



# Strategy Card Game AI Competition

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# Why Collectible Card Games?

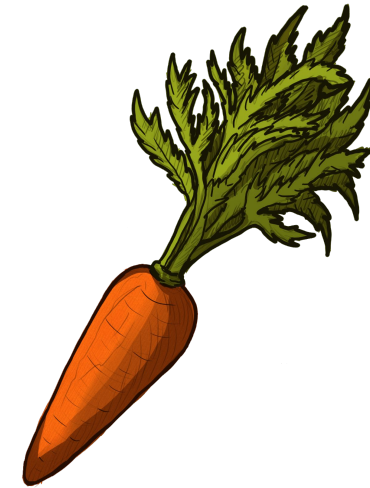
They are interesting!

For humans :-)

→ (do I need to enumerate reasons...?)

For AI:

- Large branching factor, multi-action turns
- Lot of hidden information
- Huge amount of nondeterminism
- Yet the gameplay is still very strategical



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# Legends of Code and Magic



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# Competitions



## One lane version

Jul 2018 – CodinGame Sprint Contest (24h) – 742 participants

Sep 2018 – CodinGame Marathon (30 days) – 2,174 participants

## Two lanes version

CEC 2019 – 6 entries (+2 baselines)

COG 2019 – 9 entries (+2 baselines)

**CEC 2020 – 3 new entries (+10 previous agents)**

[LegendsOfCodeAndMagic.com](https://LegendsOfCodeAndMagic.com)

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# New Entries

**Chad**, by [Marcin Witkowski](#), [Wojciech Meller](#), [Łukasz Klasiński](#), Rust

Draft: Card weights computed using harmony search

Play: MCTS with prediction of opponent's hand

**Coac** (updated), by [Victor Le](#), C++

Draft: Predefined card evaluation function

Play: Minimax-like search, depth max 3, alpha pruning

Handmade evaluation function, random search for enemy turn

**Reinforced Greediness**, by [Ronaldo Vieira](#), [Luiz Chaimowicz](#), [Anderson Tavares](#), Python

Draft: Neural networks learned by self-play

Play: One-turn deep best-first search using linear combination of features



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# Evaluation

Every two agents were compared using 250 decks, ten games each. All games with the same deck had the same random seed, resulting in an identical card ordering.

All participants source code available at [github.com/acatai/Strategy-Card-Game-AI-Competition](https://github.com/acatai/Strategy-Card-Game-AI-Competition)



We would like to thank [DigitalOcean](#) for sponsoring the hardware running our competition: CPU-optimized server with 8 CPUs and 16 GBs of RAM.



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# Results



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# Results

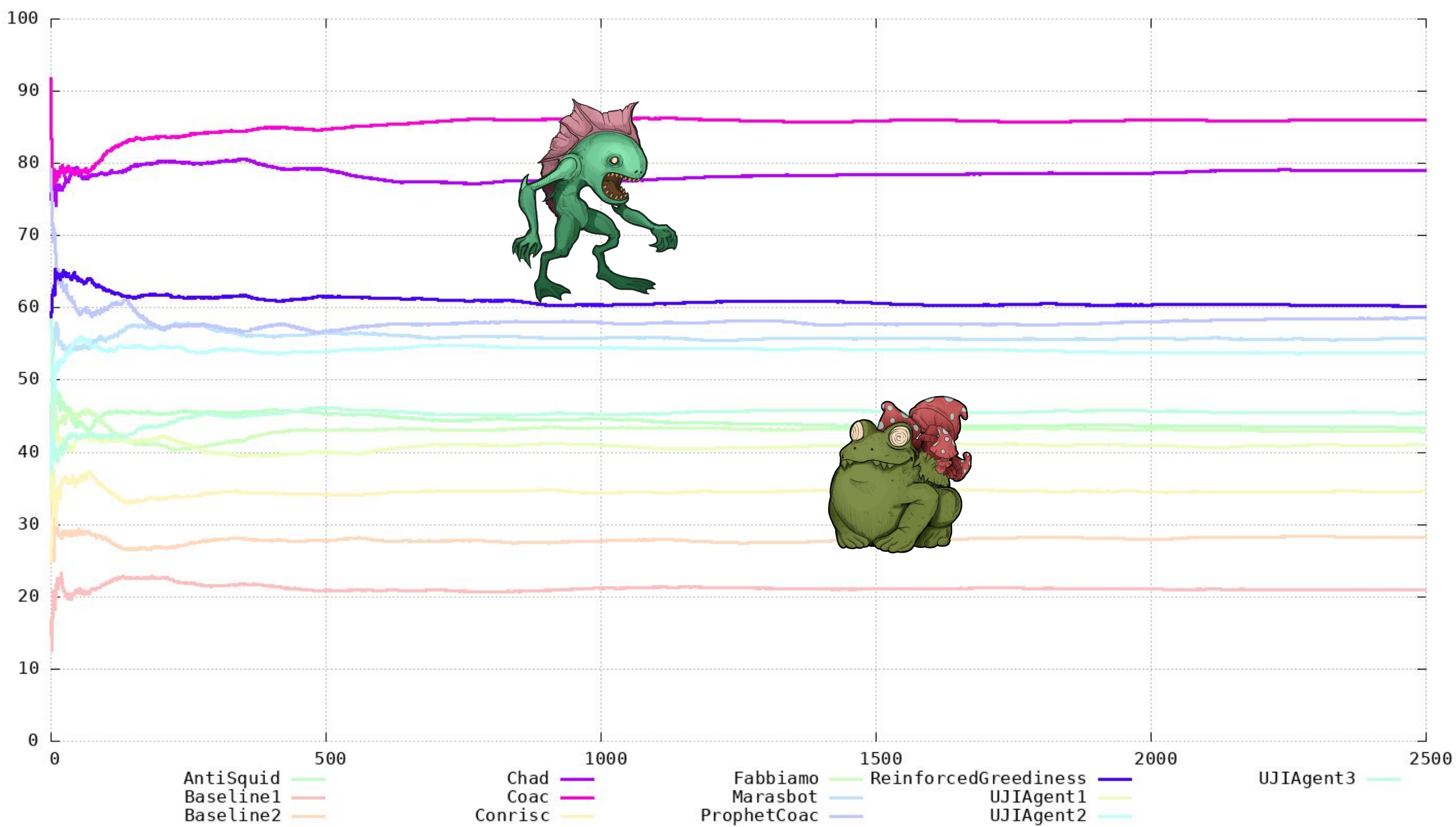


vs.	Coac	Chad	Reinforced Greediness
Coac		57.44%	67.43%
Chad	42.56%		98.22%
Reinforced Greediness	32.57%	1.78%	

Place	Player	Wins
1	Coac	86.07%
2	Chad	79.10%
3	Reinforced Greediness	60.20%
4	ProphetCoac	58.62%
5	Marasbot	55.79%
6	UJI Agent2	53.70%
7	UJI Agent3	45.44%
8	AntiSquid	43.42%
9	Fabbiamo	42.82%
10	UJI Agent1	41.04%
11	Conrisc	34.61%
12	Baseline2	28.20%
13	Baseline1	21.00%

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# Future

Next competition this year, at **IEEE COG**

→ Submission deadline is **1 August**.

→ More information at [legendsofcodeandmagic.com/COG20](https://legendsofcodeandmagic.com/COG20)

Next years:

- Extended game mechanics
- Procedurally generated sets of cards
- OpenSpiel implementation



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# The Winner



## Coac

by Victor Le  
(third time in a row)

Congratulations!!!

Second place: Chad

Third place: Reinforced Greediness

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