

# Everybody runs on patterns: how AI finds them in chess and in the classroom

Isaac Lozano Osorio



# Agenda

1. Introduction.
2. Patterns in the classroom.
3. Patterns in the chess.
4. Universal human patterns.
5. Prediction.



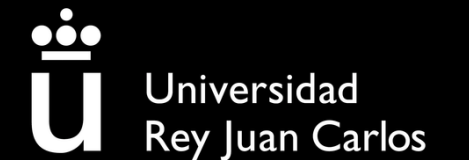
# About me



YottaChess founder.  
CiberScore founder.



Assistant Professor.  
ETSII and GRAFO group member.




Spanish Technical Team at 45th Chess Olympiad  
Budapest 2024 Open.



PhD Artificial Intelligence

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Winner II NCL Guardia Civil.

Winner JNIC 2022 y 2024.

First Prize for Best Student Paper at the Conference  
of the Spanish Association for Artificial Intelligence.



# Presentation objectives

"If you don't know what you want to achieve with your presentation, your audience won't know either"

**Harvey Diamond**

Understanding what patterns are.

How to apply this to chess and education.

# 1. Introduction

Budapest 2024: Spain wins three individual medals at the Chess Olympiad and finishes fourth.  
**A historic result.**




The secret: **psychological** support, hard work, **artificial intelligence**, and **patterns recognition**.




# 1. Introduction

Some habits:

- Players repeat **opening moves**.
- Students make the **same mistakes**.
- People create **predictable passwords**.

ChatGPT  [+ Obtener Plus](#)  Compartir 





Dime un número random del 1 al 10


Te salió el 7 

Dime un número random del 1 al 10



Pensando en seleccionar un número aleatorio entre 1 y 10 >

7



Dime un número random del 1 al 10

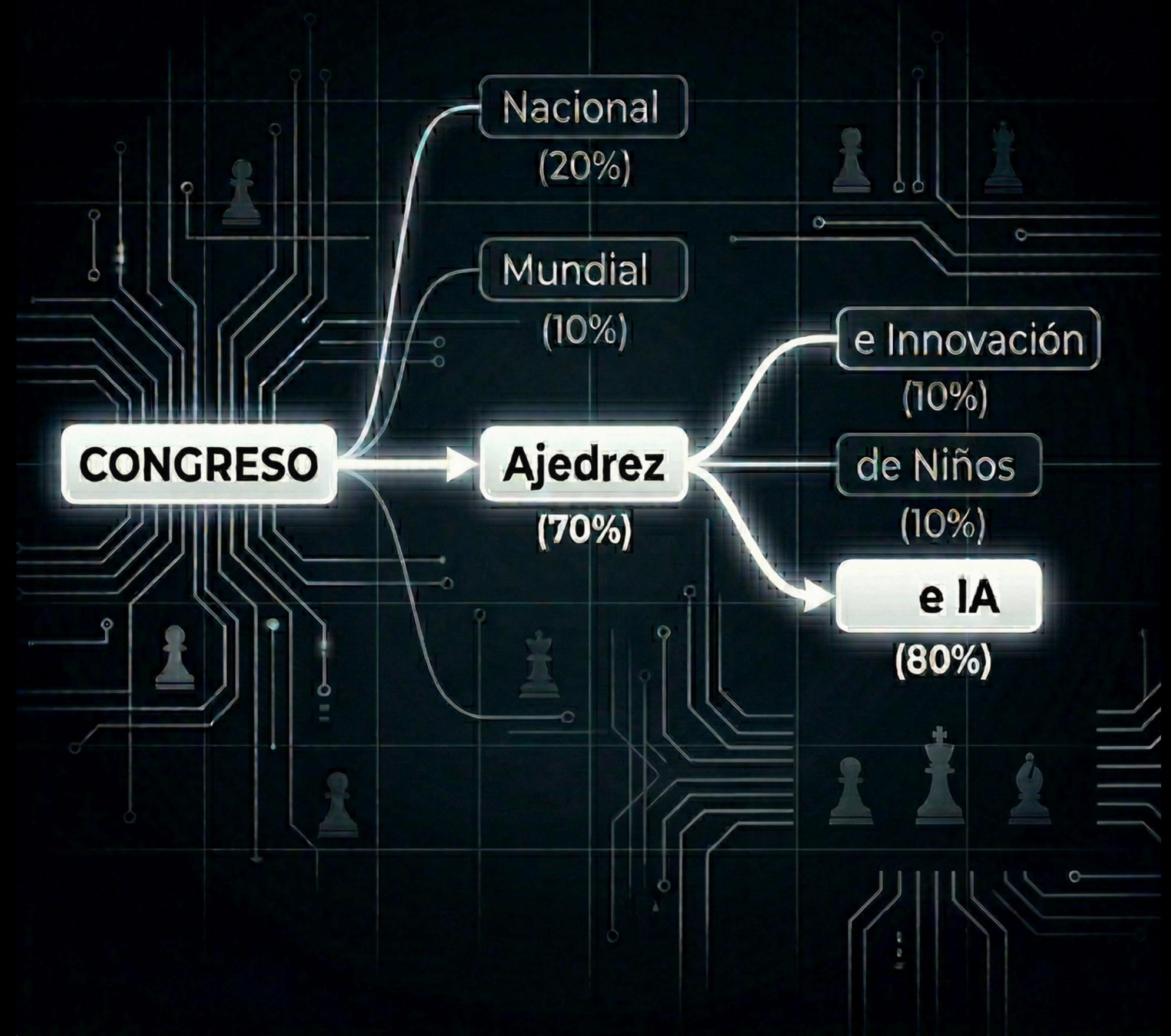
 Ver razonamiento 

El 7.

# 1. Introduction

**LLMs** analyze millions of texts and identify **statistics and patterns.**

They don't understand politics or chess; they only recognize word patterns.



# BlueThinking

## 2. Patterns in the classroom.

**2019**, one of my final degree projects, was focused on **education for children with autism spectrum disorders**.

BlueThinking was a ScratchJr-based project funded by **Orange** and presented at an international conference.



# BlueThinking

## 2. Patterns in the classroom.

The tests revealed that students were **unable to achieve the objective** (same pattern).

A picture is worth a thousand words.

**Automated aids** using algorithms were created to guide students without causing frustration.



## 2. Patterns in the classroom.

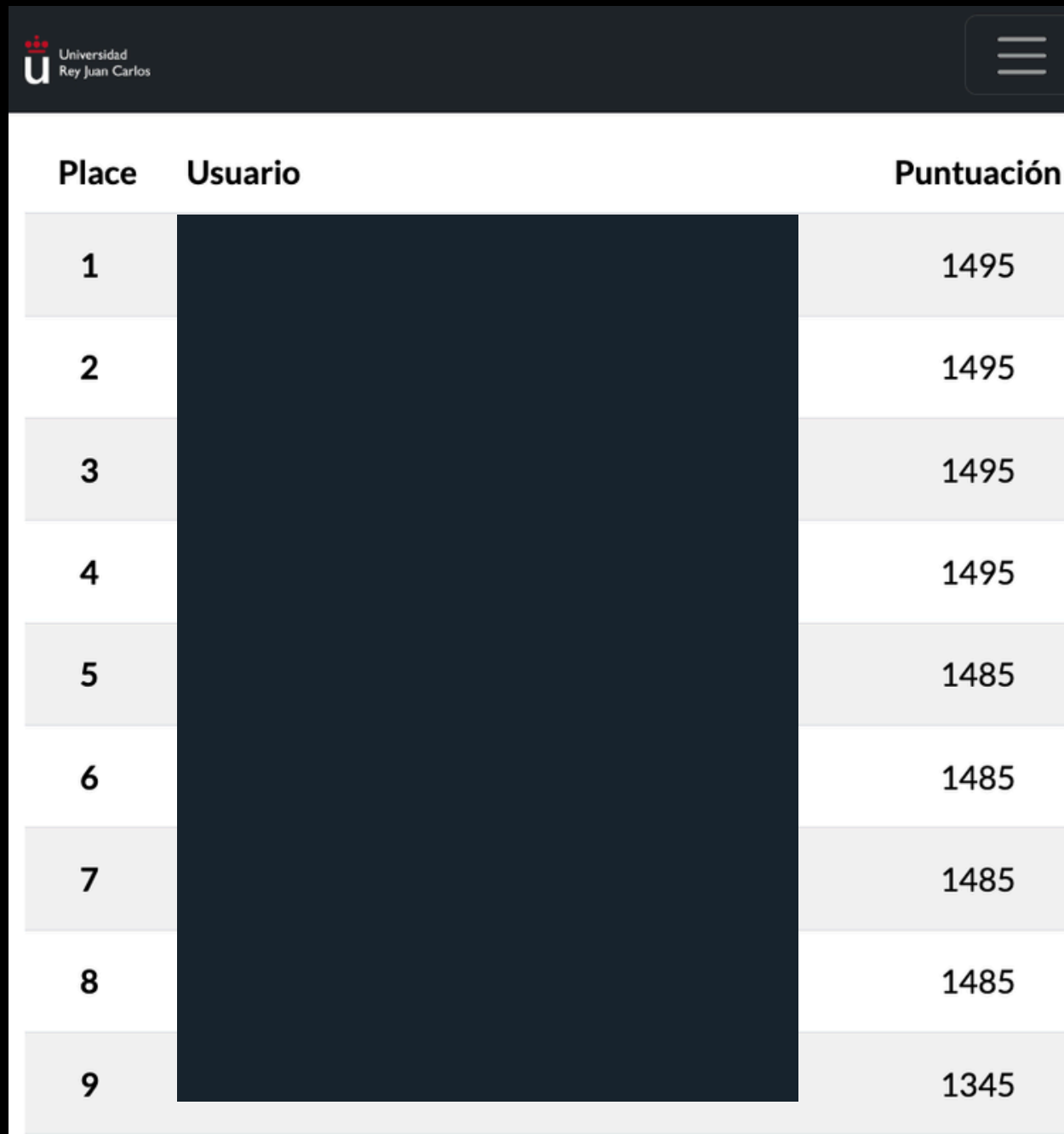
Gamification in the classroom.

- Increased **motivation**.
- Immediate **feedback**.
- A safe environment for making mistakes.
- Gradual and sustained development of positive habits (as in Duolingo).
- Collection of behavioral data (patterns).
- **Personalization**.

### Resultados estadísticos:

Calificación	%	Nº de estudiantes
SUSPENSO	61,67	37
APROBADO	6,67	4
NOTABLE	28,33	17
MATRICULA DE HONOR	3,33	2

Número de estudiantes: 60



Universidad Rey Juan Carlos

Place	Usuario	Puntuación
1		1495
2		1495
3		1495
4		1495
5		1485
6		1485
7		1485
8		1485
9		1345

Gamification platform.

1.	7.67/10
2.	4.00/10
3.	8.89/10
4.	8.73/10
5.	7.66/10
6.	8.80/10
7.	4.00/10
8.	8.90/10
9.	4.00/10

Students' final grades.

# 2. Patterns in the classroom.

Proven methodology: learn by teaching.

Usually, the teacher teaches—but **what if the student is the one doing the teaching?**

**What happens when one student teaches another how to checkmate?**

Published in international journals.



Paredes-Velasco, M., Lozano-Osorio, I., Pérez-Marín, D., & Santacruz-Valencia, L. P. (2022). **A Case Study on Learning Visual Programming With TutoApp for Composition of Tutorials: An Approach for Learning by Teaching.** IEEE Transactions on Learning Technologies, 17, 498-513.

JCR Journal No. 27 for the field education.



Lozano-Osorio, I., Ruiz-Olmedilla, S., Pérez-Marín, D., & Paredes-Velasco, M. (2024). **Learning by teaching: Creation of tutorials in the Field of vocational training.** IEEE Transactions on Education, 67(4), 602-609.

JCR Journal No. 28 for the field education.

## 2. Patterns in the classroom.

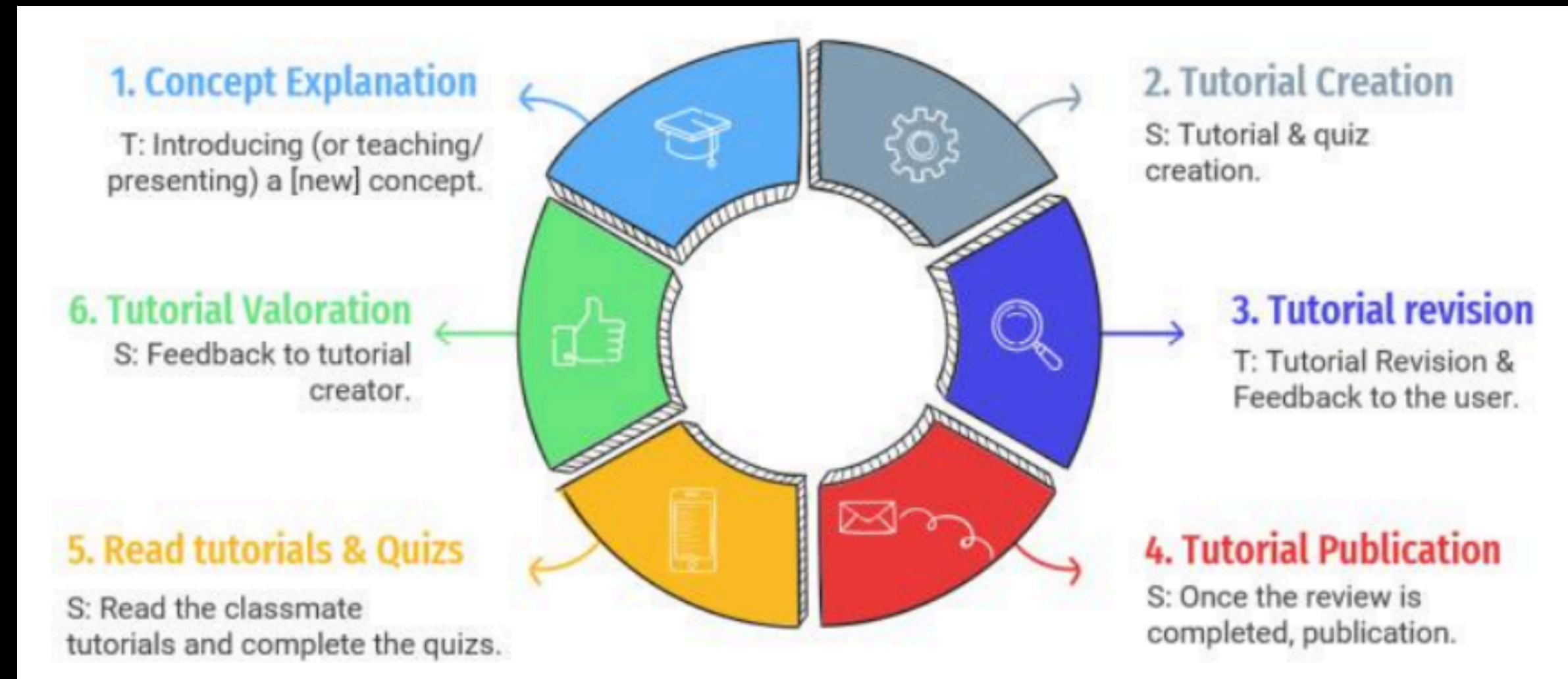
Proven methodology: learn by teaching.

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# TutoApp



1. Greater satisfaction with completed tasks.

2. The sense of enjoyment while performing the task is linked to the feeling of pride upon completing it.

### 3. Chess patterns.



1.7 million players analyzed.  
15 million games analyzed.

# YottaChess



The screenshot shows the YottaChess website interface. At the top, there is a navigation menu with links for HOME, NEWS, MATERIAL, PLAYERS, CHESS TOOLS, and HELP. To the right of the menu are flags for Spain, United Kingdom, France, Czech Republic, and India, followed by a USER link. The main header features the YOTTABASE logo and the text "The Biggest Database in the world". Below this, statistics are displayed: "15.344.723 games and 1.762.262 player profiles 02/03/2026" and "9692 registered users and 31598 downloaded games". A search bar is present with the placeholder text "ID or Surname1 Surname2, Name". At the bottom of the page, there are three buttons: "News", "Ranking", and "ELO Calculator".

HOME NEWS MATERIAL PLAYERS CHESS TOOLS HELP

YOTTABASE

## The Biggest Database in the world

15.344.723 games and 1.762.262 player profiles 02/03/2026

9692 registered users and 31598 downloaded games

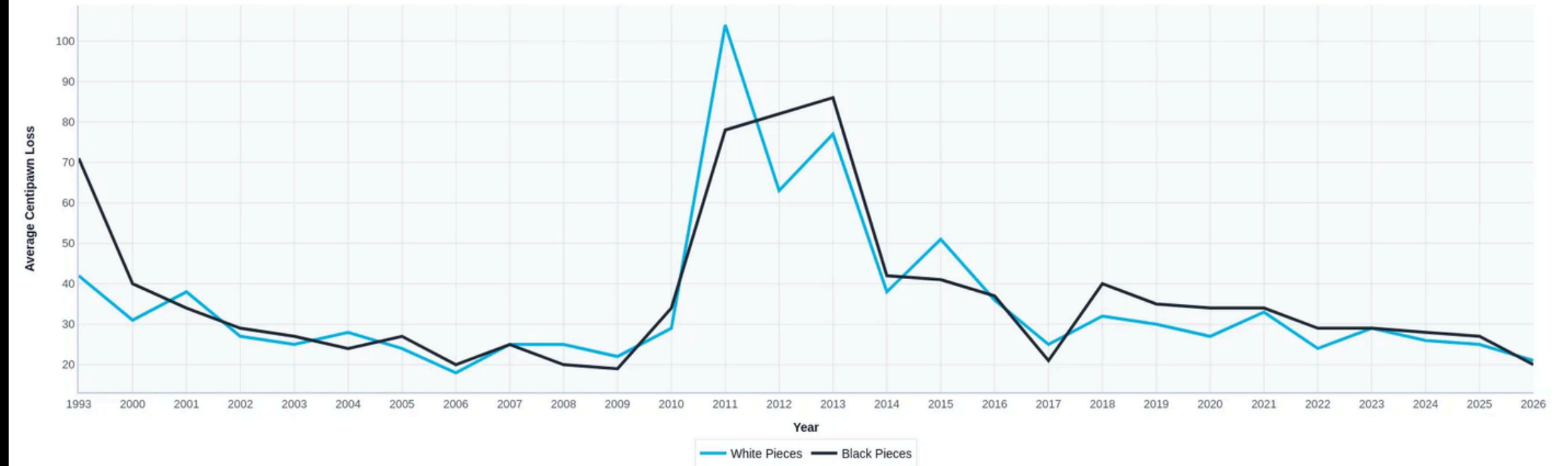
ID or Surname1 Surname2, Name

News Ranking ELO Calculator

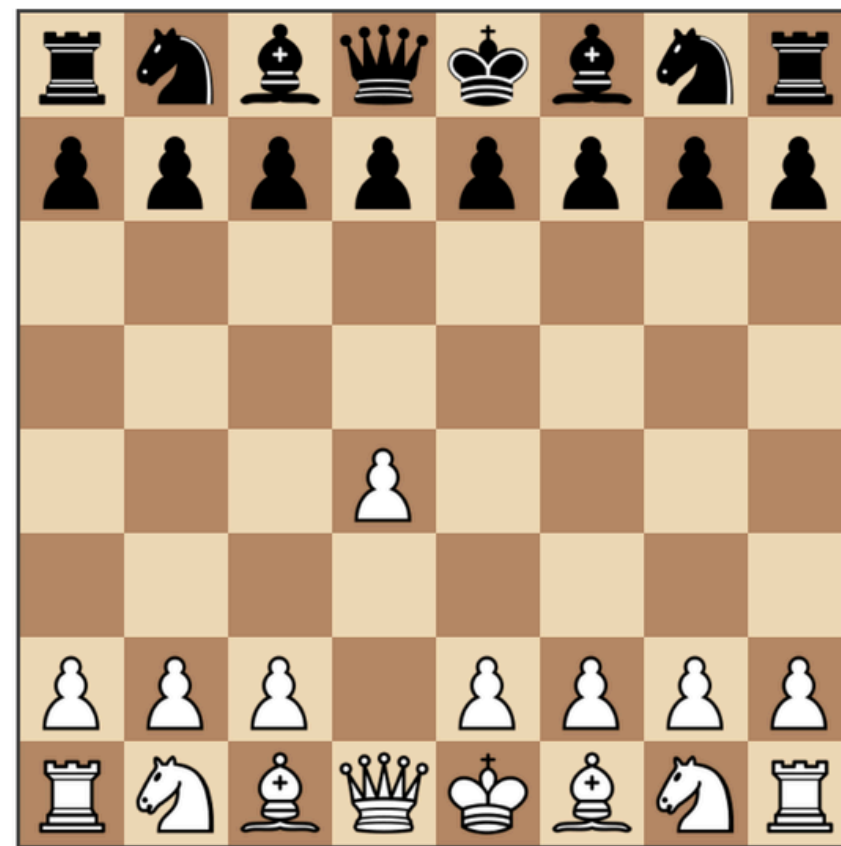
# 3. Chess patterns.

Patterns in:

1. Opening.
2. Playing style (castling, piece development, tactics vs. strategy).
3. Performance under pressure.



## ⚡ Opening Analysis - Black Pieces



### 📊 Opening Moves

Move	Games	Results
<b>Nf6</b>	1375 (2870)	19% 42% 40%
<b>d5</b>	525 (2567)	15% 39% 46%
<b>e6</b>	68 (2127)	22% 26% 51%
<b>g6</b>	66 (2837)	14% 21% 65%
<b>f5</b>	41 (2851)	17% 24% 59%
<b>d6</b>	27 (2862)	22% 22% 56%
<b>Nc6</b>	17 (2855)	12% 82%

# 3. Chess patterns.

The **Budapest Case: Customized reports** for each opponent, identifying specific weaknesses.

- We analyze the moves and timing to identify **weaknesses**.
- The more games, the greater the chance of being included in the preparation.

# Reports

CHN - GM Ding, Liren

Liren DING

<https://ratings.fide.com/profile/8603677>

<https://lichess.org/@/> <https://www.chess.com/member/chefshouse>

std. 2745 rapid. 2775 blitz. 2787

CHN 1992

47 partidas de ritmo clásico en el último año analizadas con Stockfish 16.



El número de partidas ganadas en las partidas analizadas es de 3, el de partidas perdidas de 16 y empatadas de 28.

Los datos de más abajo se han realizado con una profundidad promedio para blancas de profundidadBlancas, negras profundidadNegras y el promedio es de profundidadPromedio.

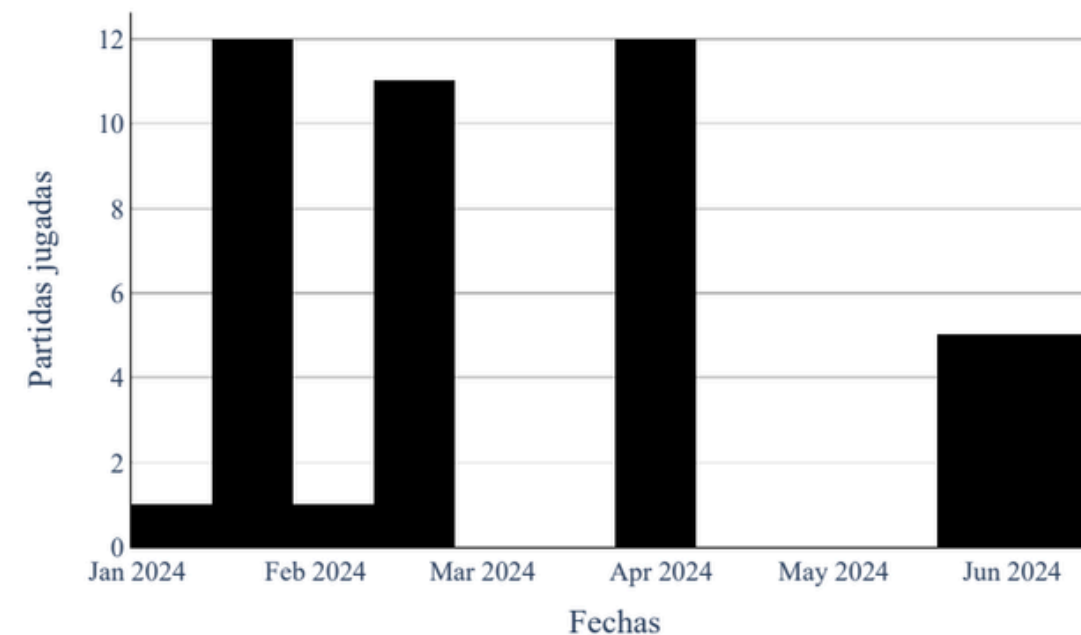


Figura 45: Partidas durante el último año por meses.

## 3. Chess patterns.

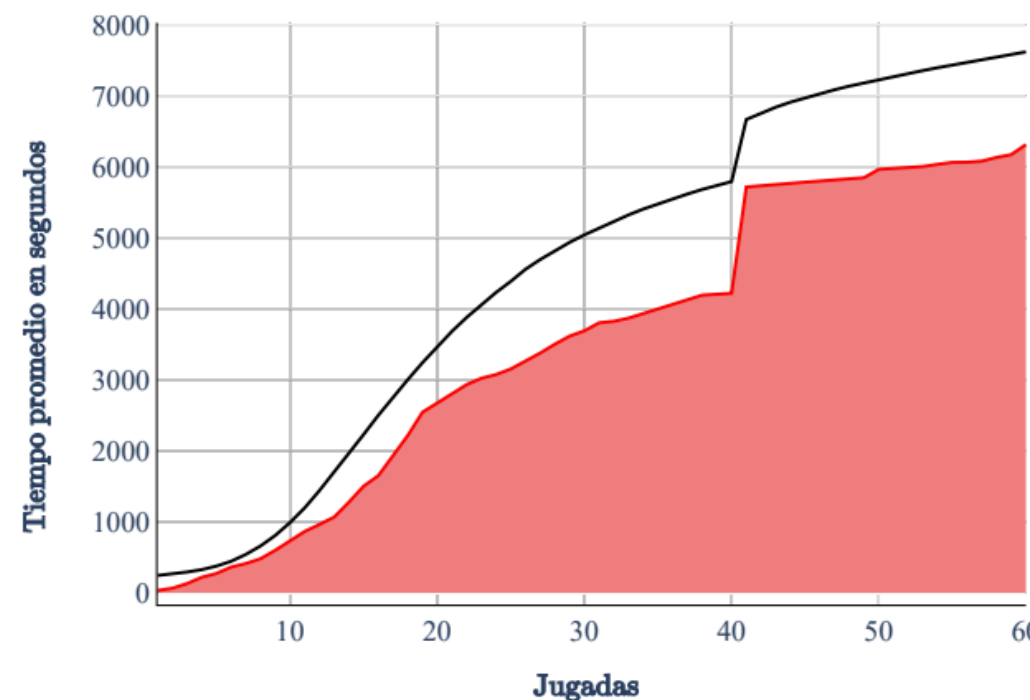
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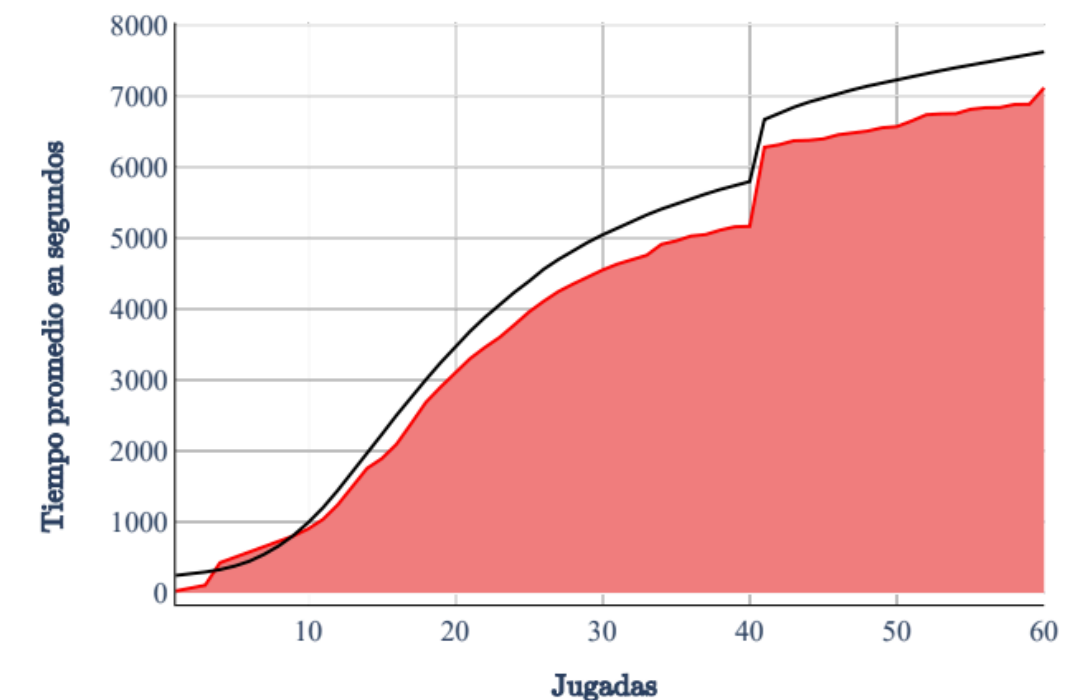
# Reports

## 🎓 Tiempo usado a lo largo de las partidas

Todas las partidas analizadas son de ritmo lento, no obstante, es importante resaltar que cuando se juega con control de tiempo, se ve una subida de tiempo en las jugadas 40.



(a) Tiempo de blancas (rojo) vs media global.



(b) Tiempo de negras (rojo) vs media global.

Figura 46: Comparación del tiempo promedio usado con blancas y negras.

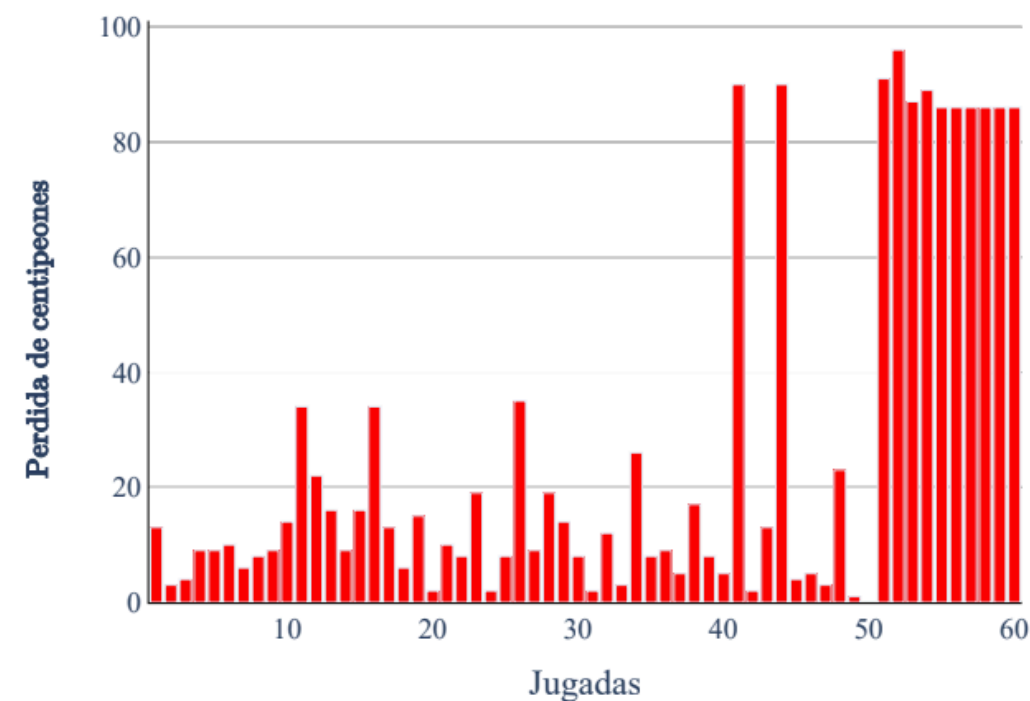
## 3. Chess patterns.

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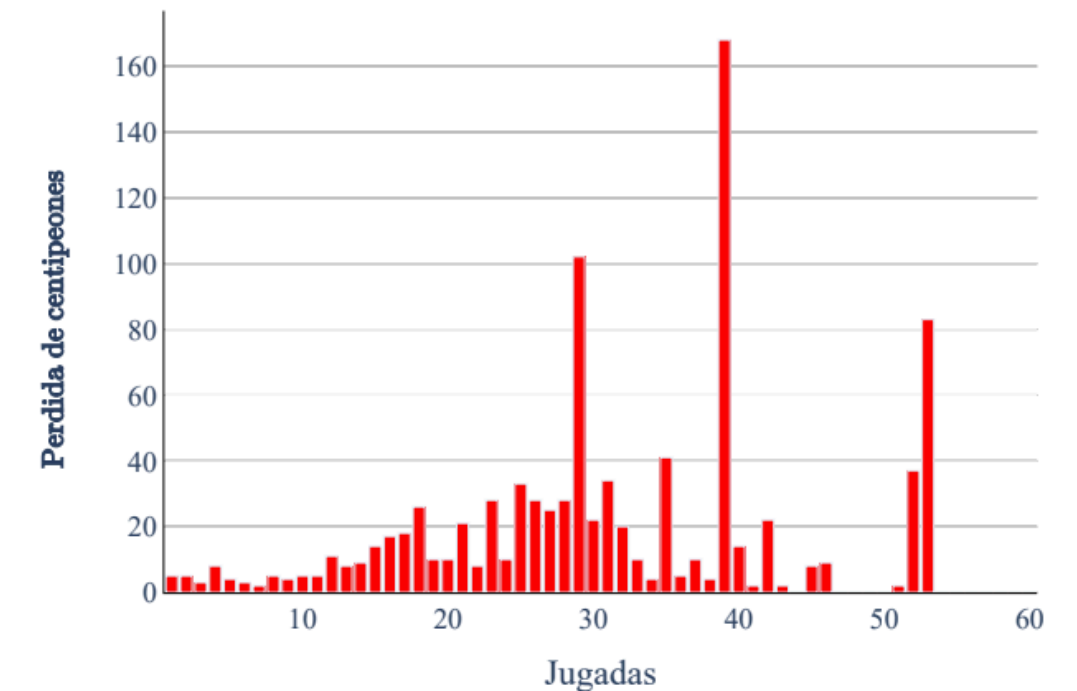
- We analyze the moves and timing to identify **weaknesses**.
- The more games, the greater the chance of being included in the preparation.

# Reports

## Valoración durante la partida



(a) Pérdida de centipeones para blancas.



(b) Pérdida de centipeones para negras.

# Reports

## 3. Chess patterns.

The **Budapest Case: Customized reports** for each opponent, identifying specific weaknesses.

- We analyze the moves and timing to identify **weaknesses**.
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The screenshot displays a chess game interface. At the top, it shows the player information for GM Gukesh D (rating 2783) and GM Ding, Liren (rating 2728). The game is in progress, with a score of 1-0 and a time of 1:07:23. The board shows a complex position with a white king on e5 and a black king on e4. The move list on the right shows the following moves:

Move	White Move	Black Move	Score
55	♖f2	...	-64.0
56	♕xf2	♕d5	
57	♕xd5	♕xd5	
58	♕e3	♕e5	
59	♕d3	f...	
50	♖b6+	♕g5	
51	♖b4	♕e6	
52	♖a4	♖b2	
53	♕a8	♕f6	-0.1
54	♖f4	♕e5	-0.1
55	♖f2	...	-64.0

The interface also shows a score of 0-1 at the bottom right and various navigation controls.

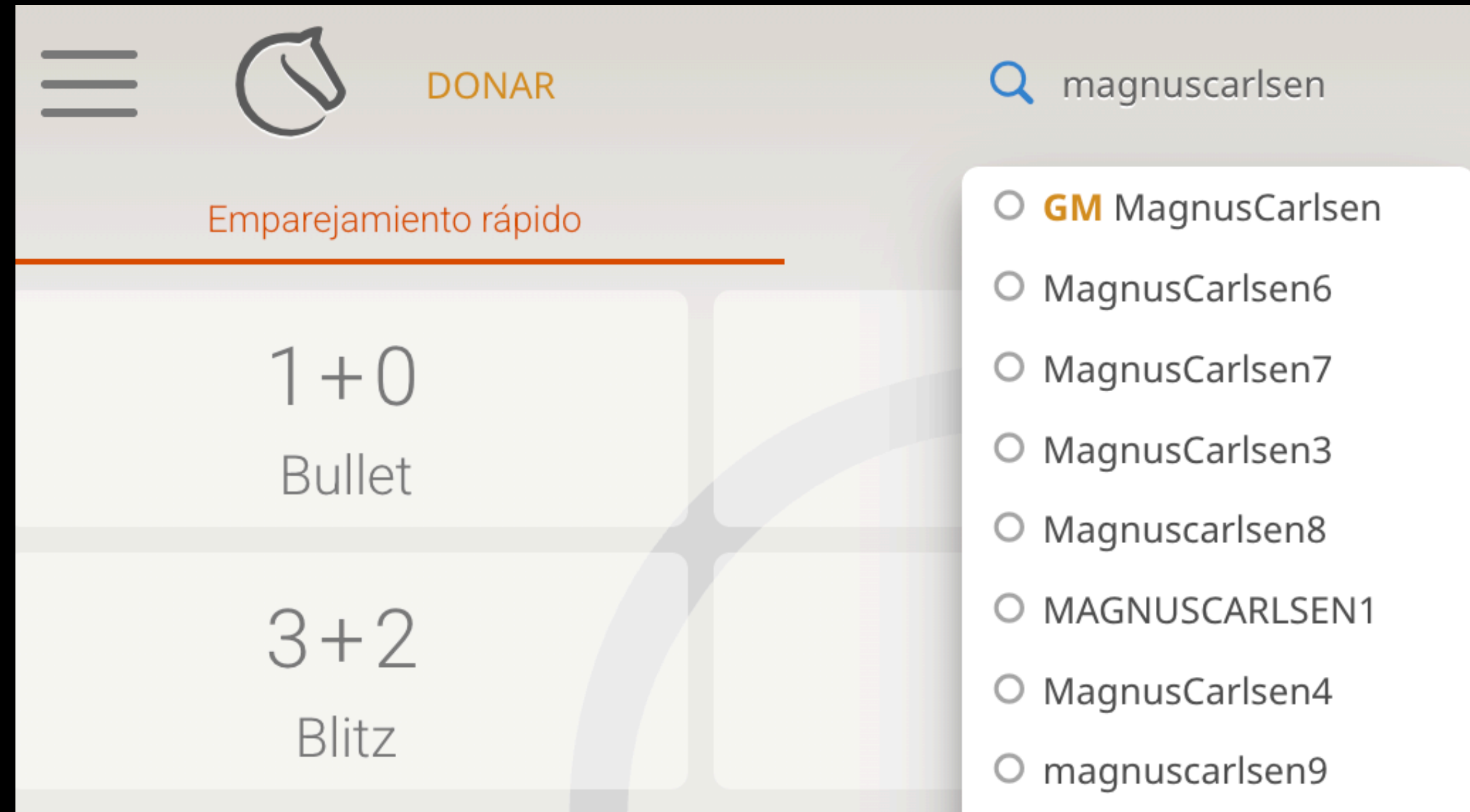
## 4. Universal human patterns.

**Humans** are **predictable**, even when we're being creative.

- Usernames follow patterns (name+year, nicknames+numbers), and passwords tend to be the same.

Humans tend to choose things that are easy to remember.

# Nicks


















# 4. Universal human patterns.

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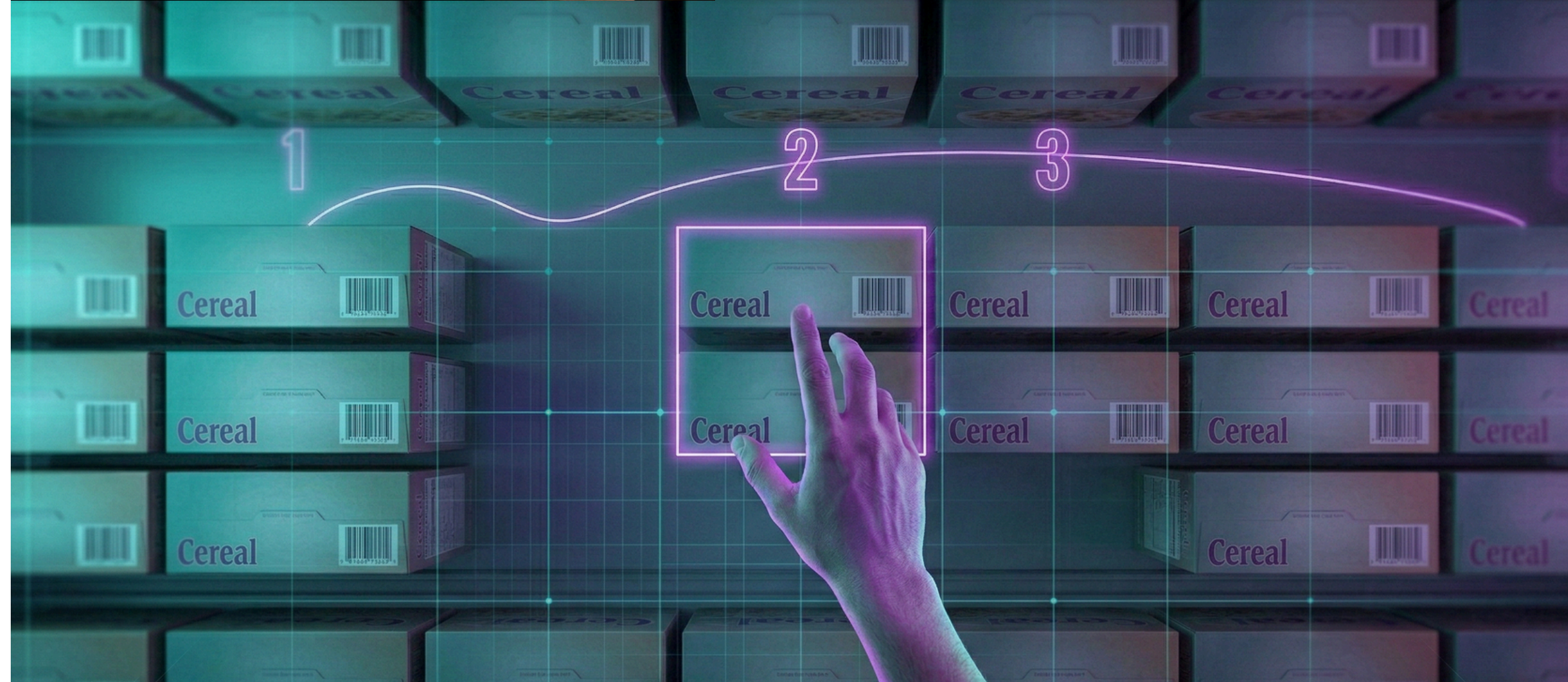
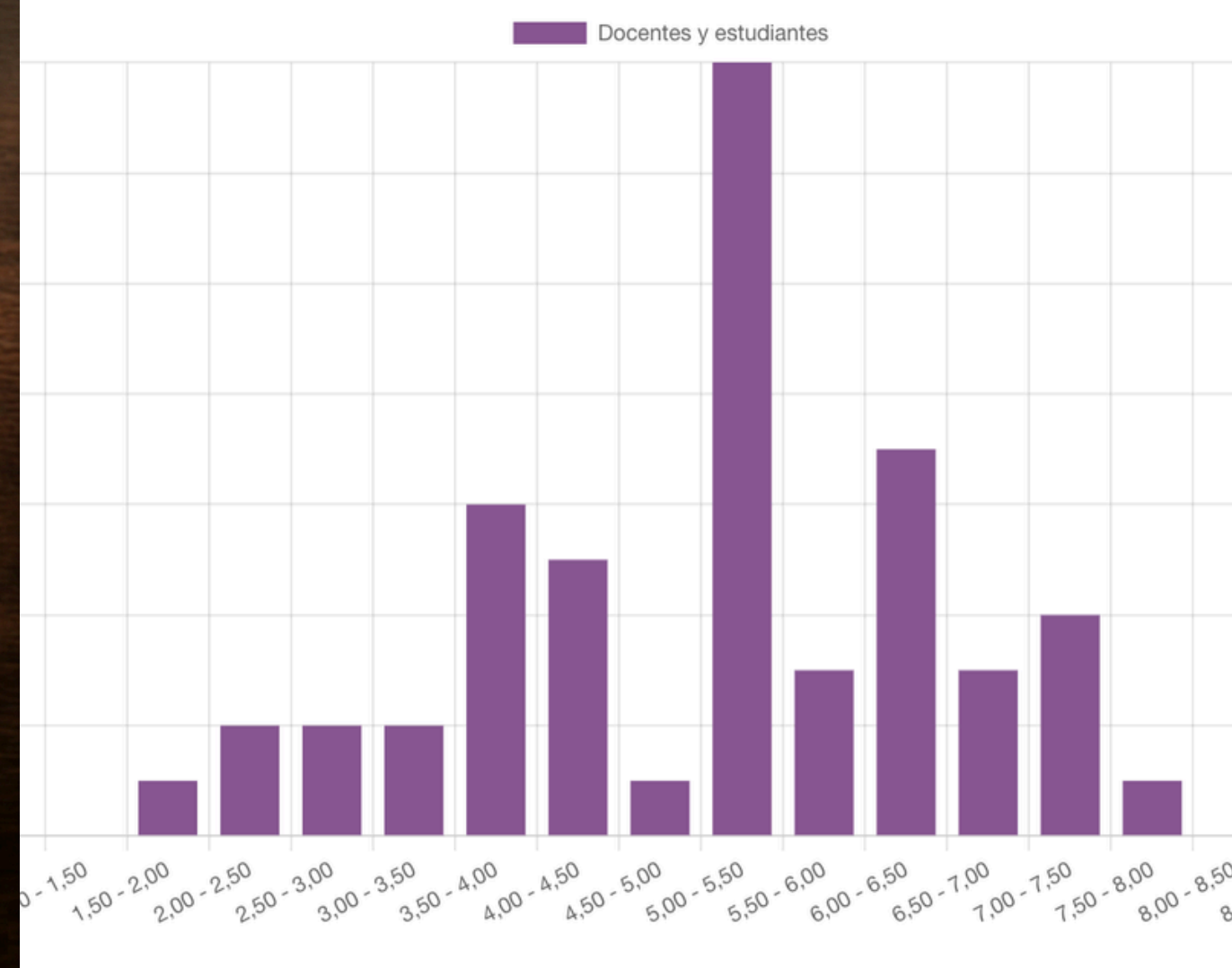
Humans tend to choose things that are easy to remember.

Ran.	Tít.	Nombre	Fed.	FIDE	Nac.	F.Nac.	FIDE ID	ID Nac.	Origen/Club	Info
1	GM	Gonzalez Perez, Arian		2481	2466	1988	3507777	26235	GAL	Ariancito
2	GM	Larino Nieto, David		2461	2447	1989	2256444	13144	GAL	Nitratochess
3	IM	Martin Duque, Jesus		2431	2442	1996	2208954	21251	MAD	JesusMartinDuque
4	IM	Tejedor Fuente, Enrique		2426	2430	1995	2299100	16130	CNT	Kiketf
5	IM	Vega Gutierrez, Sabrina		2392	2388	1987	2219026	12353	CAN	Valeron87
6	FM	Quispe Arteaga, Gabriel		2389	2391	2003	32059809	28798	MAD	ClashRoyale
7	FM	Garrido Outon, Alex		2379	2368	2005	24516279	29726	AND	Xess21
8	FM	Remolar Gallen, Jose		2335	2330	1994	2215187	21287	VAL	chess-rankings
9		Jimenez Almeida, Luis David		2285	2283	1996	22242244	23286	NAV	Pingah
10		Diaz Mino, Pablo		2281	2291	2003	24520470	31142	AND	Pablodiaz_03
11	FM	Alonso Garcia, Aaron		2258	2256	2003	24521060	29242	MUR	luron2003
12		Pena Morales, Hugo		2250	2220	1991	3804771	37222	ARA	SilenciaCuotas91
13		Ingunza Curro, Andres		2245	2247	2004	24526371	29467	MAD	easychess18
14	WFM	Eizaguerri Floris, Maria		2244	2256	2004	32065752	27758	ARA	mariiii04
15		Palacios Herrero, Pablo		2243	2248	1995	22262288	24595	ARA	PPalas

## 4. Universal human patterns.

- Take the second or third item.
- Check the pieces before the game.
- Notes usually follow a pattern.

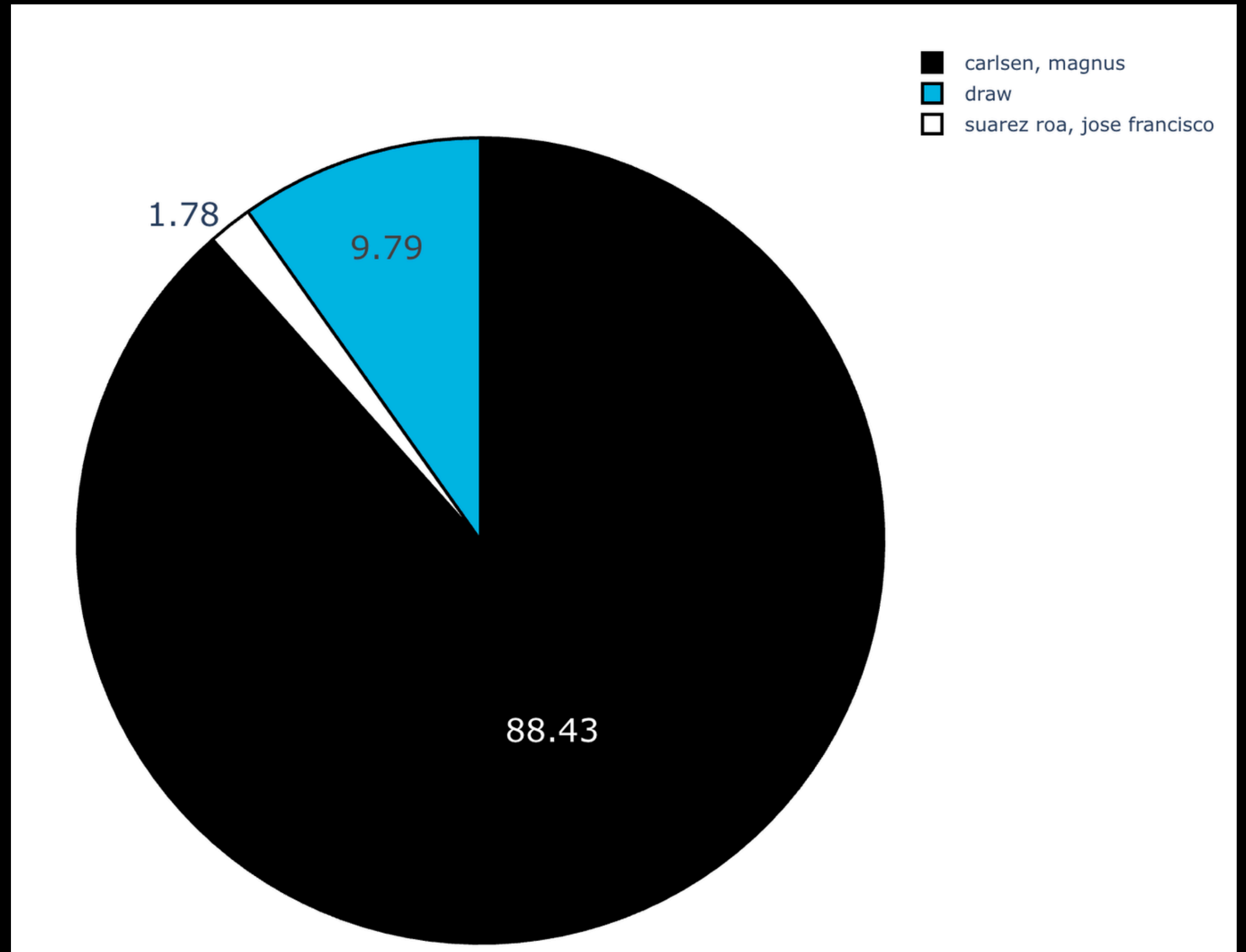
**Identifying patterns allows you to take advantage of them.**



# 5. Prediction

YottaChess **predicts outcomes based on historical data.**

In **education**, it can predict which students will struggle, which exercises each student will fail, and who is at risk of dropping out, or it can identify talented students.



# Conclusions

"Anyone who stops learning is old, whether they're twenty or eighty.

Anyone who keeps learning stays young. The most important thing in life is to keep a youthful mind."

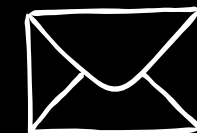
**Henry Ford**

**Patterns simply emerge, but we are the ones who build habits.**

**AI can detect patterns, an educator or coach can analyze them, and, if they are positive, help instill them as habits.**



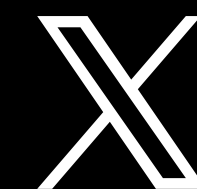
# Thanks!



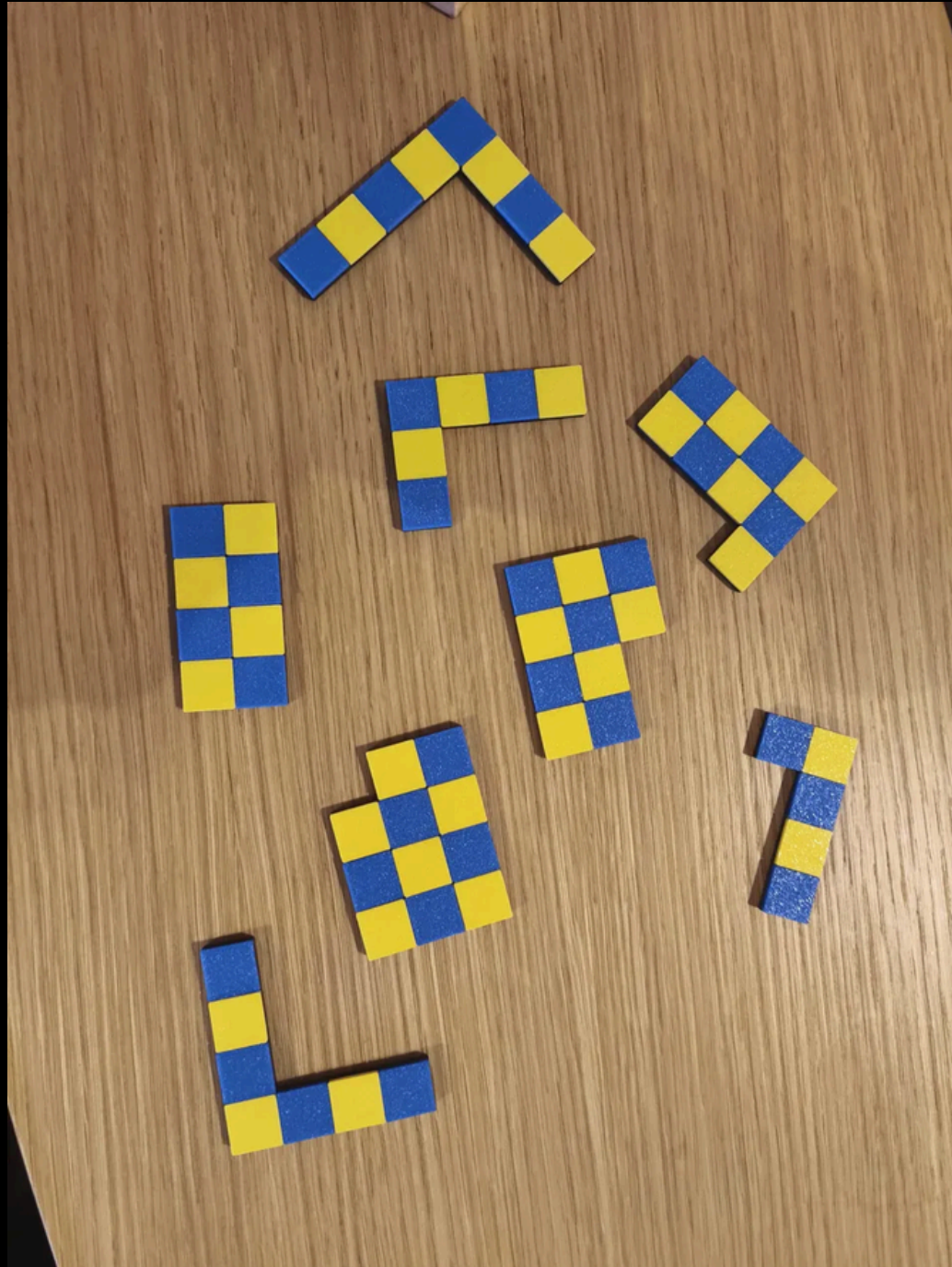
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5	5	3	3	3	7	7	7
5	5	5	5	3	7	7	7
5	5	5	5	3	7	7	7
8	8	8	8	3	7	7	1
8	2	2	4	4	4	4	1
8	2	2	4	4	4	4	1
8	2	2	6	6	6	6	1
2	2	2	6	1	1	1	1

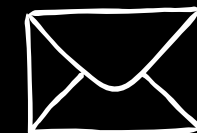
5	5	3	3	3	7	7	7
5	5	5	5	3	7	7	7
5	5	5	5	3	7	7	7
8	8	8	8	3	7	7	1
8	2	2	4	4	4	4	1
8	2	2	4	4	4	4	1
8	2	2	6	6	6	6	1
2	2	2	6	1	1	1	1

5	5	3	3	3	7	7	7
5	5	5	5	3	7	7	7
5	5	5	5	3	7	7	7
8	8	8	8	3	7	7	1
8	2	2	4	4	4	4	1
8	2	2	4	4	4	4	1
8	2	2	6	6	6	6	1
2	2	2	6	1	1	1	1

7	7	7	1	1	1	1	1
7	7	7	7	4	4	6	1
7	7	7	7	4	4	6	1
3	3	3	3	4	4	6	1
3	5	5	8	4	4	6	6
3	5	5	8	2	2	2	2
5	5	5	8	2	2	2	2
5	5	5	8	8	8	8	2



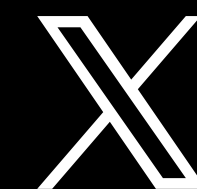
# Thanks!



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