LINCE PLUS
Software for observable studies of Sports & Health

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Encouraging Advance in Methodology
European Association of Methodology

9th European Congress of Methodology
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FREE

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01 LINCE PLUS

Observation tool

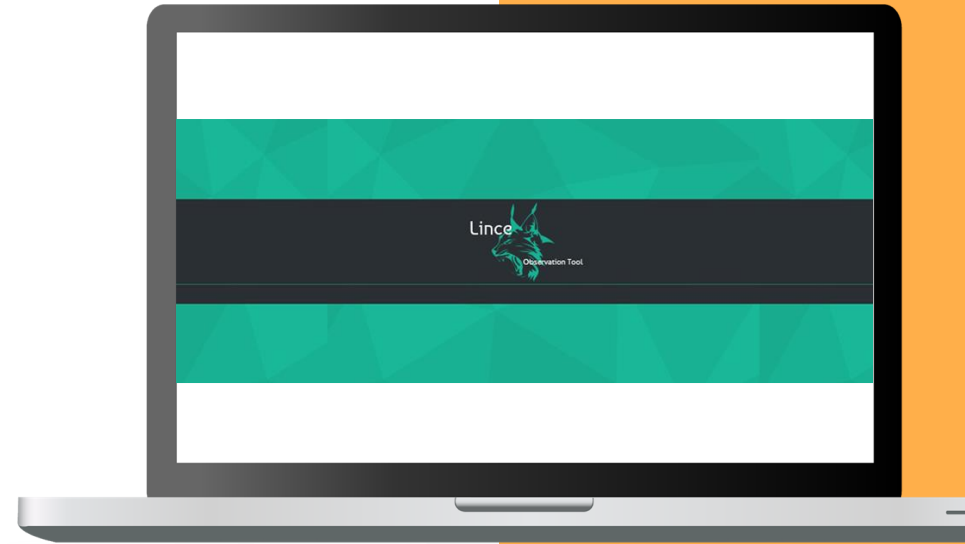"I don't remember that part of PLUS...Was not something like Lince?"

Observe**Sport**
Motor Observation Laboratory

Our research team is focused on:

- Create Physical activity programs

- Research best teaching practices

- Sport behavior analysis

Observation Tool?
> Mixed-Methods

Requires human observers

Scientist is part of the experiment too

Requires an evaluation instrument

To create qualitative data for the observed episodes

Requires specific tools

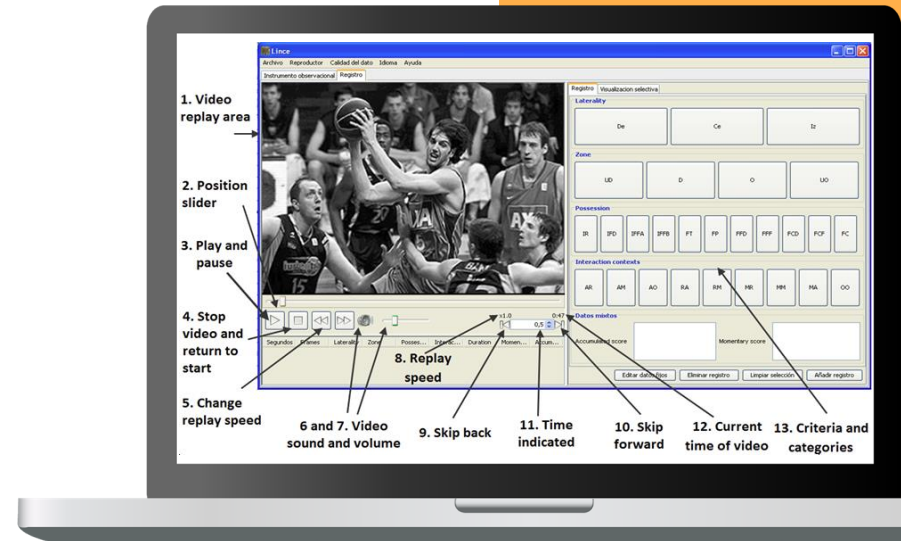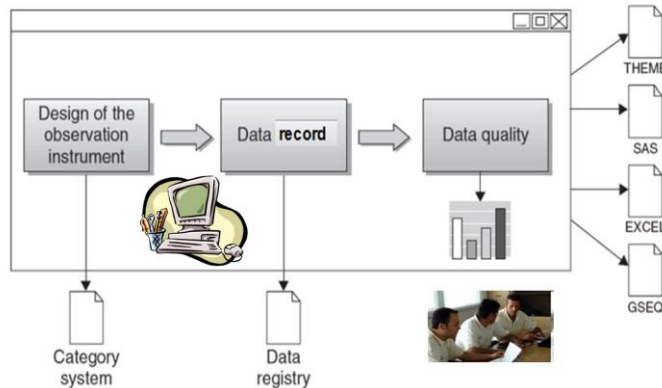And there are not so many available at low budget!

Could this improve through AI?

We are facing 2022!

What was Lince?

Lince (Gabin et al., 2012) was a FREE & open source software for behavior analysis that has been widely used on research.

+200 JCR citations

Problems with Lince?

Lince has been a great software for many years. BUT:

- It reproduces only one video

- Only for windows

- Implemented in 2011 (10 years). In technology means a lot of time!

- It can only be used for retrieving data

- It does not include all research stages

- Not responsive & No mobile

- Needs other tools for results

Should
WE grow?

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02 Base concepts

Behavior analysis

"I don't need this, I know *everything*"

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Mixed Methods

"Provides a system of great scientific rigour for the integration of qualitative and quantitative data, offering great potential for application in the field of physical activity and sport research."

Anguera et al., 2017

"There is an increasing interest in this approach for scientific research "

Anguera et al., 2020

"Most of the software allows only basic integrations for cualitative-cuantitative data"

Bazeley, 2010

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Mixed Methods

"In the last 15 years the amount of investigations has increased, showing different methods and concepts"

Anguera et al., 2017

"There is a lack of software that can be used in all stages"

Hernandez-Mendo et al., 2014

"Free & open source software is available and helps the scientific community"

Love et al, 2019

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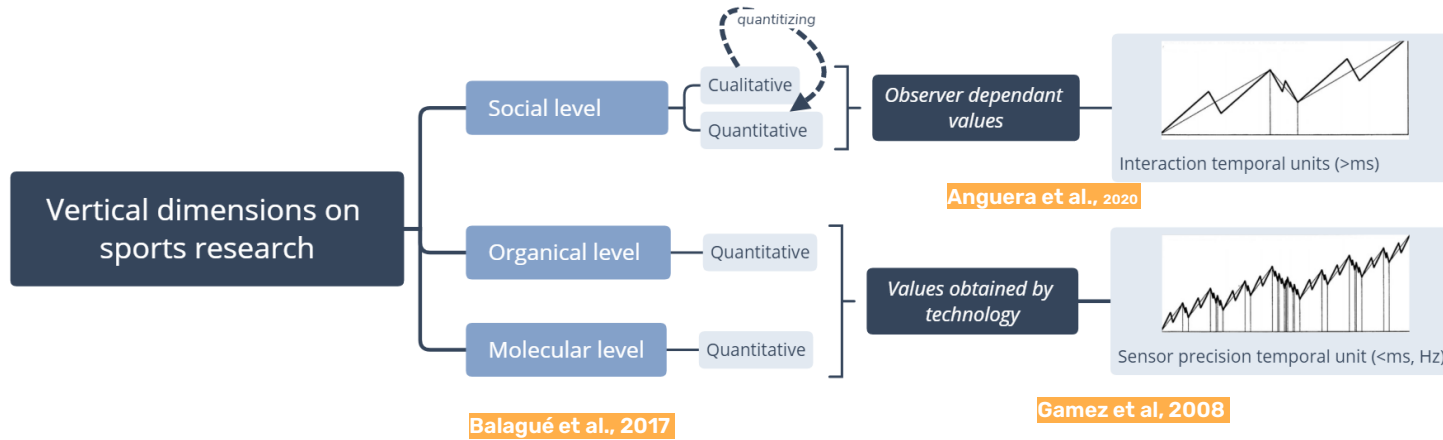21-23 July, 2021 Valencia, Spain
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Mixed Methods

Vertical dimensions on sports research

- Social level
  - Cualitative — quantitizing → Quantitative
  - Observer dependant values — Interaction temporal units (>ms)
  - Anguera et al., 2020
- Organical level — Quantitative
- Molecular level — Quantitative
  - Values obtained by technology — Sensor precision temporal unit (<ms, Hz)
  - Gamez et al, 2008

Balagué et al., 2017

Image created to synthetize content

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Software
[for Mixed Methods] on Sports

- "It must be intuitive and easy to use, with and expert mode ..." (Izquierdo et al., 2008)
- "It should provide real time feedback" (Hernández-Mendo et al., 2014)
- "Usable in all research stages" (Hernández-Mendo et al., 2014)
- "Allows integrating multiple times several data" (Bazeley, 2010, p436)
- "Observation tool needs to be open & flexible" (Anguera et al, 2017)
- "There are not many options for playing several simultaneous video" (Hernández-Mendo et al. 2014)
- "Any observational design must be allowed" (Anguera et al, 2017)

And many more needs on research!
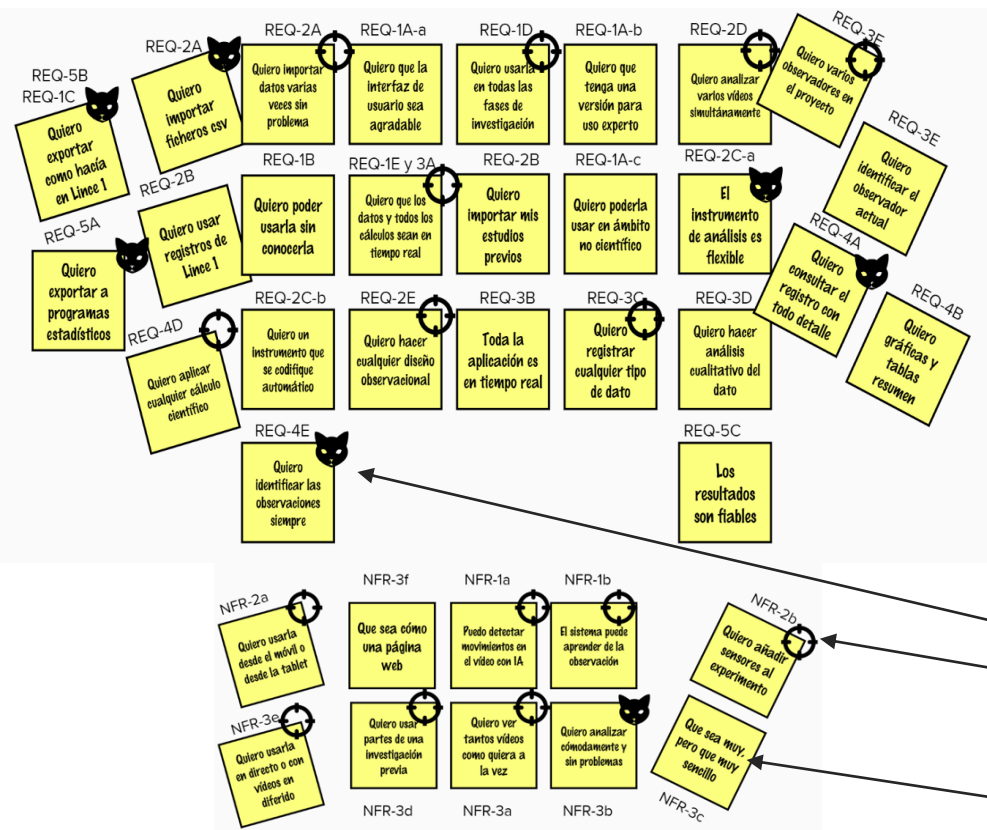
- Lince 1 feature
- New / Non documented feature
- Other software feature
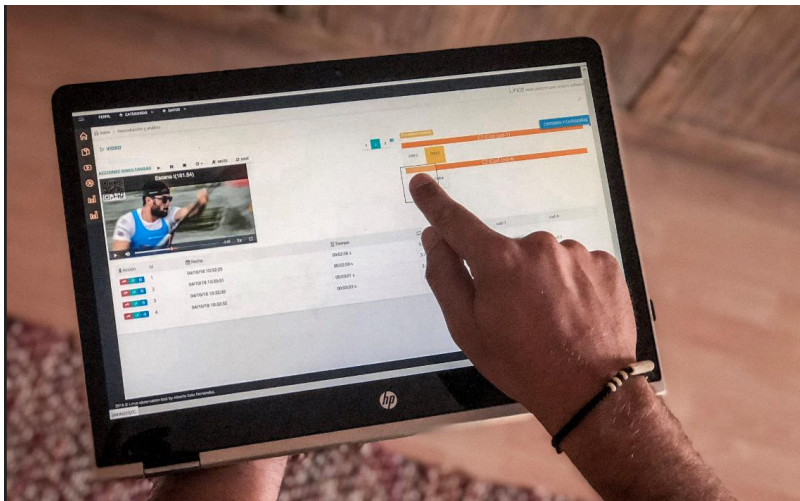
03 Deep dive

What LINCE PLUS is

💡 "I had enough with Lince on my windows xp"

LINCE PLUS (Soto-Fernandez et al, 2019)

RT-SA

Real Time Sports Application

Free & Open Source

Created from the University for sciencists

All research stages

You don't need more software if you want

It's mature

2 years since first release

Quan + Qual

Sensor data is coming to your behavior research

Video

Incredible video features

LINCE PLUS (Soto-Fernandez et al, 2019)

Statistics

R language is inside LINCE PLUS

Multiple observers

Create profiles and let them connect

Intra/Inter observer agreement

Compare registers and check agreement w/Krippendorf or Kappa

Devices

Connect all devices

Web

It uses the latest technology on the market

MacOS + Win

Execute it everywhere

LINCE PLUS

FREE

Design

Design the experiment
Observational study definition:
- study units
- temporality
- dimensions

Record

Definition of the ad hoc observation instrument
Recording of behavioural episodes

Quantitizing / Connecting

Integrative process
Possibility to include other data sources
Qual > Quan > Qual

Results

Calculation of results according to the nature of the study
Possibility to evaluate further observations

(adapted from Anguera et al., 2018)

What does LINCE PLUS bring?

Register

- Supports streaming of multiple videos!
- Real-time recording
- Collaborative work
- Allows partial calculations
- Any device

Design

Simplifies the definition of the instrument and the multi-observer context

Results

- Automates result calculations
- Simplifies the multi-observer context
- Includes R inside
- Interactive charts

LINCE**PLUS**
Installation & execution

- Go to the download website

- Download the latest version for MacOS or Windows

- Accept the installer*

- Run as an application

- Upload the videos you want
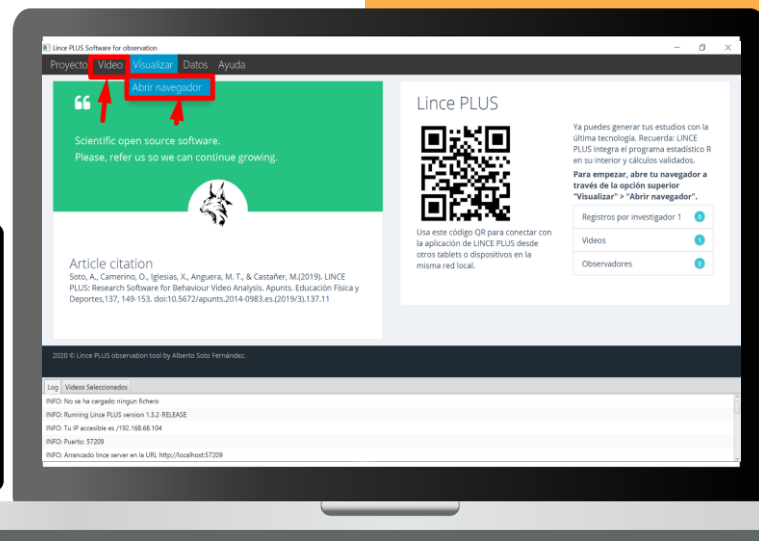
SCAN ME

https://observesport.github.io/lince-plus/

LINCEPLUS
Observation tool design

- The instrument can be generated automatically

- You can also import any previous design

- Please remember: It must be a stable instrument. If you do episode recording and remove observed criteria...inconsistency in the study!

- You can add additional observers in the project option.
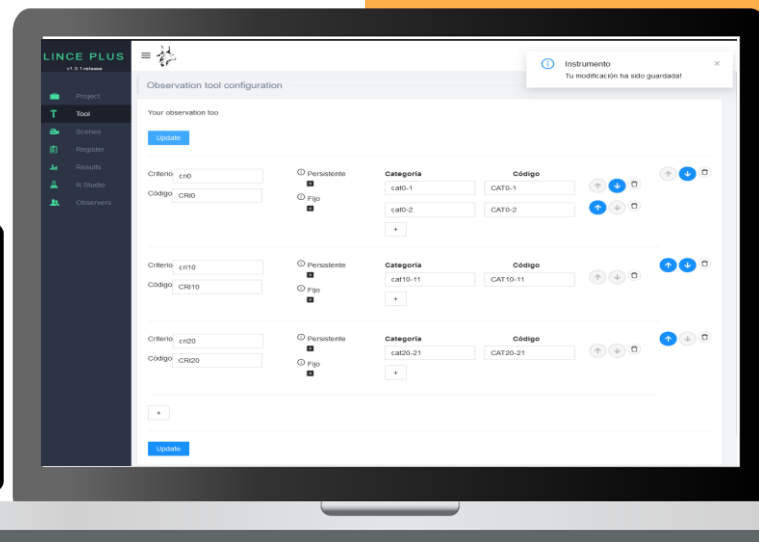
https://observesport.github.io/lince-plus/

LINCEPLUS
Recording episodes

- Access the scenes option to define observation episodes.

- Access the "record" menu option to define the criteria and categories observed for each episode.

- Control playback with the keyboard

- Define your watched criteria and update the register
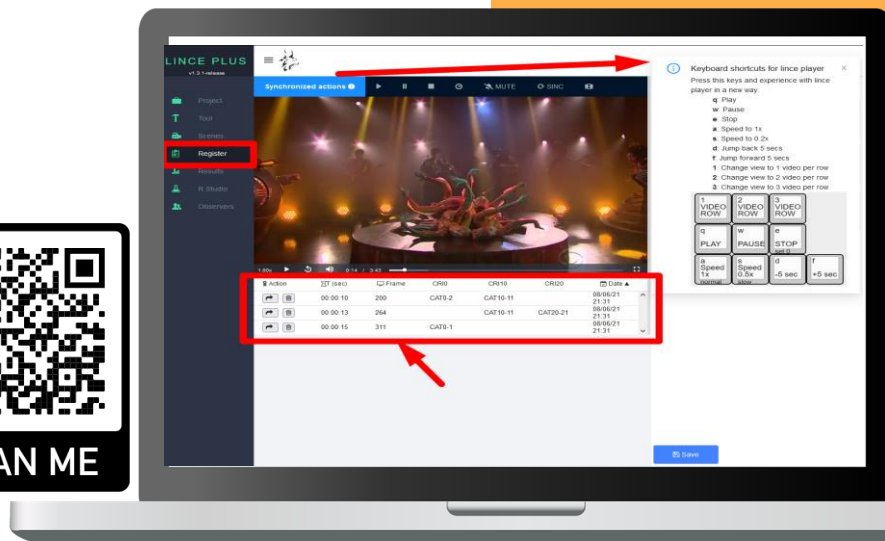
https://observesport.github.io/lince-plus/

LINCE**PLUS**
Results

- At any time and in real time you can check progression graphs or basic charts.

- You can also calculate the percentage of agreement between several observers.

- You can run your own code in the R interface for statistical calculations.
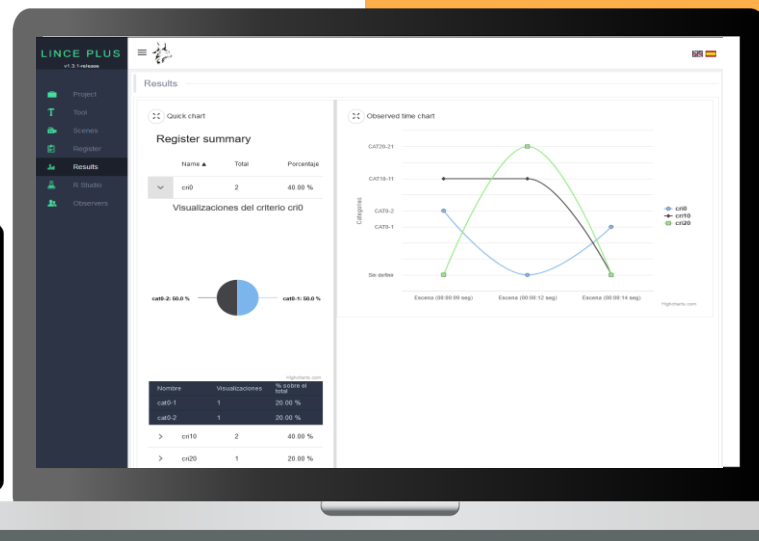
SCAN ME

https://observesport.github.io/lince-plus/
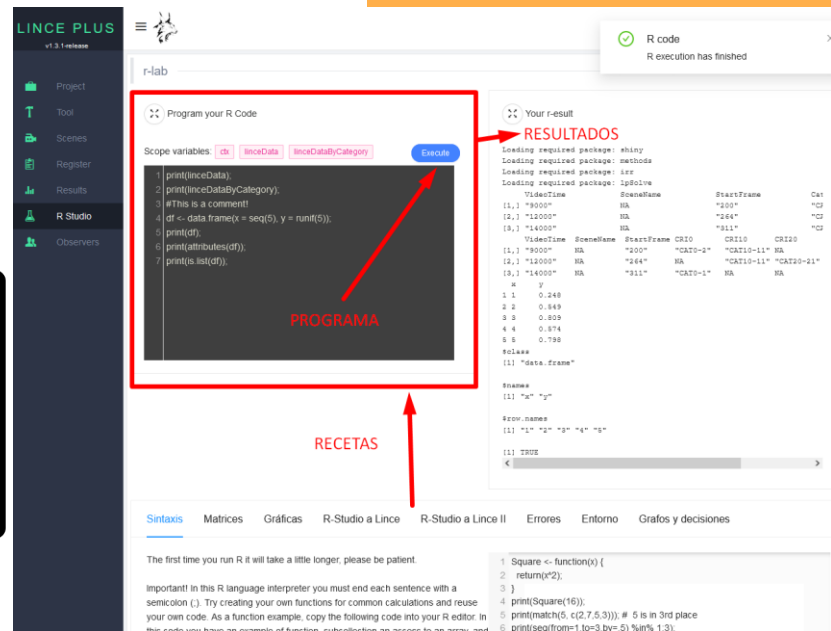
LINCE**PLUS**
R engine for statistics

- The R module has won the national Digital Challenges competition at OpenExpo.

- Allows you to program your results based on the study

- It also allows you to integrate LINCE PLUS in R-Studio if you want to generate more complete graphs or reports.

- All in real time!

SCAN ME

https://observesport.github.io/lince-plus/
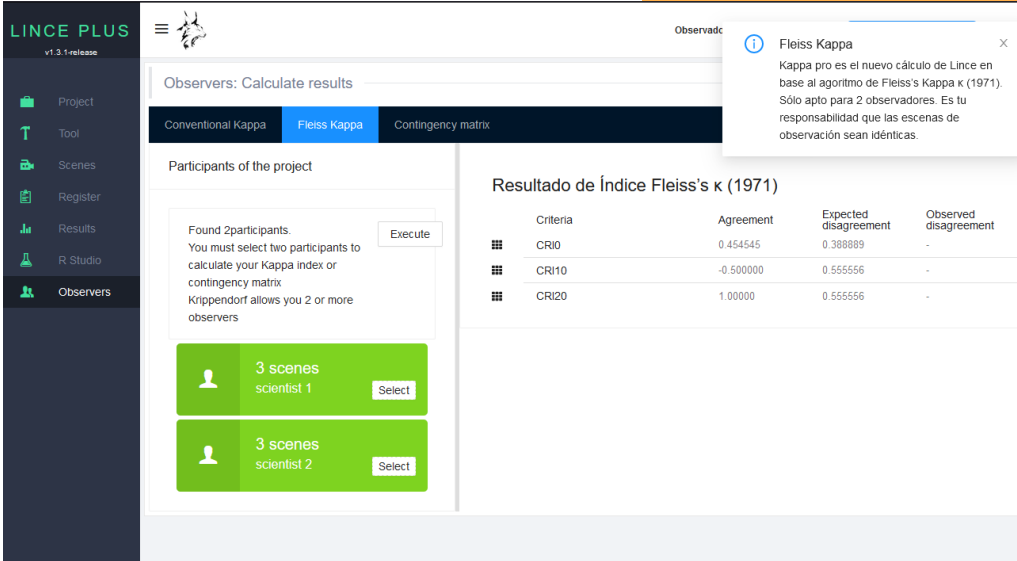
LINCEPLUS
Inter/Intra observer agreement

- LINCE PLUS allows multiple observers

- The calculation of inter/intra observer reliability using Kappa or Krippendorf is a direct click: select the observer and run the test.

SCAN ME

https://observesport.github.io/lince-plus/

04 Use cases

Possibilities ahead

💡 "Well, maybe this LINCE PLUS brings something new…but…what can I do?"

LINCE PLUS **Usage**

Zone A

< 200 users

Zone B

200 – 1000 users

Zone C

> 10000 users
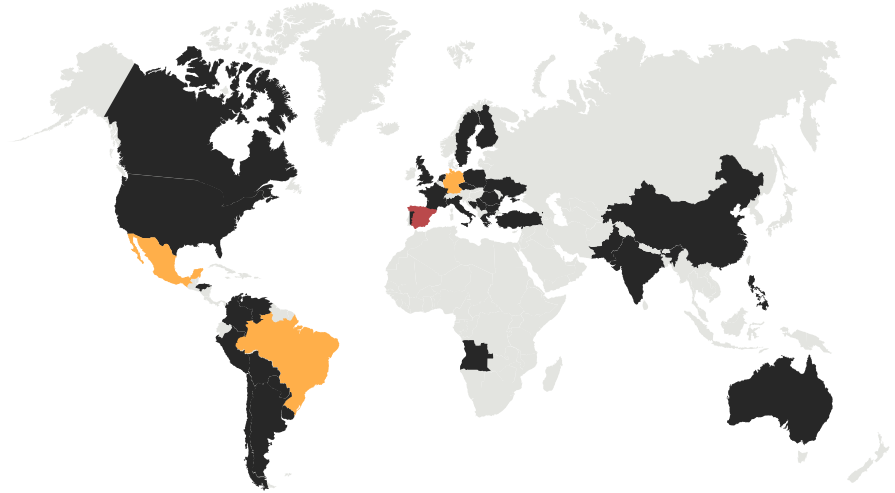
Data retrieved from June 2019 to June 2021:
+13,500 users | 19,778 sessions | average 4:26/session

LINCE PLUS Use cases

	Direct observation for an unique observer	Interobserver Collaborative work: Several observers	Intraobserver Collaborative work: Intersessional samples	Work Division*
Several observers	✗	✓	✗ ✓	✓
Several sessions	✓	✓	✓	✗
Statistic during evaluation	✓ ✗	✓ ✗	✓ ✗	✓ ✗
Several videos	✓ ✗	✓ ✗	✓ ✗	✓ ✗
On-live registration	✓ ✗	✓ ✗	✓ ✗	✓ ✗

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05 Beyond LINCE PLUS
Our next steps

"Are you still cooking more things?"

Future **Goals**

Support [help welcome]

Support is important to grow and a need for users. Multilanguage needs to improve

Relevance ■ ■ ■ ☐ ☐ ☐

Cloud

Would not be great? All in the cloud, saving your privacy. No need for updates

Relevance ■ ■ ■ ■ ■

Future **Goals**

Mobile

Support is important to grow and a need for users. Multilanguage needs to improve

Relevance ■ ■ ■ ■ ■ □

Desktop

Our base project will allways improve :)

Relevance ■ ■ □ □ □ □

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WE NEED YOUR HELP!

- - **Reference LINCE PLUS**
- - **Help us growing**
- - **Help us to translate**

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