

Lingotorium:

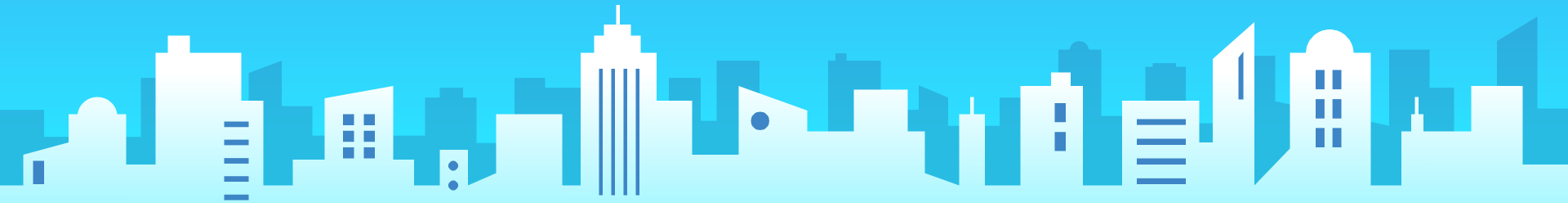
Applying language learning game mechanics into anaphoric annotation



DALI PROJECT
Queen Mary University of London
University of Essex



What
is
~~Wormingo~~
Lingotorium?



language learning **game with a purpose**



www.lingotorium.com



**Phrase
Detectives** + **Puzzles** Learning mechanics
Skills Progression = **Lingotorium**

The library

QMUL Student Reports

Sammy was seven years old. He loved to read, so his mother took him to the library. She told ? to choose some books. While Sam the books, his mother looked at to listen to music. Sammy chose ten books and the library said ? could borrow them for one month.

To answer drag him into this space.

Drag the words from below to fit in the missing words ?

seven days he him

fill the blanks



EGGS

2

LEVEL

8

14942 / 15000

door said he was happy to help. First Art sat in the car with Pan and showed him how to turn the key and make **??e e????e ?????**. Then **?e** showed him how to turn it off. You have to know how to stop before you can go, he said. Then Mavis had a lesson.

Tap letters to find
the hidden words



>>
SKIP

hangworm



EGGS

3

LEVEL 8

14996 / 15000

now-a-days.

The Flea then [?] [?] [?] [?] into foreign service, where,
it is said, he was killed.

The Grasshopper sat [w] [i] [t] [h] [o] [u] [t] on a green
bank, and reflected on worldly things; and he
[?] [?] [?] [?] too, Yes, a fine exterior is everything--a
fine exterior is what people care about.

Find the missing words [?].
Drag letters to swap.

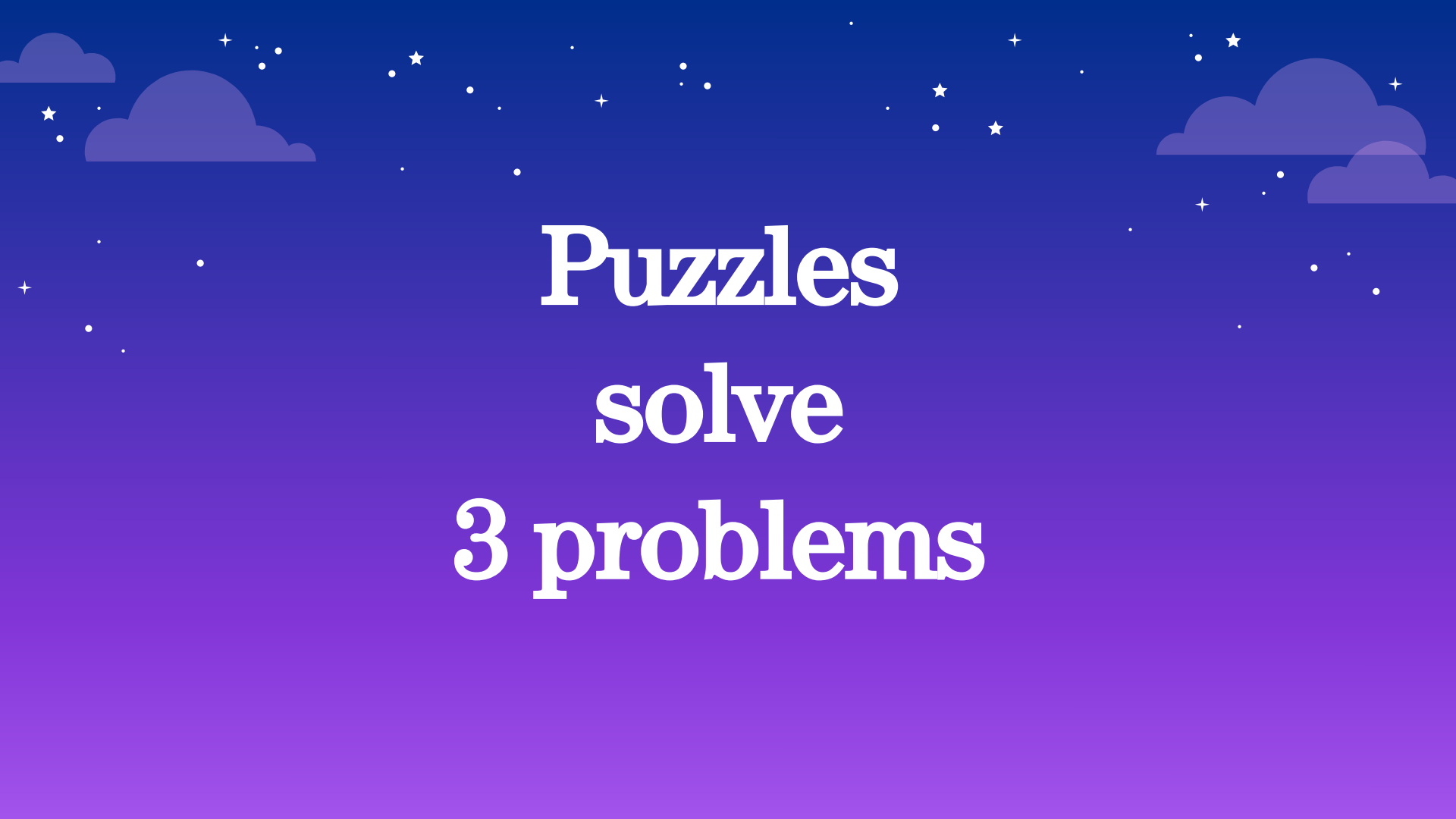


Letters get darker when placed closer to their correct positions.



SKIP

crossword

The background is a gradient from dark blue at the top to purple at the bottom. It features stylized, light blue/purple clouds at the top corners and numerous small white stars and dots scattered across the sky.

Puzzles
solve
3 problems

COLD START

A man with a mustache and snow on his face and hair, looking intensely at the camera in a snowy environment. The background is a snowy, wooded area.

HOW CAN YOU ASSIGN POINTS
WITHOUT KNOWING THE ANSWER?



GAMES ARE FUN (Huizinga 1938)

GWAPs SHOULD BE FUN (von Ahn 2006)

READING IS...

Th_n gam_fy
r_ad_ng

B__st
c_mpr_hens_
_n





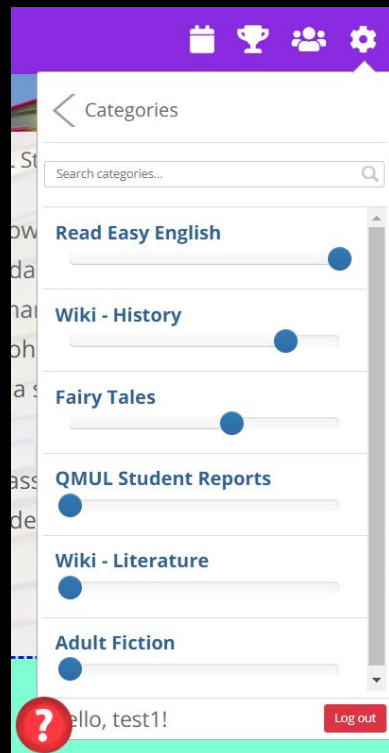
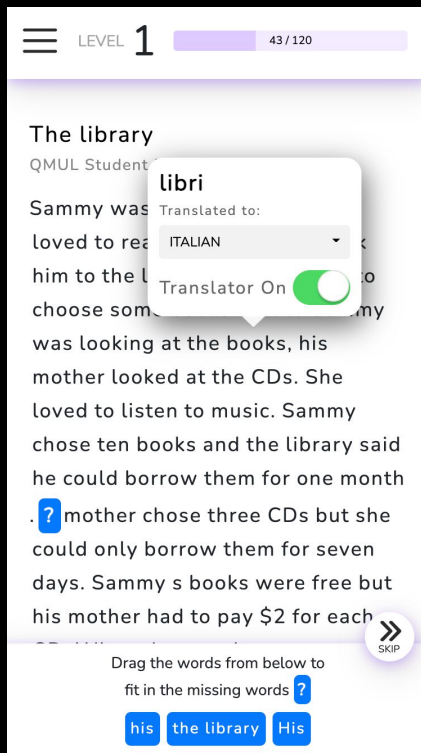
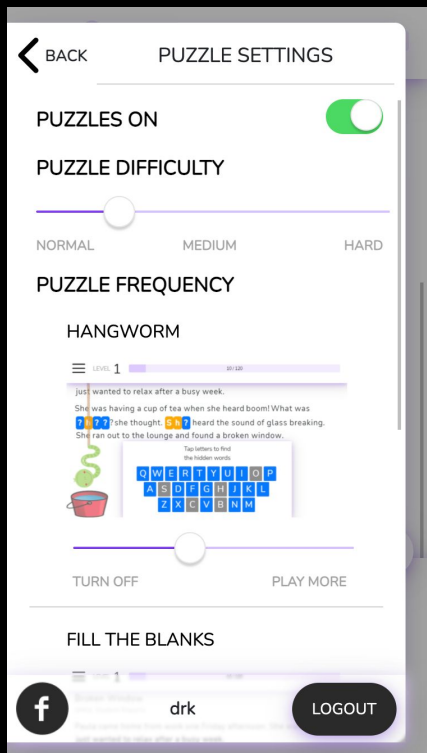
Phrase
Detectives + **Puzzles**
Learning mechanics
Skills Progression = Lingotorium

language learning game for a purpose


Goals
Feedback
Social engagement
Awarding/Forgiving
Challenge/Flow

Goals
Feedback
Social engagement
Awarding/Forgiving
Challenge/Flow

language learning mechanics



eggs today, feedback tomorrow

 You have 6 hatched eggs!

The Jungle Book - Mowgli's Brothers

190 we the Kite

Bernard Cornwell

125 England England

190 they the Wiggins family

375 their nation England

375 their petty Not Mentioned

GET REWARDS!

Has their tips been mentioned before?

NO YES

Oops! We found that 2 of your past annotations were actually correct.
You are awarded extra points for your time!

Bernard Cornwell

371 They Plural Reference

375 they his historical novels


GET REWARDS!

sleepy feeling in their tips.

Has their been mentioned before?

NO YES

tutoring annotations

 LEVEL 1 18 / 120

The library

QMUL Student Reports

Sammy was seven years old. He loved to read, so his mother took him to the library. She told him to choose some books. While Sammy was looking at the books, his mother looked at the CDs. **She** loved to listen to music. Sammy chose ten CDs. He could borrow them for one month.


Now let's do science!

Understanding which words a term refers to can be difficult for computers.

These are called **anaphors**.

GOT IT!

NO **YES**

 LEVEL 1 18 / 120

The library

QMUL Student Reports

Sammy was seven years old. He loved to read, so his mother took him to the library. She told him to choose some books. While Sammy was looking at the books, his mother looked at the CDs. **She** loved to listen to music. Sammy chose ten CDs. He could borrow them for one month.

Now, tap one of the terms that **She** refers to.

These are called **antecedents**.

Mark what **She** refers to.

BACK

You've just improved **science** a little bit more!

Please keep solving puzzles and being awesome!


NEXT

He could borrow them for one month. **?** mother chose three CDs but she could only borrow them for seven days. Sammy's books were free but his mother had to pay \$2 for each CD. When they got home Sammy read **?** books and his mother listened to her music!

Drag the words from below to fit in the missing words **?**

his His the library

SKIP

 **BACK** ABOUT LINGOTORIUM

Lingotarium is a **game-with-a-purpose** developed by the **DALI Project** at Queen Mary University of London. Players contribute to science by annotating texts for Natural Language Processing, while also improving their skill in English through the language learning-oriented puzzles.

You can earn points to unlock new skills and puzzles in two ways:

- Solve mysterious puzzles to practice your English skills.
- Annotate texts for **Natural Language Processing**.

Contribute to Science in a fun way!

f drk **LOGOUT**



**Phrase
Detectives** + **Puzzles**
Learning mechanics
Skills Progression = **Lingotorium**

MPA – player confidence scores

Paun et al., 2018

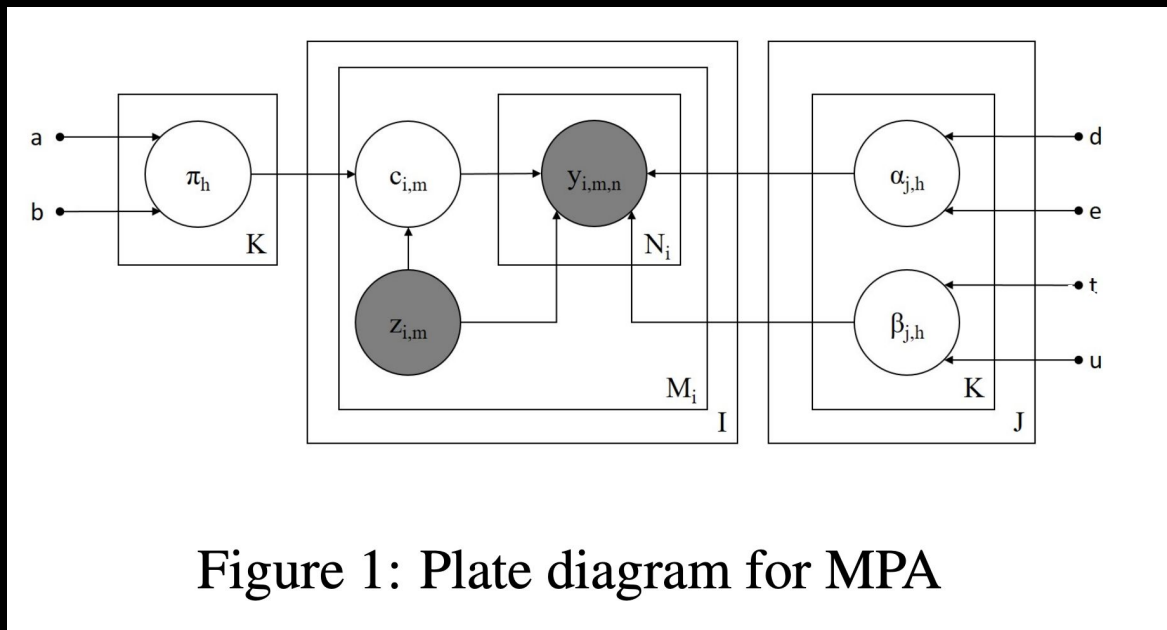


Figure 1: Plate diagram for MPA

Probabilistic Annotation Model for
Crowdsourcing Coreference

The model addresses the first part of the pair framework: the posterior of the label indicators is used to link each with the most likely label, obtaining on pairs. The coreference chains are by following the link structure from the inferred pairs

detectives inspired profiles: from the PD who annotated more than 10 DO and mentions (thresholds set to have a confidence) we extracted a total of 89 This gave us much more interesting sensitivity pairs compared to the ones from the synthetic profiles, i.e., contrasting class abilities – see Figure 2.

non-referring task

EGGS 3 LEVEL 8 14996 / 15000

Andersen's Fairy Tales - The Naughty Boy
Fairy Tales

Along time ago, **there** lived an old poet, a thoroughly kind old poet. As he was sitting one evening in his room, a dreadful storm arose without, and the rain streamed down from heaven; but the old poet sat warm and comfortable in his chimney-corner, where the fire blazed and the roasting apple hissed.

Those who have not a roof over their heads will be wetted to the skin, said the good old poet.

Oh let
exclai
door

Has **there** been mentioned before?

NO NON REFERRING YES

>> SKIP

et!
at the
ain

anno.

+

5%

confidence

plurals task

The screenshot shows a reading application interface. At the top, there's a header with a menu icon, 'EGGS 3', 'LEVEL 8', and a progress indicator '14996 / 15000'. The main text area displays the title 'Andersen Fairy Tales - The Leap-Frog' and the subtitle 'Fairy Tales'. The text of the story is shown with several words highlighted in blue and orange boxes. A dashed blue line connects the highlighted words 'they' and 'which'. At the bottom, there's a navigation bar with a 'BACK' button, a 'CONFIRM' button, and a 'SKIP' button. A small pop-up window on the right side of the screen shows a list of items: 'Chains', 'A Flea, a', and 'a Grasshopper'. The background of the app is decorated with colorful bookshelves and gears.

EGGS 3 LEVEL 8 14996 / 15000

Andersen Fairy Tales - The Leap-Frog
Fairy Tales

A Flea, a Grasshopper, and a Leap-frog once wanted to see which could jump highest; and they invited the whole world, and everybody else besides who chose to come to see the festival. Three famous jumpers were they, as everyone would say, when they all met together in the room.

Chains
A Flea, a
a Grasshopper

they refers to 3 items combined?

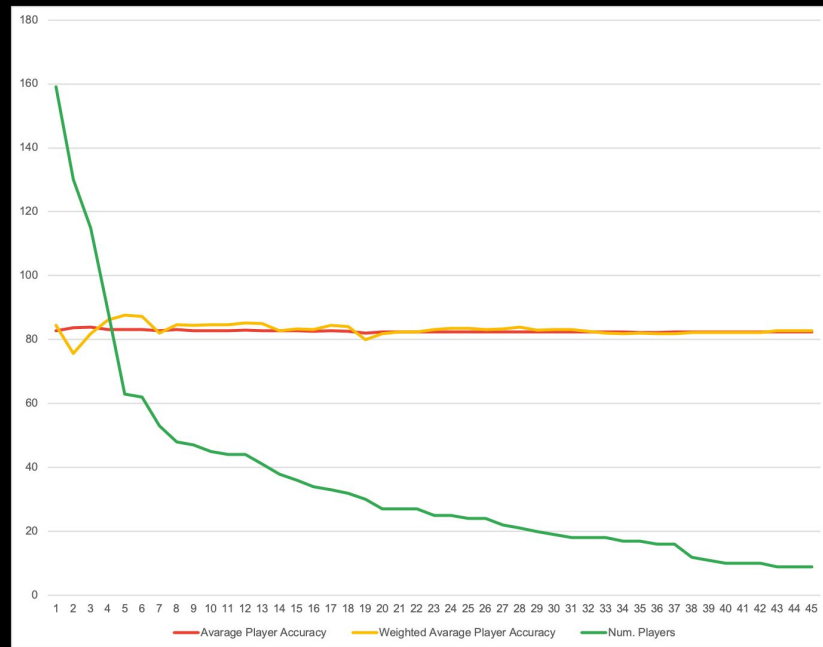
BACK CONFIRM SKIP

anno.

+

50%
confidence

Minimum #of annotations to progress to NR



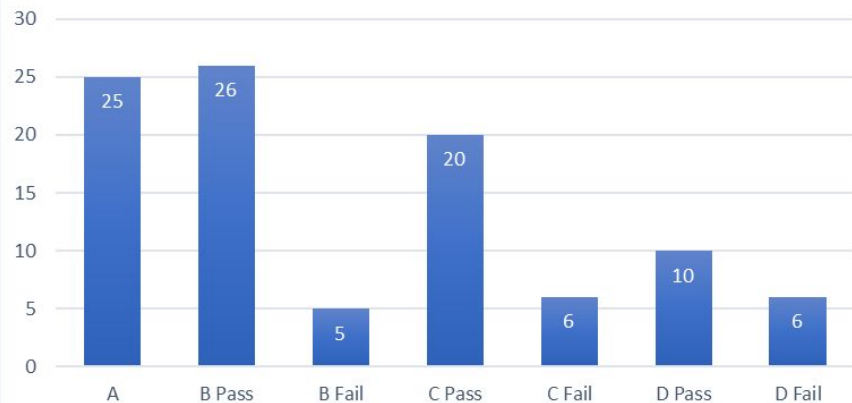
Average discourse new accuracy of players by number of annotations

Research Groups

Group	MPA threshold
A	None
B	80%
C	85%
D	90%

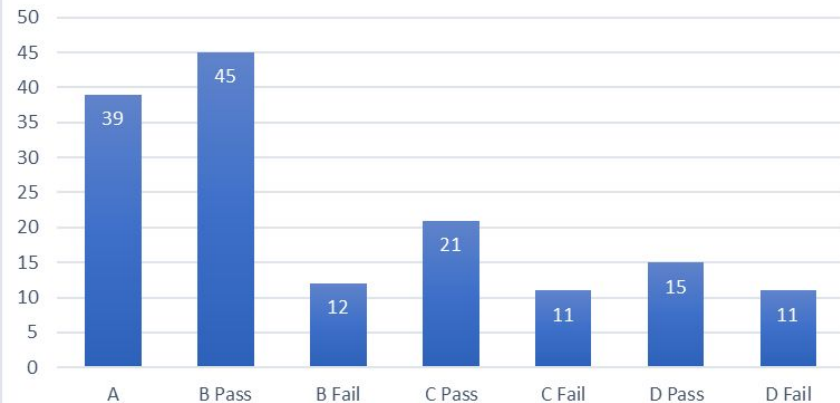
Player count per group

Group populations (n=98)



Apr 2020

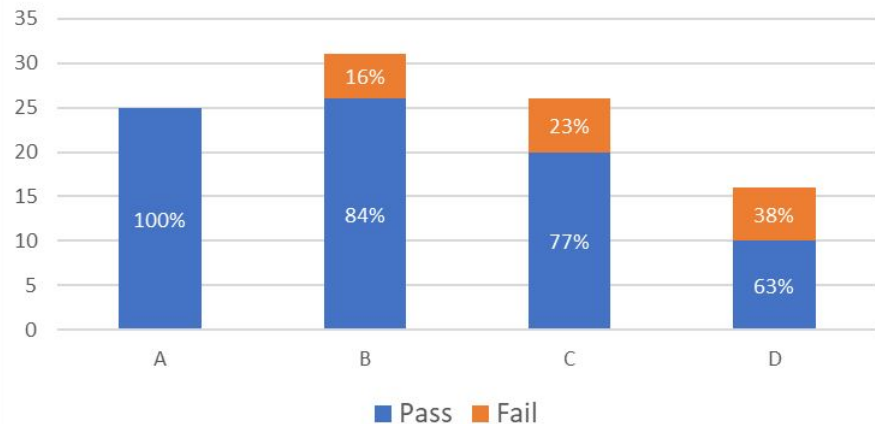
Group populations (n=154)



May 2020

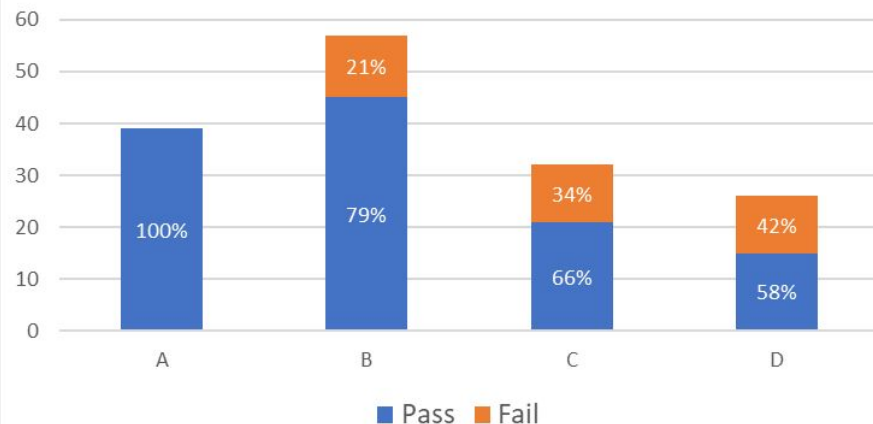
Pass/Fail percentages per group

Group populations (n=98)



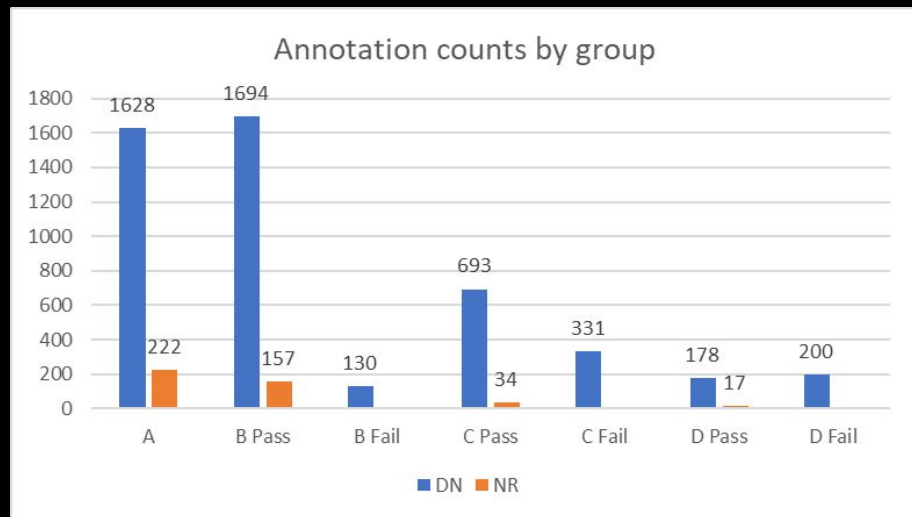
Apr 2020

Group populations (n=154)

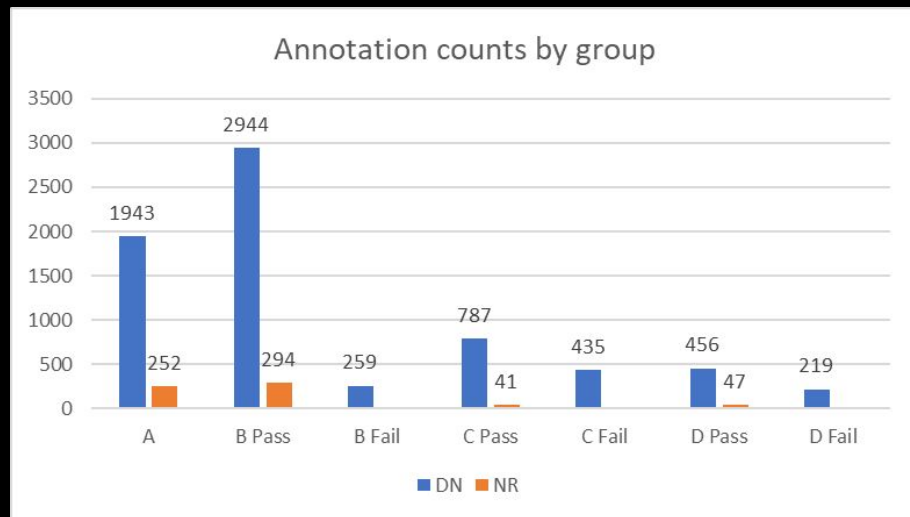


May 2020

Annotation counts by group

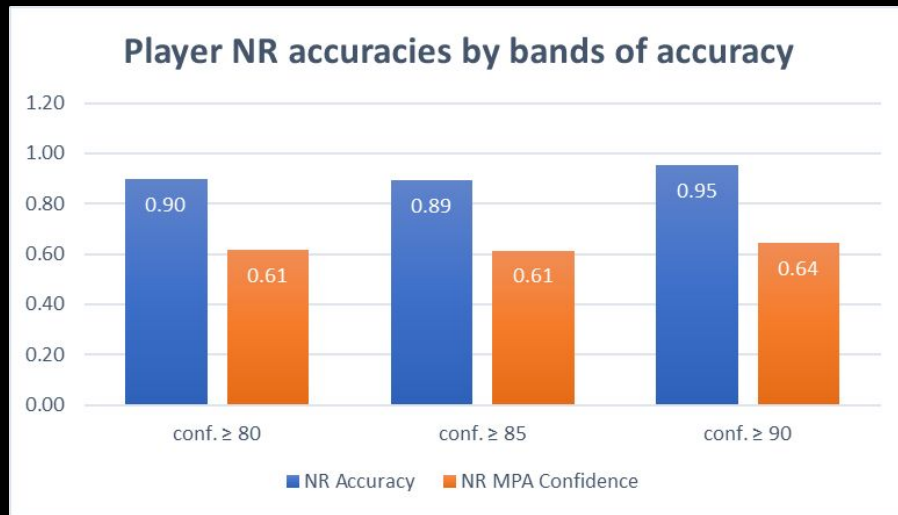


Apr 2020



May 2020

Player NR accuracies by bands of accuracy



Apr 2020



Lingotorium:

Usability & Crowd test

1000 active players

32000 annotations



...thank you!

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