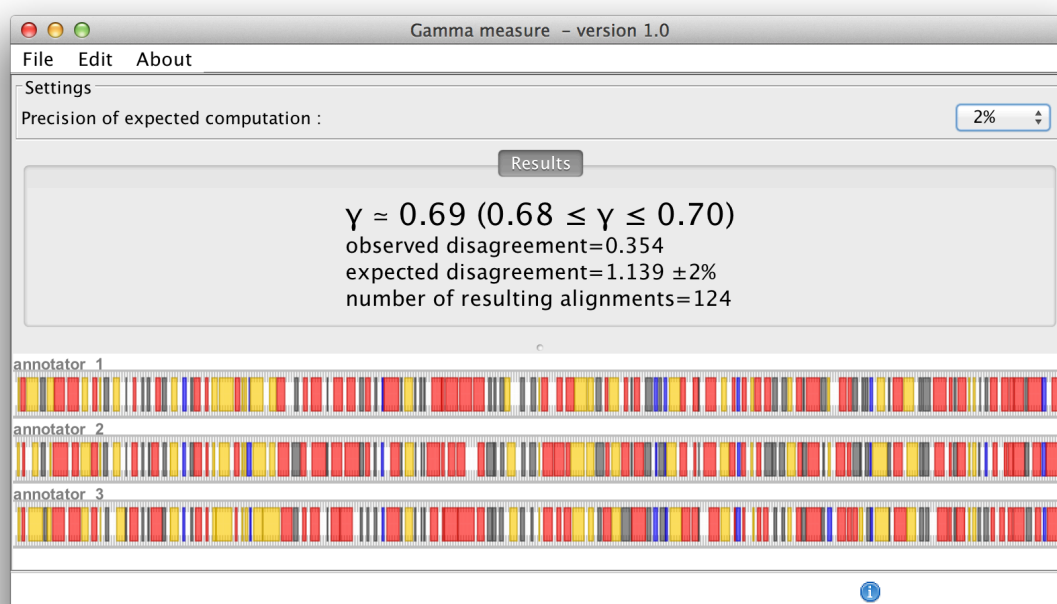


# Gamma ( $\gamma$ ) inter-annotator agreement measure

## Software Users' Manual



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## 0. Purpose

This  $\gamma$  software computes an agreement coefficient to evaluate the reliability of unitizing and coding continuous phenomena – texts, videos, conversations.

It is based on the following publication:

### ***The Unified and Holistic Method Gamma ( $\gamma$ ) for Inter-Annotator Agreement Measure and Alignment***

Yann Mathet, Antoine Widlöcher, Jean-Philippe Métivier

Computational Linguistics, MIT Press, September 2015, Vol. 41, No. 3: 437-479.

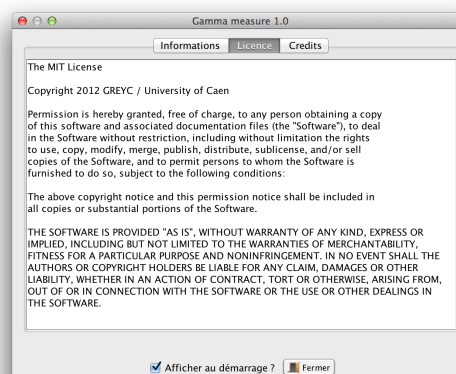
The PDF is available at: <http://www.mitpressjournals.org/toc/coli/41/3>

## 1. Requirements

This software is written in Java (for version 7 or higher). It can be run on any system (including Mac, Windows, Linux). If Java is not yet installed on your computer or not current, you will have to install the latest version (see next section "Getting started").

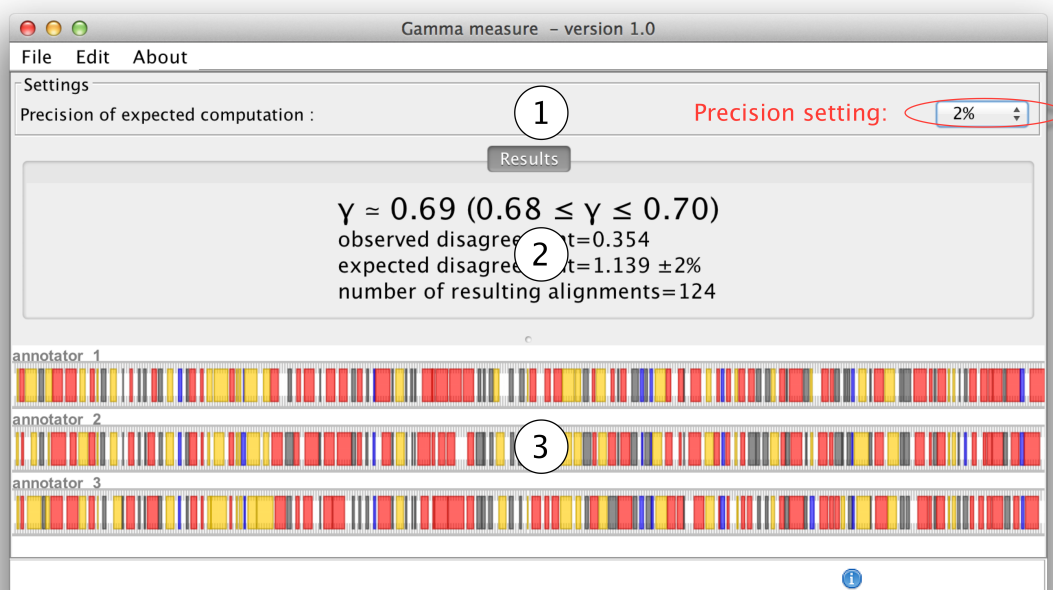
## 2. Getting started

- Download the file named "**gamma-1.0.zip**" (or a more recent version) from <https://gamma.greyc.fr>
- Unzip this file (using winrar or equivalent) to get the folder "gammaSoftware"
- Open the folder "gammaSoftware", then the folder "software", and double-click on "gamma.jar". **Do not move this file**. Instead, if needed, you may **create a shortcut** and move the shortcut on your desktop or wherever you want.
- The software should launch and a start window should appear.
- If the software does not launch after double-clicking on "gammaSoftware.jar", Java needs to be installed or updated, for example from <http://www.oracle.com/technetwork/java/javase/downloads/index.html>. Then double-click again on "gammaSoftware.jar."
- Before accessing the user interface, you will get an information window which includes the licence and credits. Please carefully read the license before using the software.



- You can get this window back at any moment (while using the software) by clicking on the "About" menu of the interface.

### 3. Introducing the interface

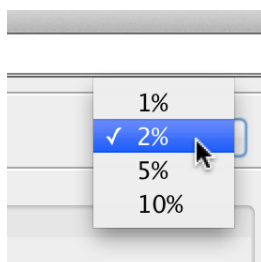


The interface consists of four parts. The menu at the top, and three panels numbered 1 to 3 on the above screenshot:

- The menu from where you can select 2 main actions: "File" to upload your data, "About" to get the credits and the licence.
- Panel 1 is the setting panel. At this time, there is only one setting, the minimum precision you wish for the computation of the expected value. This will be explained in **section 4**.
- Panel 2 will give you the results of the  $\gamma$  coefficient. They will be described in **section 5**.
- Panel 3 depicts the loaded annotations. It is automatically zoomed to fit exactly the length of the continuum, with one named line per coder (three coders in the example), and colors for unlike valuations of identified units. In the current version of the software, it is not yet possible to zoom in or zoom out.

### 4. Settings on panel 1

This first version of the software is reduced to the only one parameter: you can choose the minimal precision of the expected disagreement of the coefficient among 1%, 2%, 5% and 10% (with a confidence of 95%).



**Important** : this is not the direct precision of  $\gamma$ , but of its denominator. Indeed,  $\gamma$  is computed via the formula:  $\gamma = 1 - \text{observedDisagreement} / \text{expectedDisagreement}$ .

Whereas the observedDisagreement is directly and exactly computed by the software, the expectedDisagreement is computed by resampling iteratively the data. The obtained precision can be controlled by this setting, but the final precision of  $\gamma$  is different (may be smaller or higher, depending both on the observedDisagreement and the expectedDisagreement). At the end, you will be given the possible range of  $\gamma$ .

**Example** : In the screenshot of section 3, we have set the expected precision to 2%. Then, the expectedDisagreement is  $1.139 \pm 2\%$ , and the resulting  $\gamma$  is given by  $0.68 \leq \gamma \leq 0.70$ .

Note that each time you change this setting,  $\gamma$  is automatically recomputed accordingly.

## 5. Results in panel 2

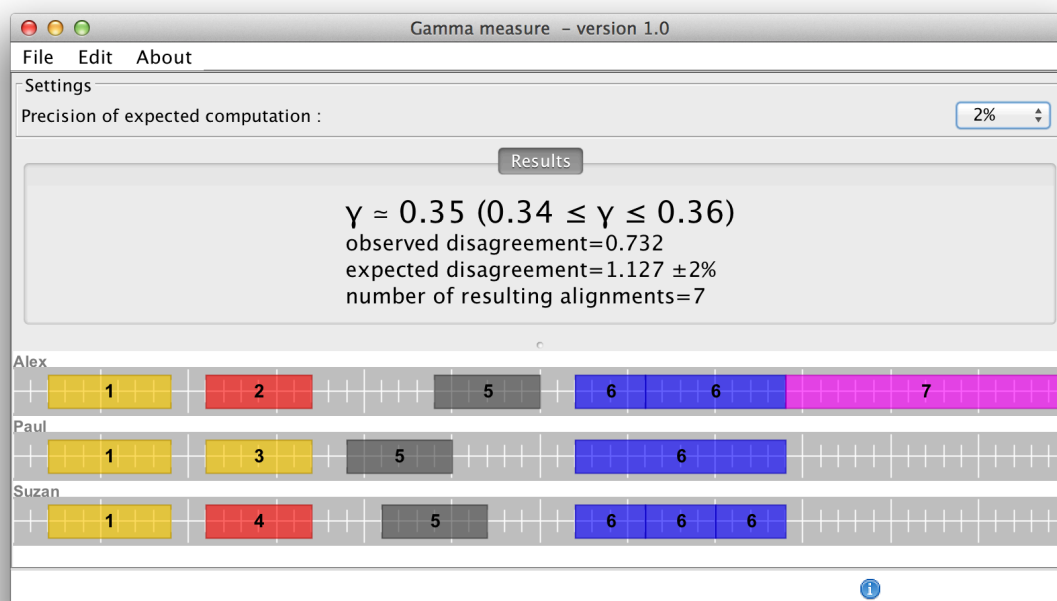
Main value :  $\gamma$

Because of what has just been explained in section 4,  $\gamma$  is provided as an approximate value,  $\gamma \approx 0.69$  in our example, and its possible range is also provided,  $0.68 \leq \gamma \leq 0.70$ . If this range is too large for your purpose, you may reduce it by selecting a more restrictive precision (see section 4) up to 1%.

Additional values : observed disagreement, expected disagreement, number of computed alignments are not directly useful for normal usage.

## 6. Loading data from "File" menu.

- Go to "File" menu, and click on "Load annotations"
- Use the browser to select a file (.txt or .csv)
- You can verify this by using the file provided in the distribution, in the "corpus" folder, named "**AlexPaulSuzan.csv**" – see below.



## 7. Formats of loaded files

This software is compliant with the annotation produced with the **Glozz annotation platform**, see **section 9**. However, whatever the way you produce your annotations, it should be quite easy to adapt them to this software, the format being very simple, as explained below.

All data should be comma delineated .csv or .txt files, containing 4 columns, one line per unit. Their 1st column contains the name of the coder, the 2<sup>nd</sup> the value assigned to that unit, the 3<sup>rd</sup> column contains the beginning and the 4<sup>th</sup> the end of that unit. For instance, Alex's 1<sup>st</sup> unit in the preceding screenshot would have to be:

```
Alex,1,2,9
```

Herein:

Alex is the name of the coder of this unit.

1 is the category or value assigned to this unit (here one numeral between 1 – 6)

2 is the beginning of this unit, measured from the beginning of the continuum

9 is the end of this unit, also measured from the beginning of the continuum

The complete file with its 16 units is as follows:

```
Alex,1,2,9
Alex,2,11,17
Alex,5,24,30
Alex,6,32,36
Alex,6,36,44
Alex,7,44,60
Paul,1,2,9
Paul,3,11,17
Paul,5,19,25
Paul,6,32,44
Suzan,1,2,9
Suzan,4,11,17
Suzan,5,21,27
Suzan,6,32,36
Suzan,6,36,40
Suzan,6,40,44
```

By default, the continuum:

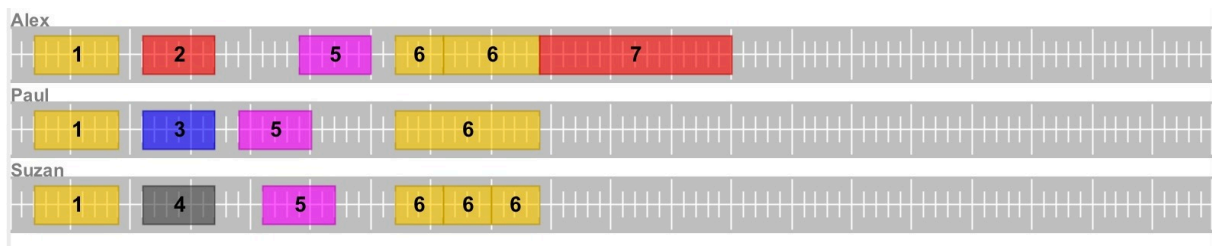
- Begins at position 0
- Ends at the highest end of anyone's last units (60 in our example, since Alex coded a unit from position 44 to position 60)

It is possible to override the default length for the continuum by adding a line preceding the list of units that specifies its length. For example:

```
length=100,0,0,0
```

This will extend the length of the continuum to force the right boundary to be 100 (instead of the default length of 60).

You can check this example with the provided file "AlexPaulSuzanLength100.csv" of the "corpus" folder, and now get the data shown below where you can see an empty part on the continuum of size 40 (i.e. 100-60):



Since  $\gamma$  is not sensitive to additional space (contrary to certain krippendorff's alpha coefficients), this is of no real use here. However it may be useful if you need to compare some results between  $\gamma$  and alphas.

## 8. Performances and limits of the software

Because it is a holistic method, the computation of  $\gamma$  is very demanding and may become very long with big data. Here are some examples with a Macbook Pro 2.3 GHz Core i7, with examples you can check by yourself (look at the "**corpus**" folder of the distribution) :

- "**AlexPaulSuzan.csv**" : 3 annotators, about 6 annotations per annotator: **almost instant**
- "**3by100.txt**" : 3 annotators, 100 annotations per annotator: **4 seconds**
- "**2by1000.txt**" : 2 annotators, 1000 annotations per annotator: **35 seconds**
- "**5by100.txt**" : 5 annotators, 100 annotations per annotator: **1 minute and 11 seconds**
- "**2by2000.txt**" : 2 annotators, 2000 annotations per annotator: **2 minutes and 18 seconds**
- "**3by500.txt**" : 3 annotators, 500 annotations per annotator: **5 minutes and 42 seconds**
- "**2by5000.txt**" : 2 annotators, 5000 annotations per annotator: **14 minutes and 25 seconds**

Consequently, if you have to compute  $\gamma$  on big data, you may have to split them.

## 9. Exporting Glozz annotations to Gamma software

Glozz is a manual annotation tool to annotate texts, which accepts as many annotators as needed. It is possible to export the Glozz annotations to Gamma software by using the "Simple CSV export" option of the "Export" menu, as shown below:

