
| 28 | P386461 obverse:5   | i-   | ta-  | ak-  | la-   | an-  |
| 29 | P386461 reverse:3   | i-   | ta-  | ak-  | la-   | an-  |
| 30 | P386478 reverse:14' | i-   | sa-  | an-  | ni-   | iq-  |
| 31 | P386004 obverse:12  | i-   | re-  | ed-  | du-   | u2-  |

9 Verbs in G durative

| n  | word                | sign | sign | sign | sign  | sign |
|----|---------------------|------|------|------|-------|------|
| 20 | P313308 reverse:17  | i-   | ga-  | am-  | ma-   | ar-  |
| 21 | P313312 reverse:1   | i-   | na-  | ak-  | ku-   | ud-  |
| 22 | P313317 reverse:8   | i-   | ha-  | al-  | li-   | iq-  |
| 23 | P313318 obverse:8   | i-   | ka-  | al-  | lu-   | u2-  |
| 24 | P313360 obverse:13  | i-   | da-  | ab-  | bu-   | ub-  |
| 25 | P313365 obverse:8   | i-   | da-  | ab-  | bu-   | um-  |
| 26 | P313373 reverse:7   | i-   | pa-  | ar-  | <ri>- | ik-  |
| 27 | P275095 obverse:9   | i#-  | pa#- | ar#- | ri#-  | ik#- |
| 28 | P386461 obverse:5   | i-   | ta-  | ak-  | la-   | an-  |
| 29 | P386461 reverse:3   | i-   | ta-  | ak-  | la-   | an-  |
| 30 | P386478 reverse:14' | i-   | sa-  | an-  | ni-   | iq-  |
| 31 | P386004 obverse:12  | i-   | re-  | ed-  | du-   | u2-  |

10 Above, enlarged

A final approach I have played with is searching for verb-exclusive suffixes. Some suffixes are common to verbs and nouns, so not all verbal suffixes are useful. The example given here is the 3rd masculine plural dative, -šunūšim.

The screenshot shows a software interface with a search pad on the left containing the following text:

```
word
/with/
sign
<: sign reading=szu
<: sign reading=nu
<: sign reading=szi
<: sign reading=im
/-/
```

The main area displays a list of results, each with a unique ID and a set of suffixes in yellow boxes. The results are as follows:

| ID | Reverse             | Suffixes                                |
|----|---------------------|---|
| 17 | P292756 obverse:16  | id- na- szu- nu- szi- im                |
| 18 | P292756 reverse:3   | aq- bi- szu- nu- szi- im                |
| 19 | P292756 reverse:7   | id- na- szu#- nu#- szi- im              |
| 20 | P292854 reverse:2   | i- di- in- szu- nu- szi- im             |
| 21 | P292854 reverse:5   | i- di- in- szu- nu#- szi#- im           |
| 22 | P355749 reverse:28  | isz- pu- ur- szu- nu- szi- im           |
| 23 | P355786 reverse:6   | szu- pi2- sza- szu- nu- szi- im         |
| 24 | P313304 reverse:13  | i- s,i- ru- szu- nu- szi- im            |
| 25 | P313315 obverse:15  | [id- di- isz]- szu- nu- szi- im         |
| 26 | P313390 reverse:4   | ta- ad- di- nu- szu- nu- szi- im        |
| 27 | P313410 obverse:14' | qi2- bi#- a- szu- nu- szi- im#          |
| 28 | P345560 reverse:9   | ni- iq- bi#- [szu]- nu#- szi- im- ma    |
| 29 | P275092 reverse:8   | szu- uk- na- ašz- szu- nu- szi- im- ma# |
| 30 | P275093 reverse:4'  | te- er- szu- nu- szi- im                |
| 31 | P275112 obverse:9   | i- na- ad- di- nu- szu- nu- szi- im     |

11 Verbs with a dative suffix

This is an enlarged view of the search results from the previous screenshot. The suffixes are highlighted in yellow boxes for each entry:

| ID | Reverse             | Suffixes                                |
|----|---------------------|---|
| 17 | P292756 obverse:16  | id- na- szu- nu- szi- im                |
| 18 | P292756 reverse:3   | aq- bi- szu- nu- szi- im                |
| 19 | P292756 reverse:7   | id- na- szu#- nu#- szi- im              |
| 20 | P292854 reverse:2   | i- di- in- szu- nu- szi- im             |
| 21 | P292854 reverse:5   | i- di- in- szu- nu#- szi#- im           |
| 22 | P355749 reverse:28  | isz- pu- ur- szu- nu- szi- im           |
| 23 | P355786 reverse:6   | szu- pi2- sza- szu- nu- szi- im         |
| 24 | P313304 reverse:13  | i- s,i- ru- szu- nu- szi- im            |
| 25 | P313315 obverse:15  | [id- di- isz]- szu- nu- szi- im         |
| 26 | P313390 reverse:4   | ta- ad- di- nu- szu- nu- szi- im        |
| 27 | P313410 obverse:14' | qi2- bi#- a- szu- nu- szi- im#          |
| 28 | P345560 reverse:9   | ni- iq- bi#- [szu]- nu#- szi- im- ma    |
| 29 | P275092 reverse:8   | szu- uk- na- ašz- szu- nu- szi- im- ma# |
| 30 | P275093 reverse:4'  | te- er- szu- nu- szi- im                |
| 31 | P275112 obverse:9   | i- na- ad- di- nu- szu- nu- szi- im     |

12 Above, enlarged

The endpoint for this line of thinking is that TF can recognize these forms even without the suffixes. Many of the verbs listed are common but irregular, thus being harder to detect using paradigm-based searches.