

# ocean test51 - openfluke ocean

Lucy Score = Throughput x Availability x Acc / 10,000. Acc is learning. Availability is the live loop. LPD condenses that into Acc-champ RAM.  
[T]=Tween [S]=Split [FP]=FastProxy [L]=Linear [HP]=HeadProxy  
Generated 2026-08-25 09:47:20. Tides up 3 / 3. This-epoch cells 5188 / 354960.  
Learning rate test51=0.05  
Holistic best train mode: Step[T][S] best dtype: float64 best arch: singlex1  
Suggested default (most Lucy-axis wins): sgd | float64 | singlex1 (9 axes)  
Acc champ collect|3x3x3|dense|fp8e4m3|lr=20|cam=2|NormalBP (100.0 Acc, 15.1 KiB). Gold cells (trifecta >=80% at <=20% Acc-champ RAM): none yet

## Train mode votes

| Key        | Layers | Mean Score |
|------------|--------|------------|
| Step[T][S] | 1      | 1264.68    |
| sgd        | 1      | 728.12     |
| Mesh[T]Alt | 1      | 428.33     |

## DType votes

| Key     | Layers | Mean Score |
|---------|--------|------------|
| float64 | 3      | 807.04     |

## Arch votes

| Key      | Layers | Mean Score |
|----------|--------|------------|
| singlex1 | 3      | 807.04     |

## Lucy axis champions (ocean-wide)

| Axis         | Tide    | Mode       | DType    | Arch         | Value    |
|--------------|---------|------------|----------|--------------|----------|
| hard_acc     | config1 | sgd        | float16  | singlex1     | 100.00   |
| throughput   | config2 | Step[T][S] | float64  | singlex1     | 2507.30  |
| availability | config2 | Step[T][S] | bfloat16 | bicameralx2  | 100.00   |
| score        | config2 | Step[T][S] | float64  | singlex1     | 1264.68  |
| soft_acc     | config1 | sgd        | fp8e4m3  | singlex1     | 90.09    |
| acc_thru     | config2 | Step[T][S] | float64  | singlex1     | 1390.61  |
| realtime     | config2 | Step[T][S] | float64  | singlex1     | 2328.46  |
| keep_learn   | config1 | sgd        | float16  | bicameralx2  | 33.30    |
| acc_per_sec  | config1 | sgd        | float16  | bicameralx2  | 33.30    |
| consistency  | config1 | sgd        | float64  | singlex1     | 100.00   |
| stability    | config2 | Step[T][S] | fp8e4m3  | tricameralx3 | 100.00   |
| mobile_score | config2 | Step[T][S] | float64  | singlex1     | 26295.13 |
| lpd          | config2 | Step[T][S] | float64  | singlex1     | 0.34     |
| mspeed       | config1 | sgd        | float64  | tricameralx3 | 1.00     |
| mavail       | config1 | sgd        | float32  | singlex1     | 1.00     |
| mix          | config1 | sgd        | float64  | singlex1     | 0.93     |
| gold_std     | config1 | sgd        | float16  | singlex1     | 24.62    |

## Train mode mean Score



## DType mean Score



Per-layer best (mode x dtype x arch)

| Tide    | LR   | Mode       | DType   | Arch     | Score  | Soft | Acc  |
|---------|------|------------|---------|----------|--------|------|------|
| config2 | 0.05 | Step[T][S] | float64 | singlex1 | 1264.7 | 21.0 | 73.9 |
| config1 | 0.05 | sgd        | float64 | singlex1 | 728.1  | 18.3 | 61.1 |
| config3 | 0.05 | Mesh[T]Alt | float64 | singlex1 | 428.3  | 0.0  | 77.5 |

Lucy axes - config2

| Axis         | Mode       | DType    | Arch         | Value    |
|--------------|------------|----------|--------------|----------|
| hard_acc     | Step[T][S] | float16  | bicameralx2  | 100.00   |
| throughput   | Step[T][S] | float64  | singlex1     | 2507.30  |
| availability | Step[T][S] | bfloat16 | bicameralx2  | 100.00   |
| score        | Step[T][S] | float64  | singlex1     | 1264.68  |
| soft_acc     | Step[T][S] | bfloat16 | bicameralx2  | 89.95    |
| acc_thru     | Step[T][S] | float64  | singlex1     | 1390.61  |
| realtime     | Step[T][S] | float64  | singlex1     | 2328.46  |
| keep_learn   | Step[T][S] | bfloat16 | singlex1     | 33.29    |
| acc_per_sec  | Step[T][S] | bfloat16 | singlex1     | 33.29    |
| consistency  | Step[T][S] | float64  | singlex1     | 100.00   |
| stability    | Step[T][S] | fp8e4m3  | tricameralx3 | 100.00   |
| mobile_score | Step[T][S] | float64  | singlex1     | 26295.13 |
| lpd          | Step[T][S] | float64  | singlex1     | 0.34     |
| mspeed       | Step[T][S] | float64  | singlex1     | 1.00     |
| mavail       | Step[T][S] | float64  | singlex1     | 1.00     |
| mix          | Step[T][S] | float64  | singlex1     | 0.88     |
| gold_std     | Step[T][S] | fp8e4m3  | singlex1     | 12.31    |

Lucy axes - config1

| Axis         | Mode | DType   | Arch         | Value    |
|--------------|------|---------|--------------|----------|
| hard_acc     | sgd  | float16 | singlex1     | 100.00   |
| throughput   | sgd  | float64 | singlex1     | 1679.56  |
| availability | sgd  | float32 | singlex1     | 88.54    |
| score        | sgd  | float64 | singlex1     | 728.12   |
| soft_acc     | sgd  | fp8e4m3 | singlex1     | 90.09    |
| acc_thru     | sgd  | float64 | singlex1     | 913.33   |
| realtime     | sgd  | float64 | singlex1     | 1300.93  |
| keep_learn   | sgd  | float16 | bicameralx2  | 33.30    |
| acc_per_sec  | sgd  | float16 | bicameralx2  | 33.30    |
| consistency  | sgd  | float64 | singlex1     | 100.00   |
| stability    | sgd  | fp8e4m3 | bicameralx2  | 100.00   |
| mobile_score | sgd  | float64 | singlex1     | 15138.89 |
| lpd          | sgd  | float64 | singlex1     | 0.29     |
| mspeed       | sgd  | float64 | tricameralx3 | 1.00     |
| mavail       | sgd  | float32 | singlex1     | 1.00     |
| mix          | sgd  | float64 | singlex1     | 0.93     |
| gold_std     | sgd  | float16 | singlex1     | 24.62    |

Lucy axes - config3

| Axis         | Mode       | DType   | Arch         | Value   |
|--------------|------------|---------|--------------|---------|
| hard_acc     | Mesh[T]Alt | float16 | tricameralx3 | 100.00  |
| throughput   | Mesh[T]Alt | float64 | singlex1     | 1710.50 |
| availability | Mesh[T]Alt | fp8e4m3 | bicameralx2  | 100.00  |
| score        | Mesh[T]Alt | float64 | singlex1     | 428.33  |

| Axis         | Mode       | DType    | Arch         | Value   |
|--------------|------------|----------|--------------|---------|
| soft_acc     | Mesh[T]Alt | bfloat16 | singlex1     | 85.13   |
| acc_thru     | Mesh[T]Alt | float64  | singlex1     | 738.85  |
| realtime     | Mesh[T]Alt | float64  | singlex1     | 1148.12 |
| keep_learn   | Mesh[T]Alt | bfloat16 | singlex1     | 33.12   |
| acc_per_sec  | Mesh[T]Alt | bfloat16 | singlex1     | 33.12   |
| consistency  | Mesh[T]Alt | float64  | singlex1     | 100.00  |
| stability    | Mesh[T]Alt | fp8e4m3  | tricameralx3 | 100.00  |
| mobile_score | Mesh[T]Alt | float64  | singlex1     | 8905.79 |
| lpd          | Mesh[T]Alt | float64  | singlex1     | 0.32    |
| mspeed       | Mesh[T]Alt | float64  | singlex1     | 1.00    |
| mavail       | Mesh[T]Alt | float64  | singlex1     | 1.00    |
| mix          | Mesh[T]Alt | float64  | singlex1     | 0.81    |
| gold_std     | Mesh[T]Alt | float16  | singlex1     | 24.62   |

## Combined leaderboard

| Tide    | Cell                                                  | Score  | Soft | Acc  | Avail |
|---------|-------------------------------------------------------|--------|------|------|-------|
| config2 | chase 1x1x1 dense float64 lr=2 cam=1 StepTweenSplit   | 1264.7 | 21.0 | 73.9 | 90.9  |
| config2 | chase 3x3x3 dense float64 lr=2 cam=1 StepTweenSplit   | 1218.4 | 21.3 | 76.9 | 90.4  |
| config2 | chase 2x2x2 dense float64 lr=2 cam=1 StepTweenSplit   | 1101.9 | 22.2 | 78.4 | 90.9  |
| config2 | chase 1x1x1 dense float64 lr=0.2 cam=1 StepTweenSplit | 1018.3 | 15.8 | 46.3 | 94.1  |
| config2 | chase 2x2x2 dense float64 lr=0.2 cam=1 StepTweenSplit | 993.0  | 15.9 | 46.7 | 93.9  |
| config2 | chase 3x3x3 dense float64 lr=0.2 cam=2 StepTweenSplit | 873.2  | 16.5 | 50.4 | 93.6  |
| config2 | flee 2x2x2 dense float64 lr=0.02 cam=1 StepTweenSplit | 800.4  | 17.5 | 81.6 | 96.8  |
| config2 | chase 3x3x3 dense float64 lr=0.2 cam=1 StepTweenSplit | 795.5  | 16.3 | 48.7 | 93.8  |
| config2 | flee 2x2x2 dense float64 lr=2 cam=1 StepTweenSplit    | 753.4  | 27.1 | 97.1 | 97.3  |
| config2 | flee 3x3x3 dense float64 lr=2 cam=1 StepTweenSplit    | 741.5  | 27.1 | 97.2 | 97.3  |
| config2 | flee 1x1x1 dense float64 lr=2 cam=1 StepTweenSplit    | 733.8  | 26.8 | 96.0 | 97.0  |
| config1 | chase 2x2x2 dense float64 lr=2 cam=1 NormalBP         | 728.1  | 18.3 | 61.1 | 79.7  |
| config2 | flee 2x2x2 dense float64 lr=0.2 cam=1 StepTweenSplit  | 714.8  | 21.3 | 81.7 | 97.3  |
| config1 | chase 3x3x3 dense float64 lr=2 cam=1 NormalBP         | 677.0  | 18.4 | 62.0 | 79.5  |
| config1 | flee 2x2x2 dense float64 lr=0.02 cam=1 NormalBP       | 612.3  | 20.7 | 84.4 | 85.6  |
| config1 | chase 1x1x1 dense float64 lr=2 cam=1 NormalBP         | 603.0  | 18.1 | 59.8 | 80.4  |
| config1 | flee 1x1x1 dense float64 lr=2 cam=1 NormalBP          | 596.3  | 26.6 | 97.1 | 87.0  |
| config1 | chase 3x3x3 dense float64 lr=0.2 cam=1 NormalBP       | 595.6  | 15.6 | 46.8 | 79.0  |
| config1 | chase 1x1x1 dense float64 lr=0.2 cam=1 NormalBP       | 579.1  | 15.6 | 46.3 | 78.8  |
| config1 | flee 3x3x3 dense float64 lr=2 cam=1 NormalBP          | 574.6  | 26.5 | 96.5 | 86.9  |

## Score by layer



## Mean Score by train mode



## Mean hard Acc by train mode



Mean SoftAcc by train mode



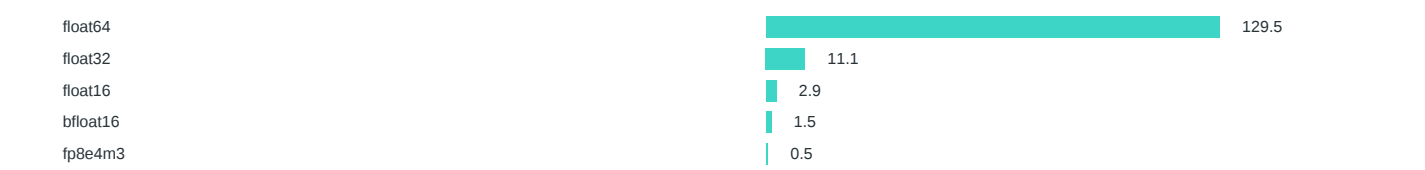
Mean Availability by train mode



Mean Throughput by train mode



Mean Score by dtype



Mean hard Acc by dtype



Mean Score by arch



Honesty - mean Score, every mode x dtype

|            | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
|------------|----------|---------|---------|---------|---------|
| Mesh[T]Alt | 1        | 2       | 8       | 88      | 0       |
| Step[T][S] | 2        | 4       | 13      | 172     | 1       |
| sgd        | 2        | 3       | 12      | 129     | 1       |

Honesty - mean hard Acc, every mode x dtype

Honesty - mean hard Acc, every mode x dtype

|            | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
|------------|----------|---------|---------|---------|---------|
| Mesh[T]Alt | 33       | 32      | 36      | 38      | 23      |
| Step[T][S] | 28       | 27      | 32      | 37      | 21      |
| sgd        | 39       | 35      | 38      | 40      | 25      |

Honesty - mean SoftAcc, every mode x dtype

|            | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
|------------|----------|---------|---------|---------|---------|
| Mesh[T]Alt | 11       | 7       | 8       | 7       | 12      |
| Step[T][S] | 14       | 7       | 7       | 7       | 13      |
| sgd        | 10       | 7       | 7       | 7       | 12      |

Honesty - mean Avail, every mode x dtype

|            | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
|------------|----------|---------|---------|---------|---------|
| Mesh[T]Alt | 47       | 53      | 65      | 71      | 30      |
| Step[T][S] | 86       | 84      | 95      | 96      | 72      |
| sgd        | 60       | 59      | 76      | 80      | 54      |

Mean Score, every mode x arch

|            | bicamera1x2 | single1x1 | tricamera1x3 |
|------------|-------------|-----------|--------------|
| Mesh[T]Alt | 21          | 25        | 18           |
| Step[T][S] | 39          | 45        | 34           |
| sgd        | 29          | 35        | 25           |

Mean hard Acc, every mode x arch

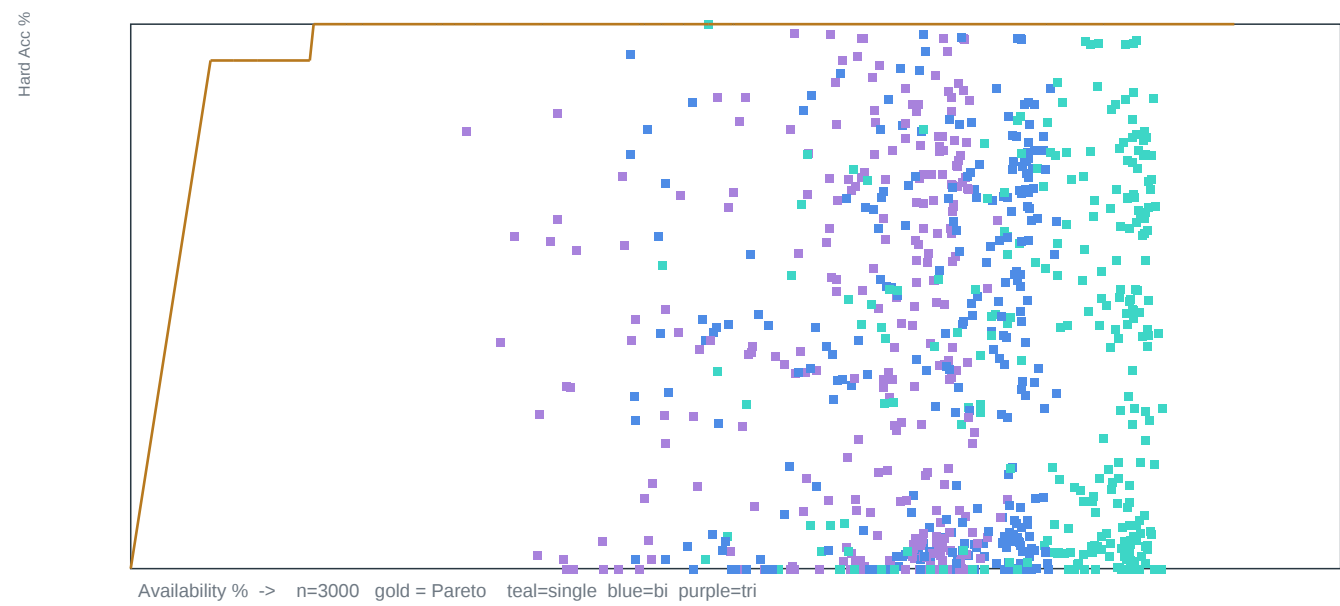
Mean hard Acc, every mode x arch

|            | bicameralx2 | singlex1 | tricameralx3 |
|------------|-------------|----------|--------------|
| Mesh[T]Alt | 34          | 31       | 34           |
| Step[T][S] | 31          | 27       | 31           |
| sgd        | 36          | 34       | 37           |

Mean Avail, every mode x arch

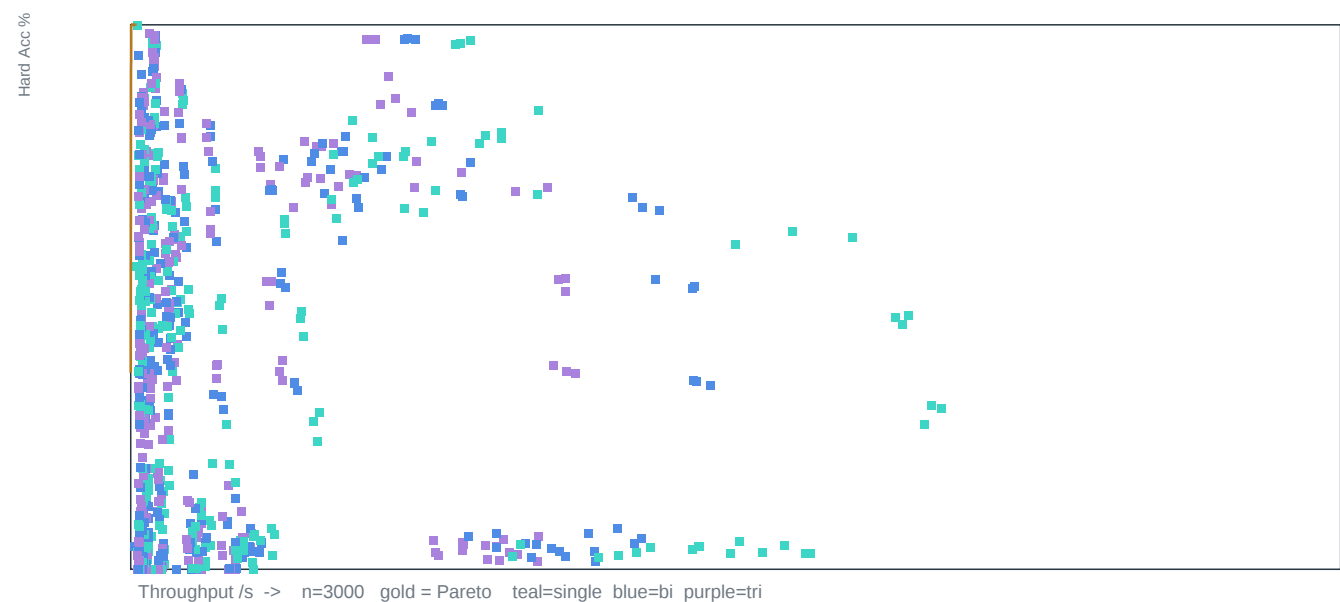
|            | bicameralx2 | singlex1 | tricameralx3 |
|------------|-------------|----------|--------------|
| Mesh[T]Alt | 56          | 56       | 52           |
| Step[T][S] | 88          | 90       | 83           |
| sgd        | 65          | 73       | 60           |

Pillars - Availability vs hard Acc

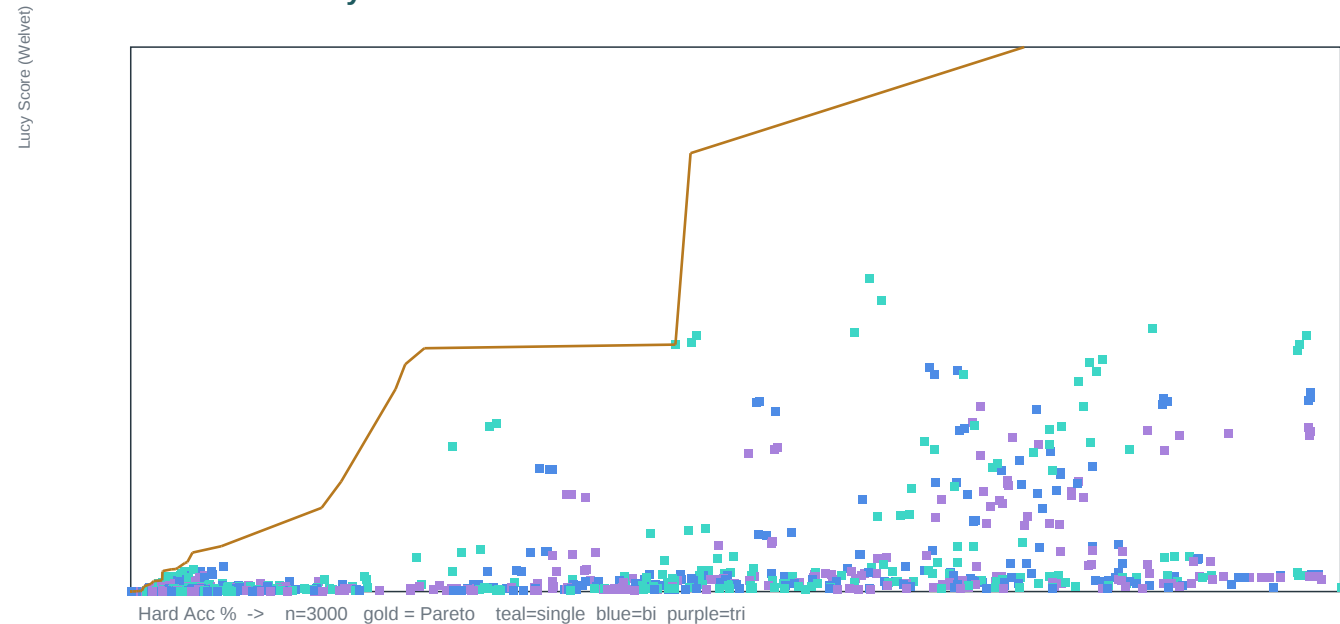


Pillars - Throughput vs hard Acc

Pillars - Throughput vs hard Acc



Pareto - hard Acc vs Lucy Score

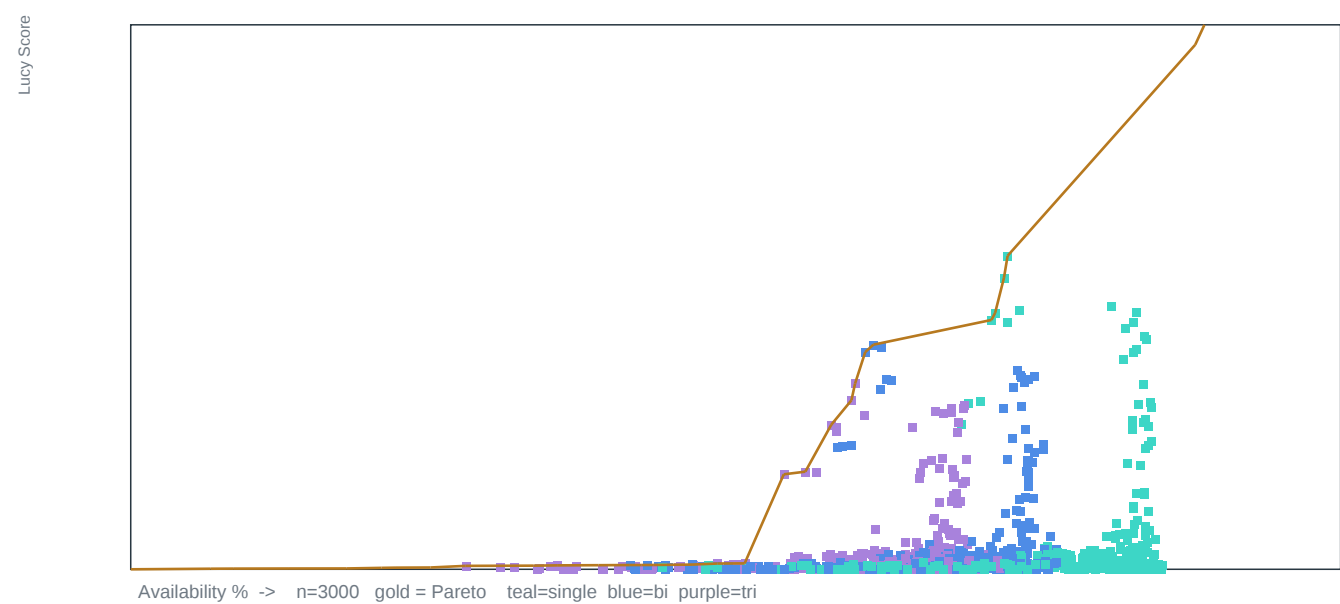


SoftAcc (serve-confidence) vs hard Acc

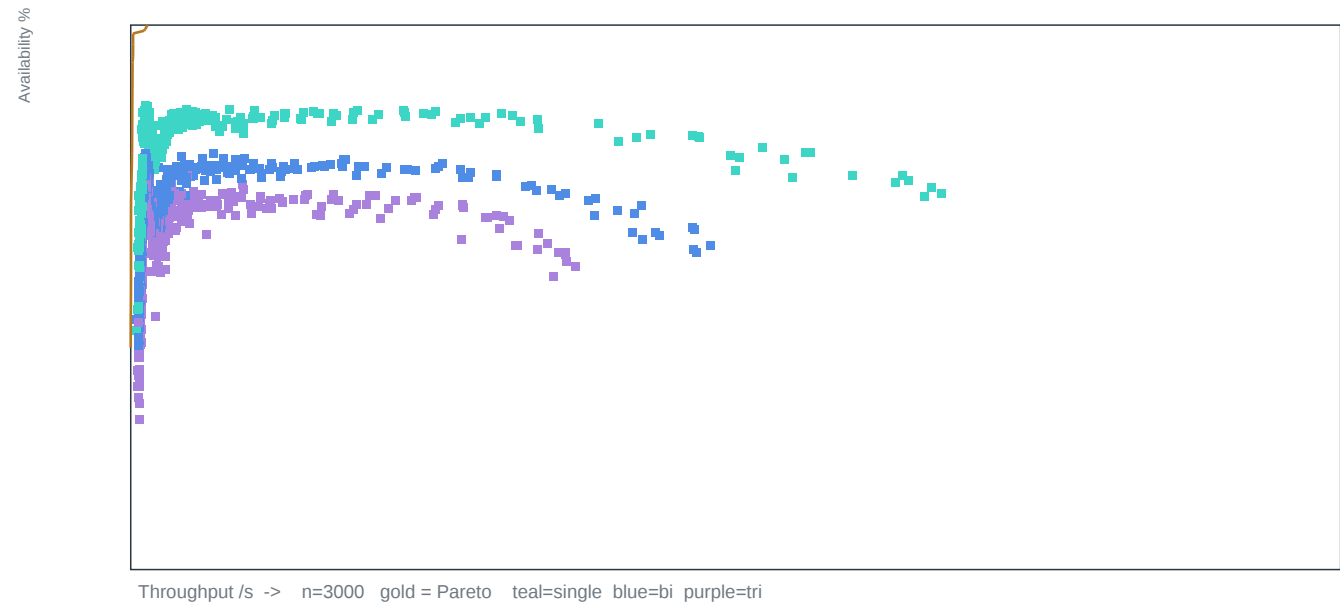


Hard Acc %

Avail vs Lucy Score (duty clock)



Pillars - Throughput vs Availability



vs sgd - matched dtype x format x arch

AccDelta is the honest column. ScoreDelta is usually Availability (duty clock), not a better chain rule. Acc win = AccDelta > 0.5. Score win = ScoreDelta > 1. Baseline is discovered from the board, not a frozen StepBP list.

| mode       | n    | AccD | Acc win% | SoftD | AvailD | ThruD | ScoreD | Score win% |
|------------|------|------|----------|-------|--------|-------|--------|------------|
| Mesh[T]Alt | 1677 | -3.1 | 42       | +0.2  | -12.1  | -4    | -10.0  | 16         |
| Step[T][S] | 1745 | -6.5 | 37       | +0.7  | +20.6  | +22   | +9.2   | 31         |

mean AccD vs sgd



mean ScoreD vs sgd (duty clock)



mean AvailD vs sgd



AccD vs sgd, every mode x dtype

|            | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
|------------|----------|---------|---------|---------|---------|
| Mesh[T]Alt | -6       | -2      | -2      | -2      | -2      |
| Step[T][S] | -11      | -7      | -6      | -4      | -4      |

ScoreD vs sgd, every mode x dtype

|            | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
|------------|----------|---------|---------|---------|---------|
| Mesh[T]Alt | -1       | -1      | -4      | -40     | -0      |
| Step[T][S] | +0       | +0      | +1      | +43     | +0      |

AvailD vs sgd, every mode x dtype

|            | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
|------------|----------|---------|---------|---------|---------|
| Mesh[T]Alt | -14      | -7      | -11     | -9      | -24     |
| Step[T][S] | +25      | +25     | +18     | +16     | +18     |

AccD vs sgd, every mode x arch

|            | bicameralx2 | singlex1 | tricameralx3 |
|------------|-------------|----------|--------------|
| Mesh[T]Alt | -3          | -3       | -3           |
| Step[T][S] | -6          | -7       | -7           |

Consciousness - Acc, Throughput, Availability

Synthetic organism / Lucy density: can the net run and train at the same time in a small box. Lucy Score = Throughput x Availability x Acc / 10,000 (hard Acc; SoftAcc is serve-confidence only). SGD that blocks serve dies on Availability. Q = geomean Acc/Thru/Avail vs learner peaks (traps do not set Thru/Avail). LPD = Q x shrink vs Acc-champ RAM; 0 unless Acc keep >=70%. Gold = all 3 pillars >=80% at <=20% Acc-champ RAM. Gold-std = Acc >=80% plus Thru or Avail, then smallest then fastest. Score/MiB is the binary trap. Acc champ collect|3x3x3|dense|fp8e4m3|lr=20|cam=2|NormalBP Acc 100.0 Thru 4 Avail 60.0% 15.1 KiB (RAM reference)

Lucy Score champ (T x Avail x Acc) chase|1x1x1|dense|float64|lr=2|cam=1|StepTweenSplit    Score 1264.7    Acc 73.9    Soft 21    49.2 KiB

Live-fit champ (best Q) chase|1x1x1|dense|float64|lr=2|cam=1|StepTweenSplit    Acc 73.9    Thru 1883    Avail 90.9%    49.2 KiB

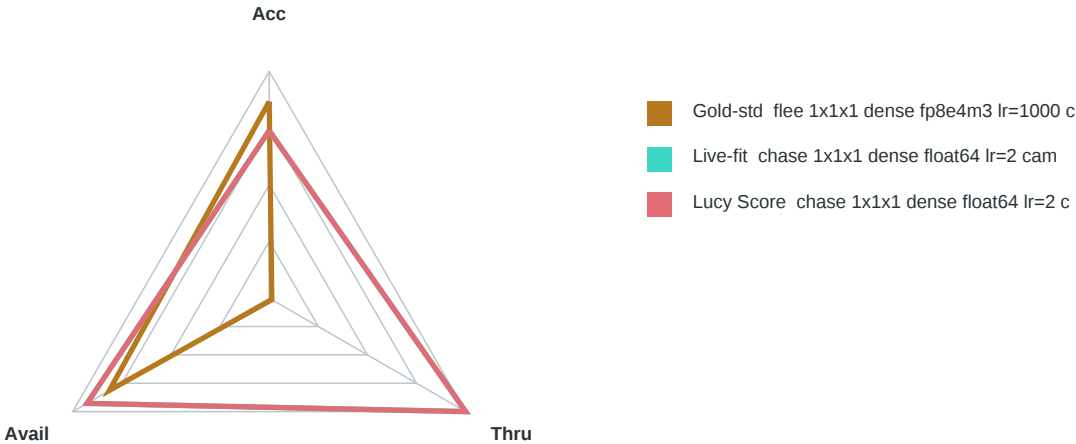
Gold-std (2+ pillars, Acc keep >= 80%, then smallest then fastest): flee|1x1x1|dense|fp8e4m3|lr=1000|cam=1|StepTweenSplit mode Step[T][S]    Acc 86.7    Thru 5    12.3 KiB

Board fastest chase|1x1x1|dense|float64|lr=0.02|cam=1|StepTweenSplit    Thru 2507 (traps may own this)    Best availability

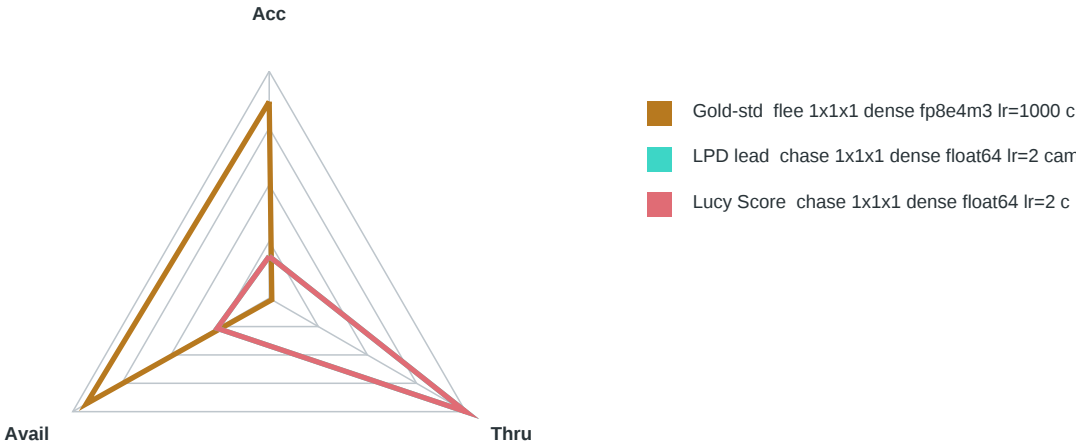
shock|2x2x2|dense|bfloat16|lr=10000|cam=2|StepTweenSplit    100.0%

Learner Thru peak 1883    learner Avail peak 98.1%

Consciousness radar - Acc / Thru / Avail vs learner peaks



Memory density radar - same pillars x shrink vs Acc champ (traps sit at origin)



No gold cell yet. Need all three pillars at 80% of learner peaks in one fifth of Acc-champ RAM.

Gold-standard train modes - 2+ pillars, Acc keep >= 80%, smallest then fastest

| Mode       | n   | Acc   | KiB  | Thru | Cell                                                              |
|------------|-----|-------|------|------|-------------------------------------------------------------------|
| Step[T][S] | 131 | 100.0 | 12.3 | 1013 | flee 1x1x1 dense fp8e4m3 lr=1000 cam=1 StepTweenSplit / flee 2x2~ |
| sgd        | 29  | 97.5  | 49.2 | 847  | flee 2x2x2 dense float64 lr=0.02 cam=1 NormalBP                   |
| Mesh[T]Alt | 3   | 82.3  | 49.2 | 471  | flee 2x2x2 dense float64 lr=10000 cam=1 MeshTweenAlt / flee 2x2x~ |

Lucy density (LPD) - Q x shrink vs Acc-champ RAM; 0 if Acc keep < 70%

| Band | Cell | Acc% | Thru% | Avail% | Q% | RAM% | xSmall | LPD | Acc | Thru | KiB |
|------|------|------|-------|--------|----|------|--------|-----|-----|------|-----|
|------|------|------|-------|--------|----|------|--------|-----|-----|------|-----|

|      |                                                  |    |     |    |    |     |     |      |      |      |      |
|------|--------------------------------------------------|----|-----|----|----|-----|-----|------|------|------|------|
| -    | chase 1x1x1 dense float64 lr=2 cam=1 StepTween~  | 74 | 100 | 93 | 88 | 326 | 0.3 | 0.27 | 73.9 | 1883 | 49.2 |
| -    | chase 3x3x3 dense float64 lr=2 cam=1 StepTween~  | 77 | 93  | 92 | 87 | 326 | 0.3 | 0.27 | 76.9 | 1752 | 49.2 |
| -    | chase 2x2x2 dense float64 lr=2 cam=1 StepTween~  | 78 | 82  | 93 | 84 | 326 | 0.3 | 0.26 | 78.4 | 1546 | 49.2 |
| keep | flee 2x2x2 dense float64 lr=0.02 cam=1 StepTwee~ | 82 | 54  | 99 | 76 | 326 | 0.3 | 0.23 | 81.6 | 1013 | 49.2 |
| keep | flee 2x2x2 dense float64 lr=2 cam=1 StepTweenS~  | 97 | 42  | 99 | 74 | 326 | 0.3 | 0.23 | 97.1 | 797  | 49.2 |
| keep | flee 3x3x3 dense float64 lr=2 cam=1 StepTweenS~  | 97 | 42  | 99 | 74 | 326 | 0.3 | 0.23 | 97.2 | 784  | 49.2 |
| keep | flee 1x1x1 dense float64 lr=2 cam=1 StepTweenS~  | 96 | 42  | 99 | 74 | 326 | 0.3 | 0.23 | 96.0 | 788  | 49.2 |
| keep | flee 2x2x2 dense float64 lr=0.2 cam=1 StepTween~ | 82 | 48  | 99 | 73 | 326 | 0.3 | 0.22 | 81.7 | 899  | 49.2 |
| -    | flee 3x3x3 dense float64 lr=0.2 cam=1 StepTween~ | 79 | 47  | 99 | 72 | 326 | 0.3 | 0.22 | 79.3 | 882  | 49.2 |
| -    | flee 1x1x1 dense float64 lr=0.2 cam=1 StepTween~ | 72 | 48  | 99 | 70 | 326 | 0.3 | 0.21 | 72.2 | 900  | 49.2 |
| keep | flee 2x2x2 dense float64 lr=0.02 cam=1 NormalBP  | 84 | 45  | 87 | 69 | 326 | 0.3 | 0.21 | 84.4 | 847  | 49.2 |
| keep | flee 1x1x1 dense float64 lr=2 cam=1 NormalBP     | 97 | 37  | 89 | 69 | 326 | 0.3 | 0.21 | 97.1 | 705  | 49.2 |
| keep | flee 3x3x3 dense float64 lr=2 cam=1 NormalBP     | 97 | 36  | 89 | 68 | 326 | 0.3 | 0.21 | 96.5 | 685  | 49.2 |
| keep | flee 2x2x2 dense float64 lr=2 cam=1 NormalBP     | 96 | 36  | 88 | 67 | 326 | 0.3 | 0.21 | 96.4 | 674  | 49.2 |
| keep | flee 2x2x2 dense float64 lr=0.2 cam=1 NormalBP   | 80 | 41  | 89 | 66 | 326 | 0.3 | 0.20 | 80.3 | 769  | 49.2 |
| -    | flee 1x1x1 dense float64 lr=0.2 cam=1 NormalBP   | 79 | 41  | 89 | 66 | 326 | 0.3 | 0.20 | 79.2 | 769  | 49.2 |
| -    | flee 2x2x2 dense float64 lr=20 cam=1 StepTween~  | 76 | 38  | 99 | 66 | 326 | 0.3 | 0.20 | 75.6 | 719  | 49.2 |
| -    | flee 3x3x3 dense float64 lr=0.2 cam=1 NormalBP   | 80 | 39  | 89 | 65 | 326 | 0.3 | 0.20 | 79.8 | 738  | 49.2 |
| -    | flee 1x1x1 dense float64 lr=0.02 cam=1 NormalBP  | 78 | 38  | 88 | 64 | 326 | 0.3 | 0.20 | 78.3 | 724  | 49.2 |
| -    | flee 3x3x3 dense float64 lr=200 cam=1 StepTween~ | 77 | 34  | 99 | 64 | 326 | 0.3 | 0.20 | 76.6 | 634  | 49.2 |

Consciousness rank - Q = geomean Acc/Thru/Avail keep

| Band | Cell                                                  | Acc% | Thru% | Avail% | Q% | LPD  | Thru | Avail |
|------|-------------------------------------------------------|------|-------|--------|----|------|------|-------|
| -    | chase 1x1x1 dense float64 lr=2 cam=1 StepTweenSplit   | 74   | 100   | 93     | 88 | 0.27 | 1883 | 90.9  |
| -    | chase 3x3x3 dense float64 lr=2 cam=1 StepTweenSplit   | 77   | 93    | 92     | 87 | 0.27 | 1752 | 90.4  |
| -    | chase 2x2x2 dense float64 lr=2 cam=1 StepTweenSplit   | 78   | 82    | 93     | 84 | 0.26 | 1546 | 90.9  |
| keep | flee 2x2x2 dense float64 lr=0.02 cam=1 StepTweenSplit | 82   | 54    | 99     | 76 | 0.23 | 1013 | 96.8  |
| keep | flee 2x2x2 dense float64 lr=2 cam=1 StepTweenSplit    | 97   | 42    | 99     | 74 | 0.23 | 797  | 97.3  |
| keep | flee 3x3x3 dense float64 lr=2 cam=1 StepTweenSplit    | 97   | 42    | 99     | 74 | 0.23 | 784  | 97.3  |
| keep | flee 1x1x1 dense float64 lr=2 cam=1 StepTweenSplit    | 96   | 42    | 99     | 74 | 0.23 | 788  | 97.0  |
| keep | flee 2x2x2 dense float64 lr=0.2 cam=1 StepTweenSplit  | 82   | 48    | 99     | 73 | 0.22 | 899  | 97.3  |
| -    | flee 3x3x3 dense float64 lr=0.2 cam=1 StepTweenSplit  | 79   | 47    | 99     | 72 | 0.22 | 882  | 97.2  |
| keep | flee 1x1x1 dense float64 lr=2 cam=2 StepTweenSplit    | 97   | 38    | 99     | 72 | 0.18 | 718  | 96.7  |

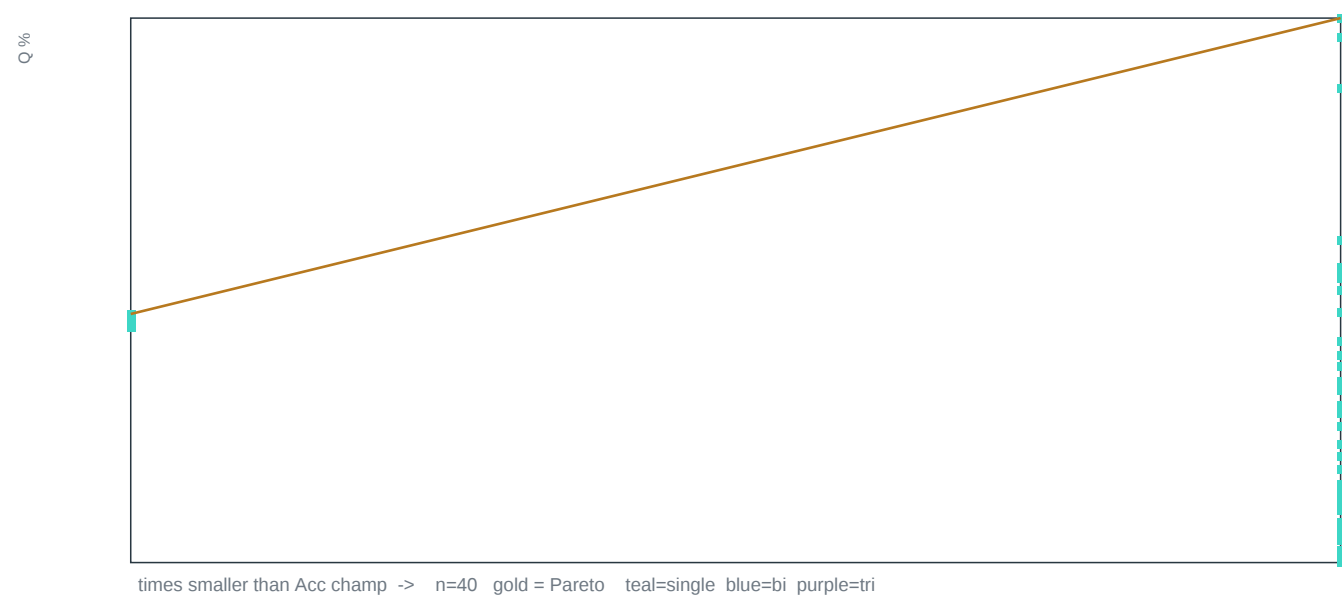
Acc keep % vs RAM KiB (gold = high Acc, low RAM vs Acc champ)



Q% vs RAM KiB (gold = high consciousness, low RAM)



Q% vs shrink vs Acc champ (gold = upper right)



Top Lucy density (LPD)

|                                                       |     |
|-------------------------------------------------------|-----|
| chase 1x1x1 dense float64 lr=2 cam=1 StepTweenSplit   | 0.3 |
| chase 3x3x3 dense float64 lr=2 cam=1 StepTweenSplit   | 0.3 |
| chase 2x2x2 dense float64 lr=2 cam=1 StepTweenSplit   | 0.3 |
| flee 2x2x2 dense float64 lr=0.02 cam=1 StepTweenSplit | 0.2 |
| flee 2x2x2 dense float64 lr=2 cam=1 StepTweenSplit    | 0.2 |
| flee 3x3x3 dense float64 lr=2 cam=1 StepTweenSplit    | 0.2 |
| flee 1x1x1 dense float64 lr=2 cam=1 StepTweenSplit    | 0.2 |
| flee 2x2x2 dense float64 lr=0.2 cam=1 StepTweenSplit  | 0.2 |
| flee 3x3x3 dense float64 lr=0.2 cam=1 StepTweenSplit  | 0.2 |
| flee 1x1x1 dense float64 lr=0.2 cam=1 StepTweenSplit  | 0.2 |
| flee 2x2x2 dense float64 lr=0.02 cam=1 NormalBP       | 0.2 |
| flee 1x1x1 dense float64 lr=2 cam=1 NormalBP          | 0.2 |
| flee 3x3x3 dense float64 lr=2 cam=1 NormalBP          | 0.2 |
| flee 2x2x2 dense float64 lr=2 cam=1 NormalBP          | 0.2 |
| flee 2x2x2 dense float64 lr=0.2 cam=1 NormalBP        | 0.2 |
| flee 1x1x1 dense float64 lr=0.2 cam=1 NormalBP        | 0.2 |

# tide test51

Lucy Score = Throughput x Availability x Acc / 10,000. LPD condenses live-fit vs Acc-champ RAM.

[T]=Tween [S]=Split [FP]=FastProxy [L]=Linear [HP]=HeadProxy

running - epoch 1 - lr 0.05 - 2026-08-25 09:47:20 - 0.0.0.0:8080

This epoch 1677 / 110160 cells. Recorded 1677 results. Learning rate 0.05.

Score 0 usually means the cell finished before a Lucy pulse (Acc never sampled). Score is live-fit: Throughput x Availability x Acc.

SGD that blocks serve dies on Availability. SoftAcc is serve-confidence only.

think-race host - tree sweep feeds Tide Lucy reports

## Lucy champions (this tide)

| Axis                | Cell                                                  | Score  | Soft | Acc   | Thru   | Avail |
|---------------------|-------------------------------------------------------|--------|------|-------|--------|-------|
| hard acc            | collect 1x1x1 dense bfloat16 lr=20 cam=1 MeshTweenAlt | 2.79   | 85.1 | 90.5  | 6.4    | 48.3  |
| throughput          | chase 1x1x1 dense float64 lr=20 cam=1 MeshTweenAlt    | 59.15  | 0.0  | 5.2   | 1710.5 | 67.1  |
| availability        | teleport 1x1x1 dense fp8e4m3 lr=2 cam=2 MeshTweenAlt  | 0.00   | 10.6 | 0.0   | 4.5    | 100.0 |
| lucy score          | flee 2x2x2 dense float64 lr=20 cam=1 MeshTweenAlt     | 428.33 | 0.0  | 77.5  | 647.1  | 85.4  |
| mobile score (trap) | flee 2x2x2 dense float64 lr=20 cam=1 MeshTweenAlt     | 428.33 | 0.0  | 77.5  | 647.1  | 85.4  |
| acc/sec             | collect 2x2x2 dense bfloat16 lr=2 cam=1 MeshTweenAlt  | 2.71   | 24.0 | 100.0 | 6.3    | 43.1  |

## Lucy axes - test51

| Axis         | Mode       | DType    | Arch         | Value   |
|--------------|------------|----------|--------------|---------|
| hard_acc     | Mesh[T]Alt | float16  | tricameralx3 | 100.00  |
| throughput   | Mesh[T]Alt | float64  | singlex1     | 1710.50 |
| availability | Mesh[T]Alt | fp8e4m3  | bicameralx2  | 100.00  |
| score        | Mesh[T]Alt | float64  | singlex1     | 428.33  |
| soft_acc     | Mesh[T]Alt | bfloat16 | singlex1     | 85.13   |
| acc_thru     | Mesh[T]Alt | float64  | singlex1     | 738.85  |
| realtime     | Mesh[T]Alt | float64  | singlex1     | 1148.12 |
| keep_learn   | Mesh[T]Alt | bfloat16 | singlex1     | 33.12   |
| acc_per_sec  | Mesh[T]Alt | bfloat16 | singlex1     | 33.12   |
| consistency  | Mesh[T]Alt | float64  | singlex1     | 100.00  |
| stability    | Mesh[T]Alt | fp8e4m3  | tricameralx3 | 100.00  |
| mobile_score | Mesh[T]Alt | float64  | singlex1     | 8905.79 |
| lpd          | Mesh[T]Alt | float64  | singlex1     | 0.32    |
| mspeed       | Mesh[T]Alt | float64  | singlex1     | 1.00    |
| mavail       | Mesh[T]Alt | float64  | singlex1     | 1.00    |
| mix          | Mesh[T]Alt | float64  | singlex1     | 0.81    |
| gold_std     | Mesh[T]Alt | float16  | singlex1     | 24.62   |

## Best settings per train mode

| Mode       | DType   | Format | Score | Soft | Acc  | Avail | n    |
|------------|---------|--------|-------|------|------|-------|------|
| Mesh[T]Alt | float64 | none   | 428.3 | 0.0  | 77.5 | 85.4  | 1677 |

## Best dtype per mode

| Mode       | Winner dtype | Score | Soft | Acc  |
|------------|--------------|-------|------|------|
| Mesh[T]Alt | float64      | 428.3 | 0.0  | 77.5 |

## Best mode per dtype

| DType    | Winner mode | Score | Soft | Acc  |
|----------|-------------|-------|------|------|
| float64  | Mesh[T]Alt  | 428.3 | 0.0  | 77.5 |
| float32  | Mesh[T]Alt  | 33.5  | 0.1  | 91.5 |
| float16  | Mesh[T]Alt  | 11.2  | 2.2  | 96.0 |
| bfloat16 | Mesh[T]Alt  | 4.2   | 0.6  | 87.5 |

|         |            |     |      |      |
|---------|------------|-----|------|------|
| fp8e4m3 | Mesh[T]Alt | 1.7 | 29.2 | 93.3 |
|---------|------------|-----|------|------|

Leaderboard - test51

| #  | Cell                                                 | Score | Soft | Acc  | Thru  | Avail |
|----|------------------------------------------------------|-------|------|------|-------|-------|
| 1  | flee 2x2x2 dense float64 lr=20 cam=1 MeshTweenAlt    | 428.3 | 0.0  | 77.5 | 647.1 | 85.4  |
| 2  | flee 1x1x1 dense float64 lr=20 cam=1 MeshTweenAlt    | 392.3 | 0.8  | 70.2 | 655.5 | 85.2  |
| 3  | flee 3x3x3 dense float64 lr=200 cam=1 MeshTweenAlt   | 377.3 | 0.1  | 76.1 | 579.7 | 85.5  |
| 4  | flee 1x1x1 dense float64 lr=20 cam=2 MeshTweenAlt    | 376.8 | 0.5  | 79.3 | 576.5 | 82.4  |
| 5  | flee 1x1x1 dense float64 lr=200 cam=1 MeshTweenAlt   | 376.1 | 0.0  | 76.1 | 584.5 | 84.6  |
| 6  | chase 2x2x2 dense float64 lr=2 cam=1 MeshTweenAlt    | 364.9 | 24.5 | 79.6 | 928.6 | 49.4  |
| 7  | flee 2x2x2 dense float64 lr=20 cam=2 MeshTweenAlt    | 361.6 | 0.5  | 76.2 | 570.5 | 83.2  |
| 8  | flee 3x3x3 dense float64 lr=20 cam=1 MeshTweenAlt    | 361.2 | 0.9  | 66.2 | 643.3 | 84.8  |
| 9  | chase 1x1x1 dense float64 lr=2 cam=1 MeshTweenAlt    | 353.2 | 23.7 | 77.1 | 933.5 | 49.1  |
| 10 | chase 3x3x3 dense float64 lr=2 cam=1 MeshTweenAlt    | 352.2 | 23.8 | 76.3 | 921.8 | 50.1  |
| 11 | flee 1x1x1 dense float64 lr=1000 cam=1 MeshTweenAlt  | 348.6 | 0.4  | 79.5 | 522.3 | 83.9  |
| 12 | flee 3x3x3 dense float64 lr=20 cam=2 MeshTweenAlt    | 348.0 | 0.5  | 73.3 | 571.7 | 83.1  |
| 13 | flee 2x2x2 dense float64 lr=1000 cam=1 MeshTweenAlt  | 343.1 | 0.4  | 76.7 | 528.9 | 84.6  |
| 14 | flee 2x2x2 dense float64 lr=200 cam=1 MeshTweenAlt   | 335.5 | 0.5  | 67.1 | 585.6 | 85.3  |
| 15 | flee 3x3x3 dense float64 lr=1000 cam=1 MeshTweenAlt  | 333.0 | 0.0  | 75.0 | 523.5 | 84.8  |
| 16 | flee 2x2x2 dense float64 lr=10000 cam=1 MeshTweenAlt | 328.1 | 0.0  | 81.4 | 469.4 | 85.9  |
| 17 | flee 1x1x1 dense float64 lr=200 cam=2 MeshTweenAlt   | 321.1 | 0.0  | 71.7 | 537.7 | 83.3  |
| 18 | flee 1x1x1 dense float64 lr=1000 cam=2 MeshTweenAlt  | 319.8 | 0.0  | 79.8 | 481.5 | 83.2  |
| 19 | flee 2x2x2 dense float64 lr=200 cam=2 MeshTweenAlt   | 319.3 | 0.0  | 71.8 | 533.2 | 83.4  |
| 20 | flee 1x1x1 dense float64 lr=2 cam=1 MeshTweenAlt     | 313.8 | 27.5 | 97.7 | 527.7 | 60.8  |

Top scores - test51



Top scores - test51



Mean Score by train mode



Mean hard Acc by train mode



Mean SoftAcc by train mode



Mean Availability by train mode



Mean Throughput by train mode



Mean Score by dtype



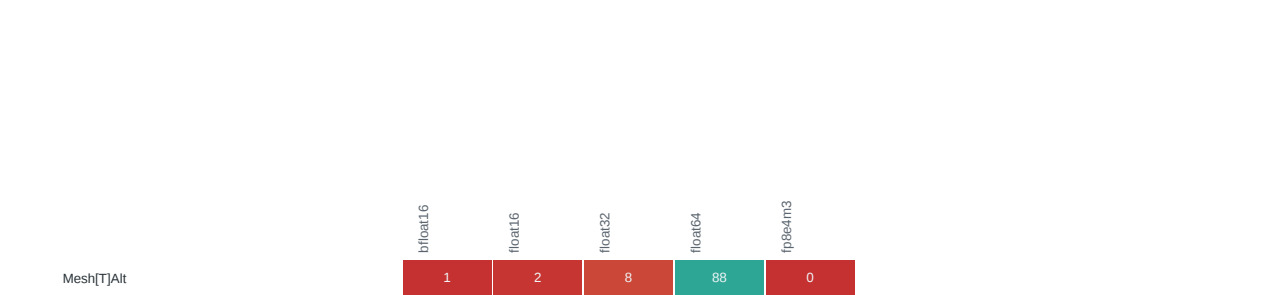
Mean hard Acc by dtype



Mean Score by arch



Honesty - mean Score, every mode x dtype



Honesty - mean hard Acc, every mode x dtype

Honesty - mean hard Acc, every mode x dtype

|            |          |         |         |         |         |
|------------|----------|---------|---------|---------|---------|
|            | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
| Mesh[T]Alt | 33       | 32      | 36      | 38      | 23      |

Honesty - mean SoftAcc, every mode x dtype

|            |          |         |         |         |         |
|------------|----------|---------|---------|---------|---------|
|            | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
| Mesh[T]Alt | 11       | 7       | 8       | 7       | 12      |

Honesty - mean Avail, every mode x dtype

|            |          |         |         |         |         |
|------------|----------|---------|---------|---------|---------|
|            | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
| Mesh[T]Alt | 47       | 53      | 65      | 71      | 30      |

Mean Score, every mode x arch

|            |             |          |              |
|------------|-------------|----------|--------------|
|            | bicameralx2 | singlex1 | tricameralx3 |
| Mesh[T]Alt | 21          | 25       | 18           |

Mean hard Acc, every mode x arch

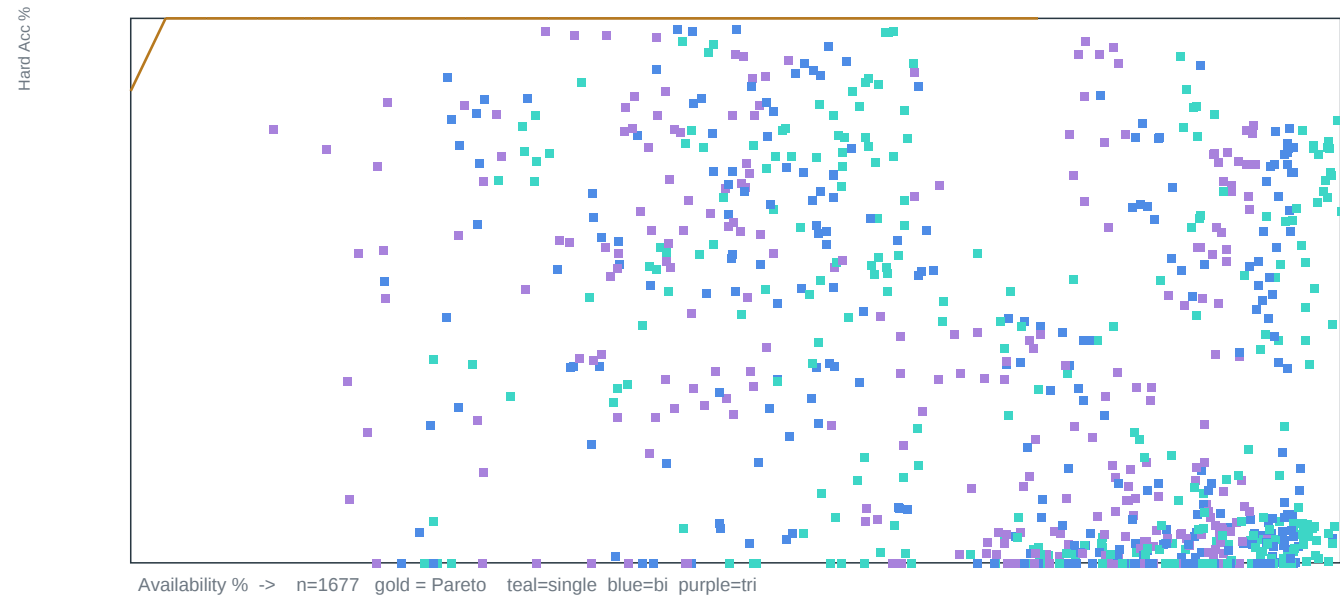
|            |             |          |              |
|------------|-------------|----------|--------------|
|            | bicameralx2 | singlex1 | tricameralx3 |
| Mesh[T]Alt | 34          | 31       | 34           |

Mean Avail, every mode x arch

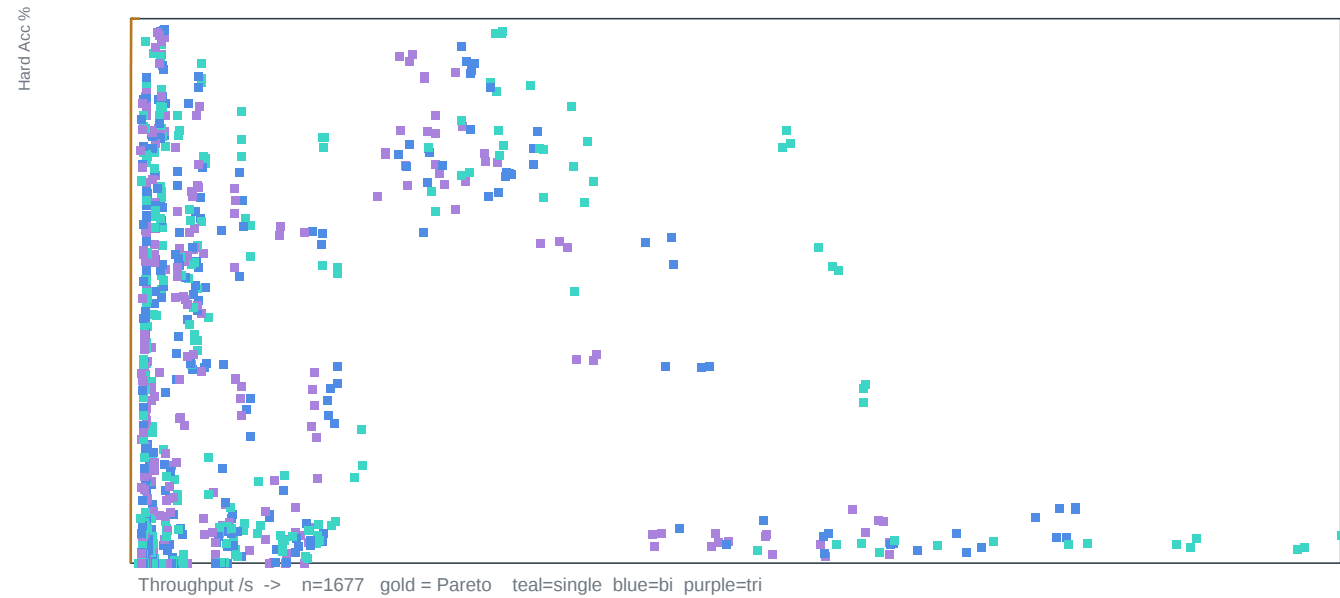
Mean Avail, every mode x arch



Pillars - Availability vs hard Acc

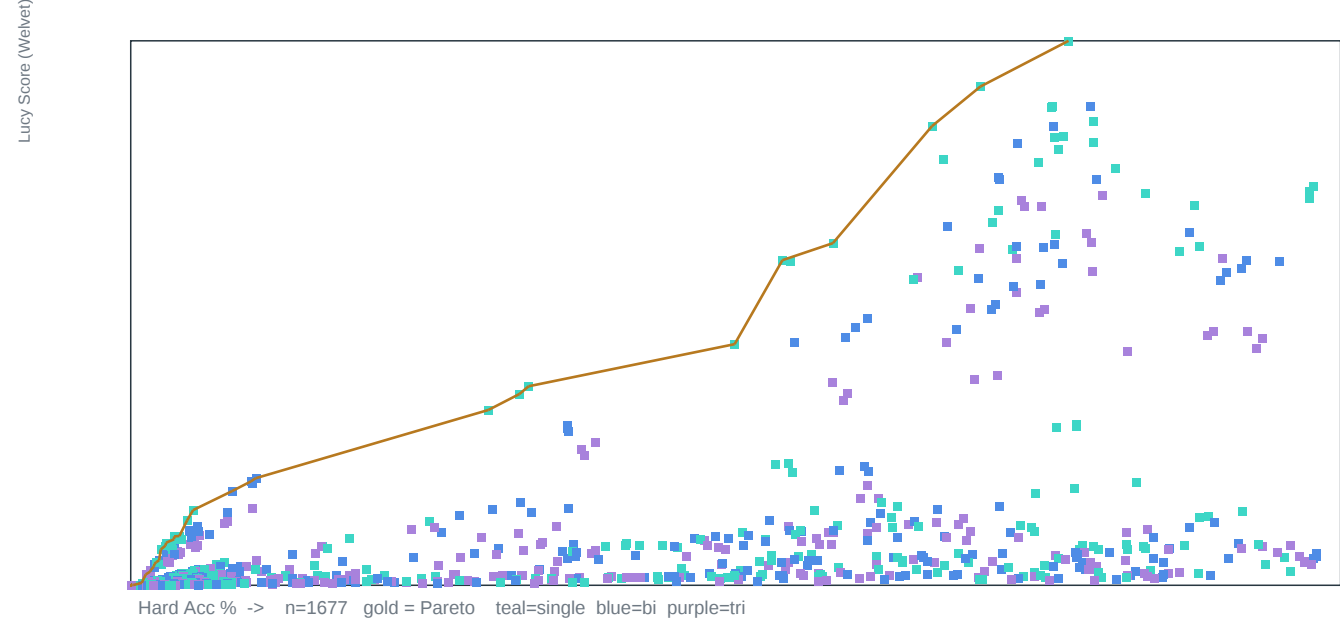


Pillars - Throughput vs hard Acc

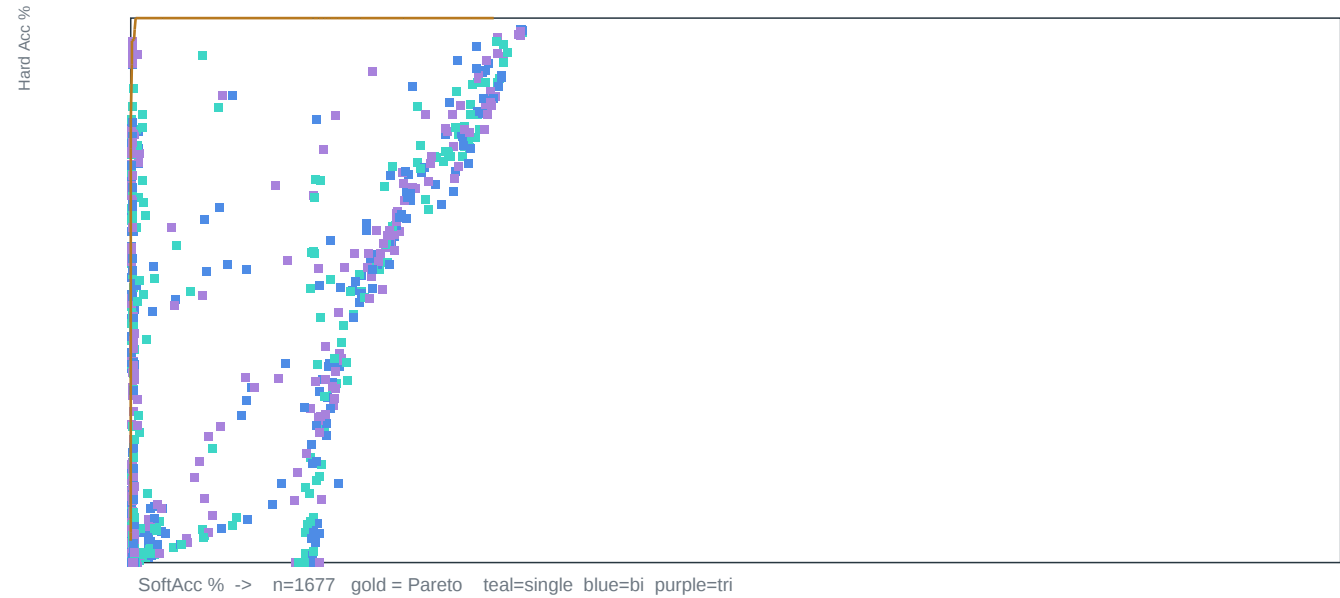


Pareto - hard Acc vs Lucy Score

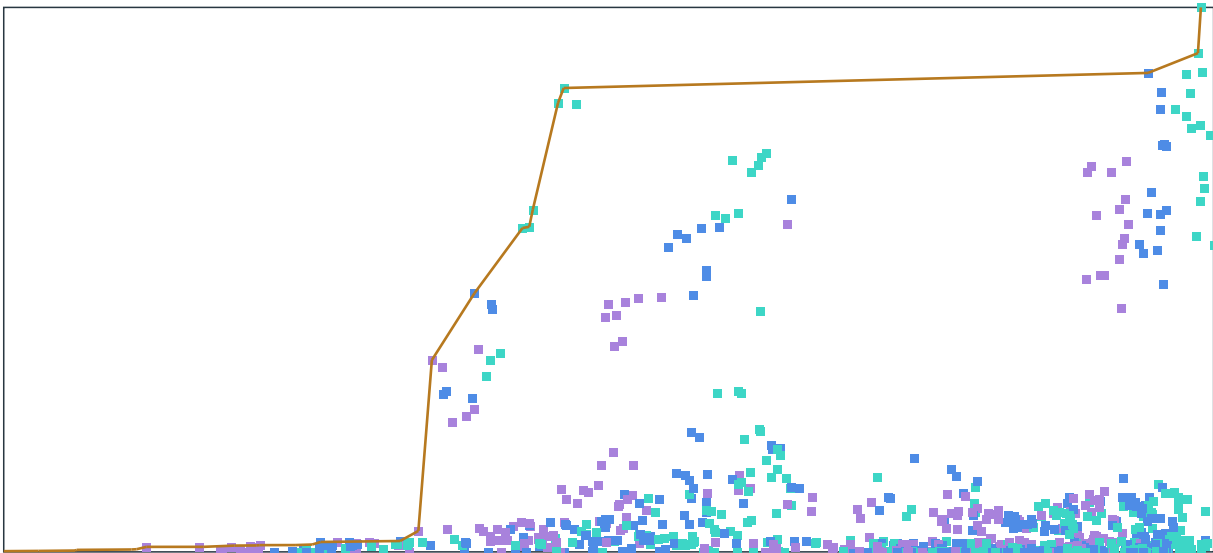
Pareto - hard Acc vs Lucy Score



SoftAcc (serve-confidence) vs hard Acc

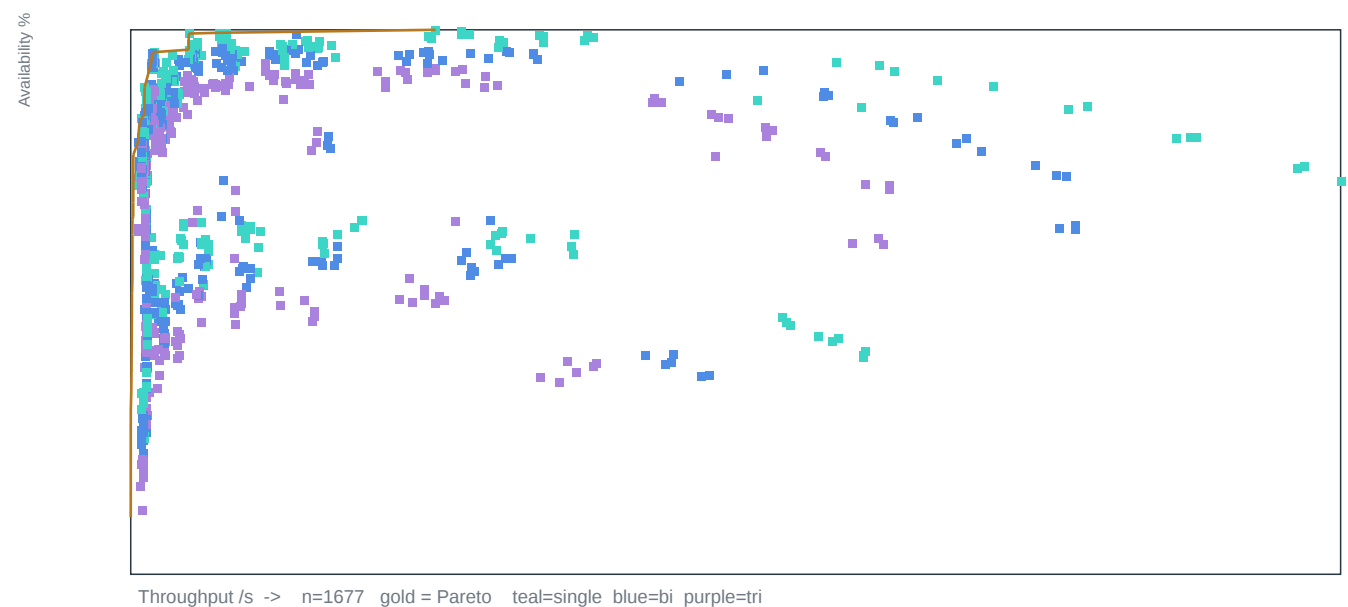


Avail vs Lucy Score (duty clock)



Lucy Score

Pillars - Throughput vs Availability



Consciousness - Acc, Throughput, Availability

Synthetic organism / Lucy density: can the net run and train at the same time in a small box. Lucy Score = Throughput x Availability x Acc / 10,000 (hard Acc; SoftAcc is serve-confidence only). SGD that blocks serve dies on Availability. Q = geomean Acc/Thru/Avail vs learner peaks (traps do not set Thru/Avail). LPD = Q x shrink vs Acc-champ RAM; 0 unless Acc keep >=70%. Gold = all 3 pillars >=80% at <=20% Acc-champ RAM. Gold-std = Acc >=80% plus Thru or Avail, then smallest then fastest. Score/MiB is the binary trap.

Acc champ flee|3x3x3|dense|fp8e4m3|lr=2|cam=3|MeshTweenAlt Acc 100.0 Thru 5 Avail 22.0% 19.1 KiB (RAM reference)

Lucy Score champ (T x Avail x Acc) flee|2x2x2|dense|float64|lr=20|cam=1|MeshTweenAlt Score 428.3 Acc 77.5 Soft 0 49.2 KiB

Live-fit champ (best Q) flee|2x2x2|dense|float64|lr=20|cam=1|MeshTweenAlt Acc 77.5 Thru 647 Avail 85.4% 49.2 KiB

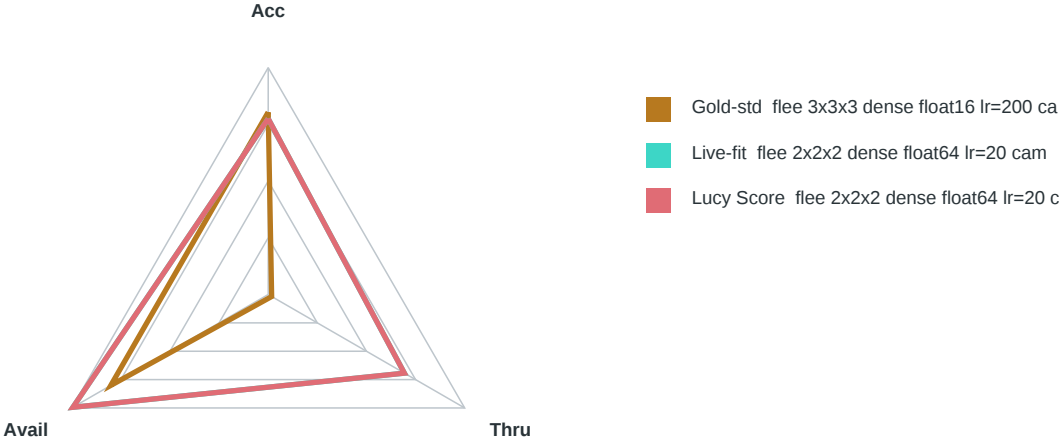
Gold-std (2+ pillars, Acc keep >= 80%, then smallest then fastest): flee|3x3x3|dense|float16|lr=200|cam=1|MeshTweenAlt mode Mesh[T]Alt Acc 80.4 Thru 16 24.6 KiB

Board fastest chase|1x1x1|dense|float64|lr=20|cam=1|MeshTweenAlt Thru 1710 (traps may own this) Best availability

flee|1x1x1|dense|float64|lr=1e+06|cam=1|MeshTweenAlt 86.1%

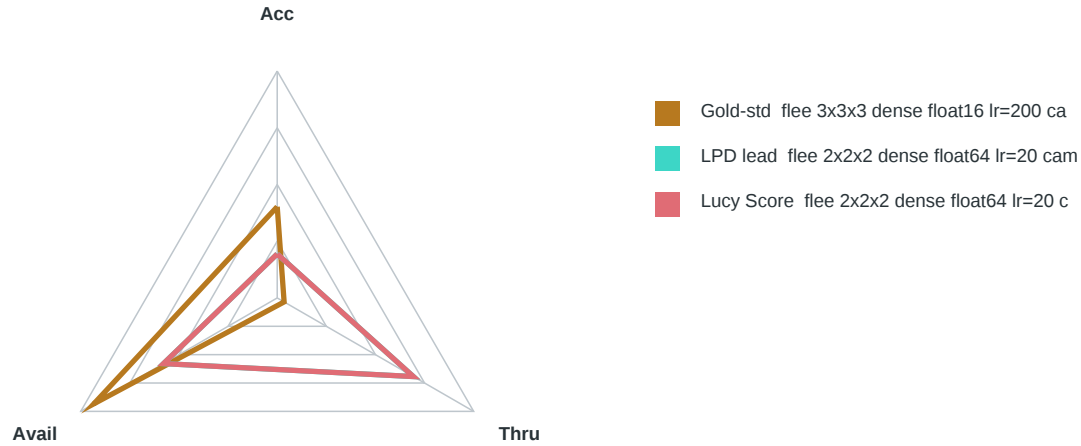
Learner Thru peak 933 learner Avail peak 85.9%

Consciousness radar - Acc / Thru / Avail vs learner peaks



Memory density radar - same pillars x shrink vs Acc champ (traps sit at origin)

Memory density radar - same pillars x shrink vs Acc champ (traps sit at origin)



No gold cell yet. Need all three pillars at 80% of learner peaks in one fifth of Acc-champ RAM.

Gold-standard train modes - 2+ pillars, Acc keep >= 80%, smallest then fastest

| Mode       | n  | Acc   | KiB  | Thru | Cell                                                               |
|------------|----|-------|------|------|--------------------------------------------------------------------|
| Mesh[T]Alt | 26 | 100.0 | 24.6 | 471  | flee 3x3x3 dense float16 lr=200 cam=1 MeshTweenAlt / flee 2x2x2 d- |

Lucy density (LPD) - Q x shrink vs Acc-champ RAM; 0 if Acc keep < 70%

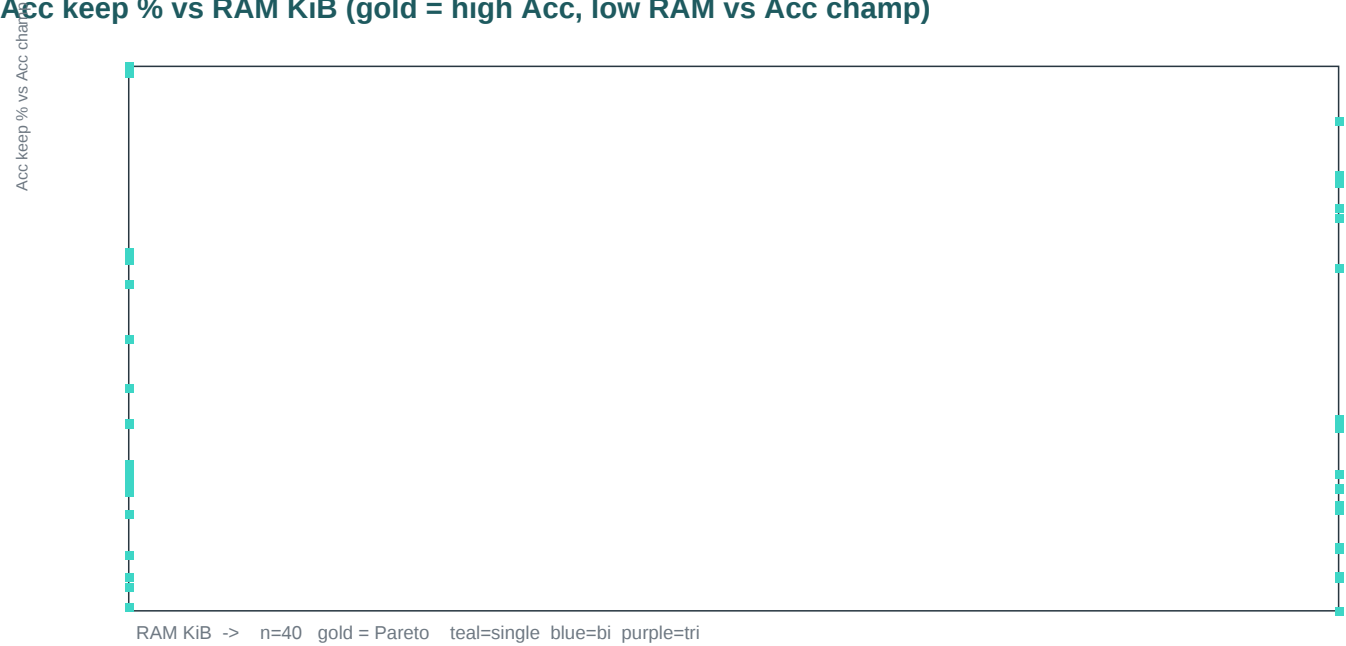
| Band | Cell                                             | Acc% | Thru% | Avail% | Q% | RAM% | xSmall | LPD  | Acc  | Thru | KiB  |
|------|--------------------------------------------------|------|-------|--------|----|------|--------|------|------|------|------|
| -    | flee 2x2x2 dense float64 lr=20 cam=1 MeshTween~  | 78   | 69    | 99     | 81 | 258  | 0.4    | 0.32 | 77.5 | 647  | 49.2 |
| -    | flee 1x1x1 dense float64 lr=20 cam=1 MeshTween~  | 70   | 70    | 99     | 79 | 258  | 0.4    | 0.31 | 70.2 | 656  | 49.2 |
| -    | flee 3x3x3 dense float64 lr=200 cam=1 MeshTwee~  | 76   | 62    | 100    | 78 | 258  | 0.4    | 0.30 | 76.1 | 580  | 49.2 |
| -    | flee 1x1x1 dense float64 lr=200 cam=1 MeshTwee~  | 76   | 63    | 98     | 78 | 258  | 0.4    | 0.30 | 76.1 | 585  | 49.2 |
| -    | chase 2x2x2 dense float64 lr=2 cam=1 MeshTwee~   | 80   | 99    | 57     | 77 | 258  | 0.4    | 0.30 | 79.6 | 929  | 49.2 |
| -    | chase 1x1x1 dense float64 lr=2 cam=1 MeshTwee~   | 77   | 100   | 57     | 76 | 258  | 0.4    | 0.30 | 77.1 | 933  | 49.2 |
| -    | chase 3x3x3 dense float64 lr=2 cam=1 MeshTwee~   | 76   | 99    | 58     | 76 | 258  | 0.4    | 0.30 | 76.3 | 922  | 49.2 |
| -    | flee 1x1x1 dense float64 lr=1000 cam=1 MeshTwe~  | 80   | 56    | 98     | 76 | 258  | 0.4    | 0.29 | 79.5 | 522  | 49.2 |
| -    | flee 2x2x2 dense float64 lr=1000 cam=1 MeshTwe~  | 77   | 57    | 98     | 75 | 258  | 0.4    | 0.29 | 76.7 | 529  | 49.2 |
| -    | flee 3x3x3 dense float64 lr=1000 cam=1 MeshTwe~  | 75   | 56    | 99     | 75 | 258  | 0.4    | 0.29 | 75.0 | 524  | 49.2 |
| keep | flee 2x2x2 dense float64 lr=10000 cam=1 MeshTw~  | 81   | 50    | 100    | 74 | 258  | 0.4    | 0.29 | 81.4 | 469  | 49.2 |
| acc  | flee 1x1x1 dense float64 lr=2 cam=1 MeshTweenAlt | 98   | 57    | 71     | 73 | 258  | 0.4    | 0.28 | 97.7 | 528  | 49.2 |
| acc  | flee 3x3x3 dense float64 lr=2 cam=1 MeshTweenAlt | 97   | 56    | 70     | 73 | 258  | 0.4    | 0.28 | 97.4 | 526  | 49.2 |
| acc  | flee 2x2x2 dense float64 lr=0.02 cam=1 MeshTwe~  | 84   | 67    | 69     | 73 | 258  | 0.4    | 0.28 | 83.9 | 624  | 49.2 |
| acc  | flee 2x2x2 dense float64 lr=2 cam=1 MeshTweenAlt | 97   | 55    | 70     | 72 | 258  | 0.4    | 0.28 | 97.4 | 518  | 49.2 |
| acc  | flee 1x1x1 dense float64 lr=0.2 cam=1 MeshTwee~  | 88   | 61    | 70     | 72 | 258  | 0.4    | 0.28 | 87.9 | 567  | 49.2 |
| -    | flee 1x1x1 dense float64 lr=10000 cam=1 MeshTw~  | 72   | 52    | 100    | 72 | 258  | 0.4    | 0.28 | 71.7 | 481  | 49.2 |
| -    | flee 3x3x3 dense float64 lr=10000 cam=1 MeshTw~  | 71   | 50    | 100    | 71 | 258  | 0.4    | 0.28 | 71.2 | 469  | 49.2 |
| -    | flee 3x3x3 dense float64 lr=1e+06 cam=1 MeshTw~  | 76   | 45    | 99     | 70 | 258  | 0.4    | 0.27 | 76.4 | 423  | 49.2 |
| acc  | flee 2x2x2 dense float64 lr=0.2 cam=1 MeshTwee~  | 88   | 55    | 69     | 69 | 258  | 0.4    | 0.27 | 88.3 | 510  | 49.2 |

Consciousness rank - Q = geomean Acc/Thru/Avail keep

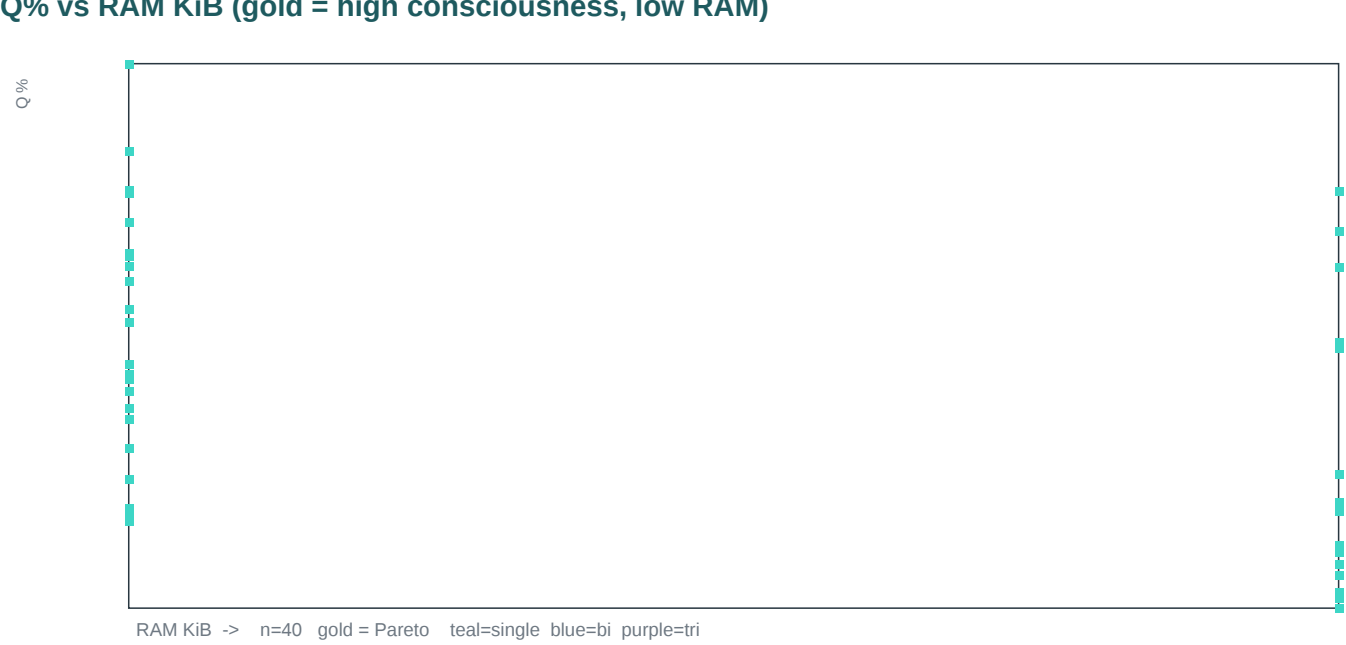
| Band | Cell                                               | Acc% | Thru% | Avail% | Q% | LPD  | Thru | Avail |
|------|----------------------------------------------------|------|-------|--------|----|------|------|-------|
| -    | flee 2x2x2 dense float64 lr=20 cam=1 MeshTweenAlt  | 78   | 69    | 99     | 81 | 0.32 | 647  | 85.4  |
| -    | flee 1x1x1 dense float64 lr=20 cam=1 MeshTweenAlt  | 70   | 70    | 99     | 79 | 0.31 | 656  | 85.2  |
| -    | flee 3x3x3 dense float64 lr=200 cam=1 MeshTweenAlt | 76   | 62    | 100    | 78 | 0.30 | 580  | 85.5  |
| -    | flee 1x1x1 dense float64 lr=20 cam=2 MeshTweenAlt  | 79   | 62    | 96     | 78 | 0.25 | 576  | 82.4  |

|   |                                                     |    |     |    |    |      |     |      |
|---|-----------------------------------------------------|----|-----|----|----|------|-----|------|
| - | flee 1x1x1 dense float64 lr=200 cam=1 MeshTweenAlt  | 76 | 63  | 98 | 78 | 0.30 | 585 | 84.6 |
| - | chase 2x2x2 dense float64 lr=2 cam=1 MeshTweenAlt   | 80 | 99  | 57 | 77 | 0.30 | 929 | 49.4 |
| - | flee 2x2x2 dense float64 lr=20 cam=2 MeshTweenAlt   | 76 | 61  | 97 | 77 | 0.24 | 570 | 83.2 |
| - | chase 1x1x1 dense float64 lr=2 cam=1 MeshTweenAlt   | 77 | 100 | 57 | 76 | 0.30 | 933 | 49.1 |
| - | chase 3x3x3 dense float64 lr=2 cam=1 MeshTweenAlt   | 76 | 99  | 58 | 76 | 0.30 | 922 | 50.1 |
| - | flee 1x1x1 dense float64 lr=1000 cam=1 MeshTweenAlt | 80 | 56  | 98 | 76 | 0.29 | 522 | 83.9 |

Acc keep % vs RAM KiB (gold = high Acc, low RAM vs Acc champ)

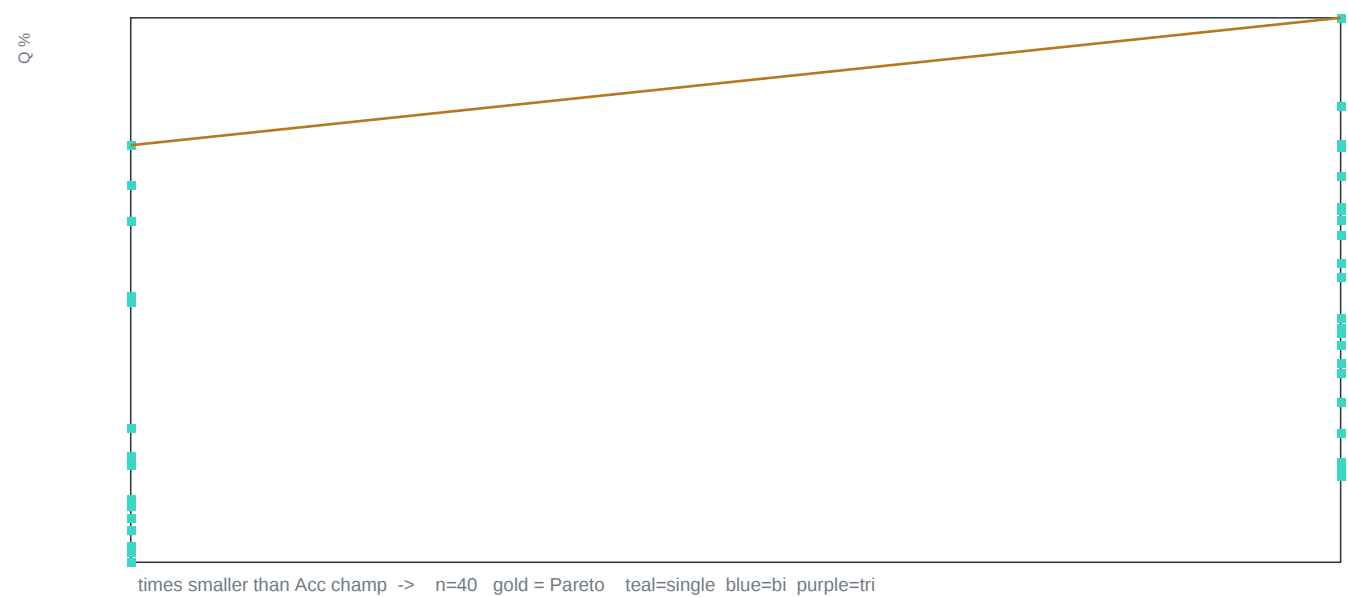


Q% vs RAM KiB (gold = high consciousness, low RAM)



Q% vs shrink vs Acc champ (gold = upper right)

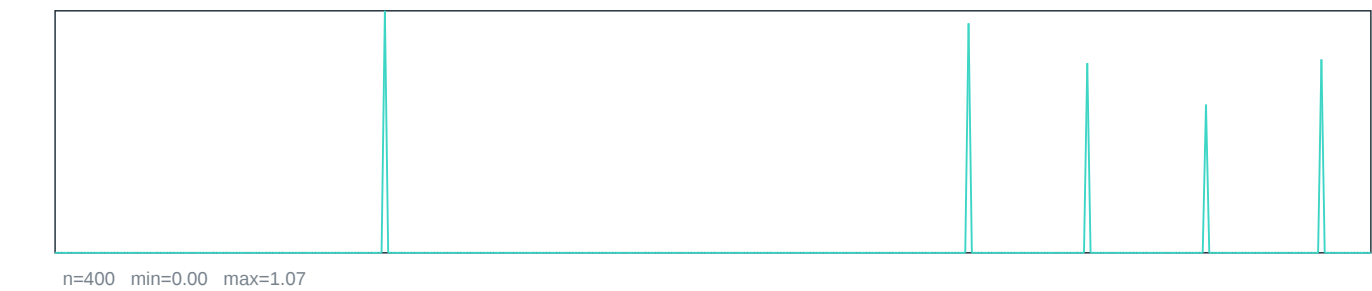
Q% vs shrink vs Acc champ (gold = upper right)



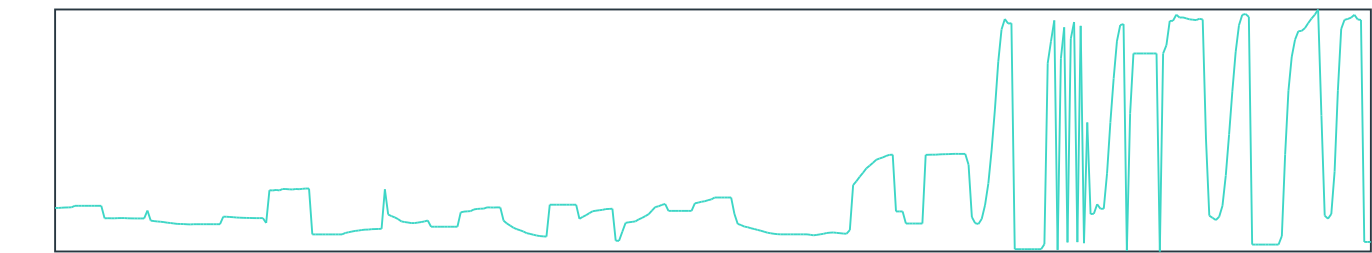
Top Lucy density (LPD)

|                                                      |     |
|------------------------------------------------------|-----|
| flee 2x2x2 dense float64 lr=20 cam=1 MeshTweenAlt    | 0.3 |
| flee 1x1x1 dense float64 lr=20 cam=1 MeshTweenAlt    | 0.3 |
| flee 3x3x3 dense float64 lr=200 cam=1 MeshTweenAlt   | 0.3 |
| flee 1x1x1 dense float64 lr=200 cam=1 MeshTweenAlt   | 0.3 |
| chase 2x2x2 dense float64 lr=2 cam=1 MeshTweenAlt    | 0.3 |
| chase 1x1x1 dense float64 lr=2 cam=1 MeshTweenAlt    | 0.3 |
| chase 3x3x3 dense float64 lr=2 cam=1 MeshTweenAlt    | 0.3 |
| flee 1x1x1 dense float64 lr=1000 cam=1 MeshTweenAlt  | 0.3 |
| flee 2x2x2 dense float64 lr=1000 cam=1 MeshTweenAlt  | 0.3 |
| flee 3x3x3 dense float64 lr=1000 cam=1 MeshTweenAlt  | 0.3 |
| flee 2x2x2 dense float64 lr=10000 cam=1 MeshTweenAlt | 0.3 |
| flee 1x1x1 dense float64 lr=2 cam=1 MeshTweenAlt     | 0.3 |
| flee 3x3x3 dense float64 lr=2 cam=1 MeshTweenAlt     | 0.3 |
| flee 2x2x2 dense float64 lr=0.02 cam=1 MeshTweenAlt  | 0.3 |
| flee 2x2x2 dense float64 lr=2 cam=1 MeshTweenAlt     | 0.3 |
| flee 1x1x1 dense float64 lr=0.2 cam=1 MeshTweenAlt   | 0.3 |

Pulse Score - test51

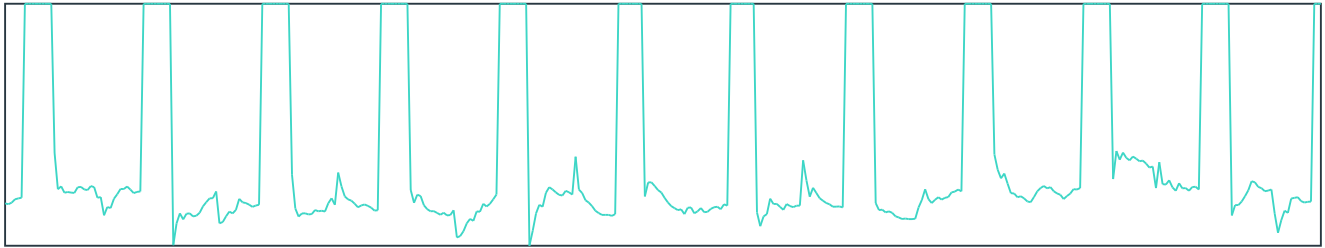


Pulse SoftAcc - test51



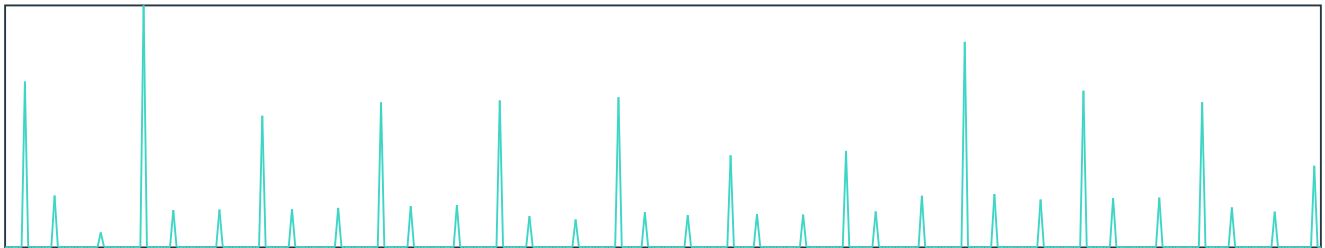
n=400 min=9.88 max=27.38

## Pulse Availability - test51



n=400 min=10.78 max=100.00

## Pulse Throughput - test51



n=400 min=4.00 max=2036.53

## Queue by train mode (this epoch)

| Mode                | Done | Run | Left  | Total |
|---------------------|------|-----|-------|-------|
| Mesh[T]Alt          | 1677 | 1   | 10562 | 12240 |
| Mesh[T][S][FP]      | 0    | 0   | 12240 | 12240 |
| Mesh[T][S]Sparse    | 0    | 0   | 12240 | 12240 |
| Step[T][S][HP]      | 0    | 0   | 12240 | 12240 |
| Step[T][S][L]       | 0    | 0   | 12240 | 12240 |
| Step[T][S][FP]      | 0    | 0   | 12240 | 12240 |
| Step[T][S][L]Cache  | 0    | 0   | 12240 | 12240 |
| Step[T][S][HP]Async | 0    | 0   | 12240 | 12240 |
| Step[T][S]Sparse    | 0    | 0   | 12240 | 12240 |

# tide test51

Lucy Score = Throughput x Availability x Acc / 10,000. LPD condenses live-fit vs Acc-champ RAM.

[T]=Tween [S]=Split [FP]=FastProxy [L]=Linear [HP]=HeadProxy

running - epoch 1 - lr 0.05 - 2026-08-25 09:47:21 - 0.0.0.0:8080

This epoch 1745 / 122400 cells. Recorded 1745 results. Learning rate 0.05.

Score 0 usually means the cell finished before a Lucy pulse (Acc never sampled). Score is live-fit: Throughput x Availability x Acc.

SGD that blocks serve dies on Availability. SoftAcc is serve-confidence only.

think-race host - tree sweep feeds Tide Lucy reports

## Lucy champions (this tide)

| Axis                | Cell                                                     | Score   | Soft | Acc   | Thru   | Avail |
|---------------------|----------------------------------------------------------|---------|------|-------|--------|-------|
| hard acc            | teleport 2x2x2 dense bfloat16 lr=20 cam=2 StepTweenSplit | 5.34    | 89.9 | 95.2  | 6.5    | 86.1  |
| throughput          | chase 1x1x1 dense float64 lr=0.02 cam=1 StepTweenSplit   | 527.88  | 13.9 | 22.7  | 2507.3 | 92.8  |
| availability        | shock 2x2x2 dense bfloat16 lr=10000 cam=2 StepTweenSplit | 0.27    | 0.8  | 5.6   | 4.9    | 100.0 |
| lucy score          | chase 1x1x1 dense float64 lr=2 cam=1 StepTweenSplit      | 1264.68 | 21.0 | 73.9  | 1882.9 | 90.9  |
| mobile score (trap) | chase 1x1x1 dense float64 lr=2 cam=1 StepTweenSplit      | 1264.68 | 21.0 | 73.9  | 1882.9 | 90.9  |
| acc/sec             | flee 1x1x1 dense bfloat16 lr=0.02 cam=1 StepTweenSplit   | 7.37    | 13.2 | 100.0 | 8.7    | 85.2  |

## Lucy axes - test51

| Axis         | Mode       | DType    | Arch         | Value    |
|--------------|------------|----------|--------------|----------|
| hard_acc     | Step[T][S] | float16  | bicameralx2  | 100.00   |
| throughput   | Step[T][S] | float64  | singlex1     | 2507.30  |
| availability | Step[T][S] | bfloat16 | bicameralx2  | 100.00   |
| score        | Step[T][S] | float64  | singlex1     | 1264.68  |
| soft_acc     | Step[T][S] | bfloat16 | bicameralx2  | 89.95    |
| acc_thru     | Step[T][S] | float64  | singlex1     | 1390.61  |
| realtime     | Step[T][S] | float64  | singlex1     | 2328.46  |
| keep_learn   | Step[T][S] | bfloat16 | singlex1     | 33.29    |
| acc_per_sec  | Step[T][S] | bfloat16 | singlex1     | 33.29    |
| consistency  | Step[T][S] | float64  | singlex1     | 100.00   |
| stability    | Step[T][S] | fp8e4m3  | tricameralx3 | 100.00   |
| mobile_score | Step[T][S] | float64  | singlex1     | 26295.13 |
| lpd          | Step[T][S] | float64  | singlex1     | 0.34     |
| mspeed       | Step[T][S] | float64  | singlex1     | 1.00     |
| mavail       | Step[T][S] | float64  | singlex1     | 1.00     |
| mix          | Step[T][S] | float64  | singlex1     | 0.88     |
| gold_std     | Step[T][S] | fp8e4m3  | singlex1     | 12.31    |

## Best settings per train mode

| Mode       | DType   | Format | Score  | Soft | Acc  | Avail | n    |
|------------|---------|--------|--------|------|------|-------|------|
| Step[T][S] | float64 | none   | 1264.7 | 21.0 | 73.9 | 90.9  | 1745 |

## Best dtype per mode

| Mode       | Winner dtype | Score  | Soft | Acc  |
|------------|--------------|--------|------|------|
| Step[T][S] | float64      | 1264.7 | 21.0 | 73.9 |

## Best mode per dtype

| DType    | Winner mode | Score  | Soft | Acc   |
|----------|-------------|--------|------|-------|
| float64  | Step[T][S]  | 1264.7 | 21.0 | 73.9  |
| float32  | Step[T][S]  | 61.0   | 23.5 | 83.3  |
| float16  | Step[T][S]  | 16.0   | 13.0 | 98.2  |
| bfloat16 | Step[T][S]  | 8.1    | 12.9 | 100.0 |

|         |            |     |      |      |
|---------|------------|-----|------|------|
| fp8e4m3 | Step[T][S] | 4.0 | 22.9 | 88.9 |
|---------|------------|-----|------|------|

Leaderboard - test51

| #  | Cell                                                  | Score  | Soft | Acc  | Thru   | Avail |
|----|-------------------------------------------------------|--------|------|------|--------|-------|
| 1  | chase 1x1x1 dense float64 lr=2 cam=1 StepTweenSplit   | 1264.7 | 21.0 | 73.9 | 1882.9 | 90.9  |
| 2  | chase 3x3x3 dense float64 lr=2 cam=1 StepTweenSplit   | 1218.4 | 21.3 | 76.9 | 1751.8 | 90.4  |
| 3  | chase 2x2x2 dense float64 lr=2 cam=1 StepTweenSplit   | 1101.9 | 22.2 | 78.4 | 1545.6 | 90.9  |
| 4  | chase 1x1x1 dense float64 lr=0.2 cam=1 StepTweenSplit | 1018.3 | 15.8 | 46.3 | 2338.0 | 94.1  |
| 5  | chase 2x2x2 dense float64 lr=0.2 cam=1 StepTweenSplit | 993.0  | 15.9 | 46.7 | 2265.9 | 93.9  |
| 6  | chase 3x3x3 dense float64 lr=0.2 cam=2 StepTweenSplit | 873.2  | 16.5 | 50.4 | 1850.7 | 93.6  |
| 7  | flee 2x2x2 dense float64 lr=0.02 cam=1 StepTweenSplit | 800.4  | 17.5 | 81.6 | 1012.5 | 96.8  |
| 8  | chase 3x3x3 dense float64 lr=0.2 cam=1 StepTweenSplit | 795.5  | 16.3 | 48.7 | 1740.8 | 93.8  |
| 9  | flee 2x2x2 dense float64 lr=2 cam=1 StepTweenSplit    | 753.4  | 27.1 | 97.1 | 797.4  | 97.3  |
| 10 | flee 3x3x3 dense float64 lr=2 cam=1 StepTweenSplit    | 741.5  | 27.1 | 97.2 | 783.8  | 97.3  |
| 11 | flee 1x1x1 dense float64 lr=2 cam=1 StepTweenSplit    | 733.8  | 26.8 | 96.0 | 787.8  | 97.0  |
| 12 | flee 2x2x2 dense float64 lr=0.2 cam=1 StepTweenSplit  | 714.8  | 21.3 | 81.7 | 899.2  | 97.3  |
| 13 | chase 1x1x1 dense float64 lr=0.2 cam=3 StepTweenSplit | 695.6  | 16.5 | 50.8 | 1492.7 | 91.7  |
| 14 | flee 3x3x3 dense float64 lr=0.2 cam=1 StepTweenSplit  | 679.2  | 20.9 | 79.3 | 881.5  | 97.2  |
| 15 | flee 1x1x1 dense float64 lr=2 cam=2 StepTweenSplit    | 675.8  | 27.2 | 97.3 | 718.2  | 96.7  |
| 16 | flee 2x2x2 dense float64 lr=2 cam=2 StepTweenSplit    | 668.8  | 27.4 | 97.5 | 708.8  | 96.8  |
| 17 | flee 3x3x3 dense float64 lr=2 cam=2 StepTweenSplit    | 663.8  | 27.0 | 96.8 | 709.2  | 96.6  |
| 18 | chase 2x2x2 dense float64 lr=0.2 cam=3 StepTweenSplit | 656.8  | 16.1 | 48.3 | 1475.4 | 92.1  |
| 19 | flee 1x1x1 dense float64 lr=0.2 cam=2 StepTweenSplit  | 654.4  | 23.1 | 84.1 | 806.5  | 96.5  |
| 20 | flee 1x1x1 dense float64 lr=0.02 cam=1 StepTweenSplit | 651.6  | 15.9 | 66.7 | 1006.2 | 97.1  |

Top scores - test51



Top scores - test51



Mean Score by train mode



Mean hard Acc by train mode



Mean SoftAcc by train mode



Mean Availability by train mode



Mean Throughput by train mode



Mean Score by dtype



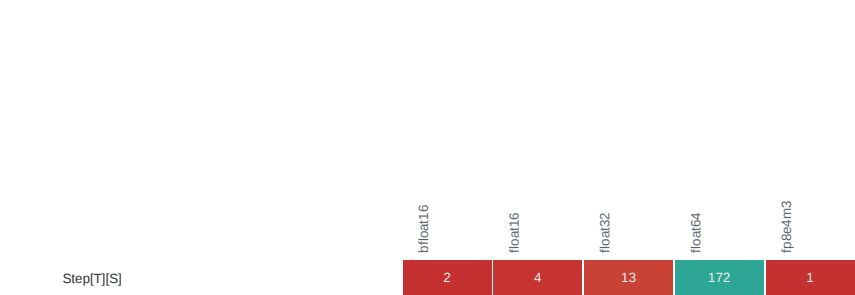
Mean hard Acc by dtype



Mean Score by arch



Honesty - mean Score, every mode x dtype



Honesty - mean hard Acc, every mode x dtype

Honesty - mean hard Acc, every mode x dtype

|             |          |         |         |         |         |
|-------------|----------|---------|---------|---------|---------|
|             | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
| Step[TJ][S] | 28       | 27      | 32      | 37      | 21      |

Honesty - mean SoftAcc, every mode x dtype

|             |          |         |         |         |         |
|-------------|----------|---------|---------|---------|---------|
|             | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
| Step[TJ][S] | 14       | 7       | 7       | 7       | 13      |

Honesty - mean Avail, every mode x dtype

|             |          |         |         |         |         |
|-------------|----------|---------|---------|---------|---------|
|             | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
| Step[TJ][S] | 86       | 84      | 95      | 96      | 72      |

Mean Score, every mode x arch

|             |             |          |              |
|-------------|-------------|----------|--------------|
|             | bicameralx2 | singlex1 | tricameralx3 |
| Step[TJ][S] | 39          | 45       | 34           |

Mean hard Acc, every mode x arch

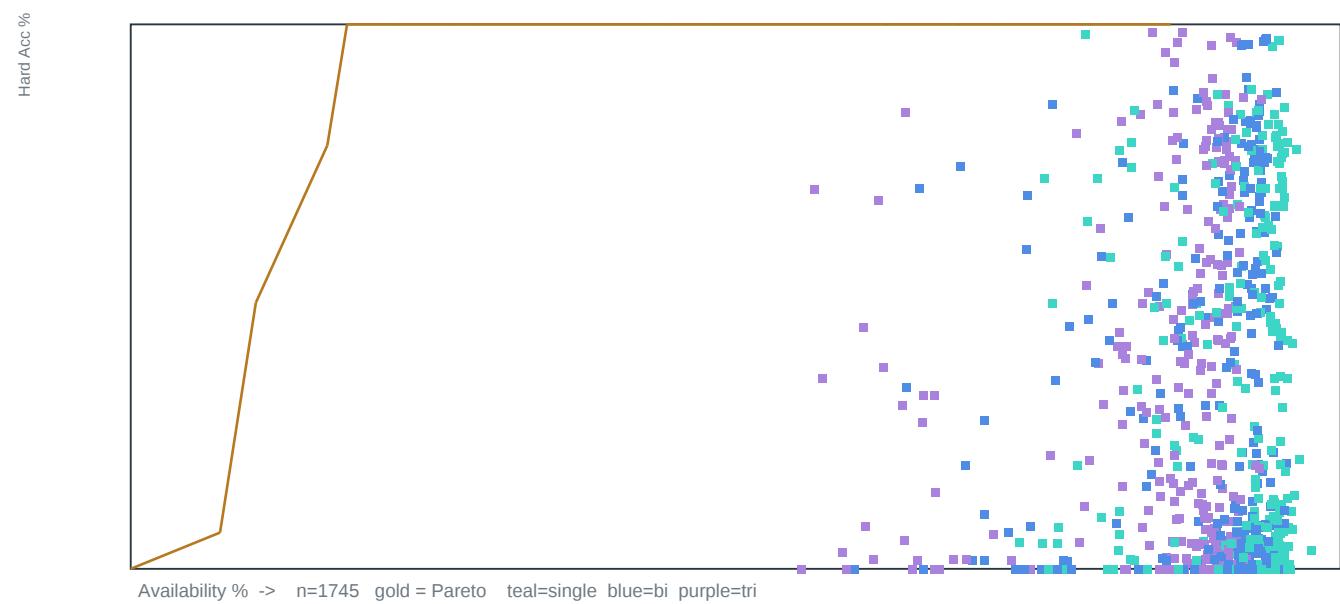
|             |             |          |              |
|-------------|-------------|----------|--------------|
|             | bicameralx2 | singlex1 | tricameralx3 |
| Step[TJ][S] | 31          | 27       | 31           |

Mean Avail, every mode x arch

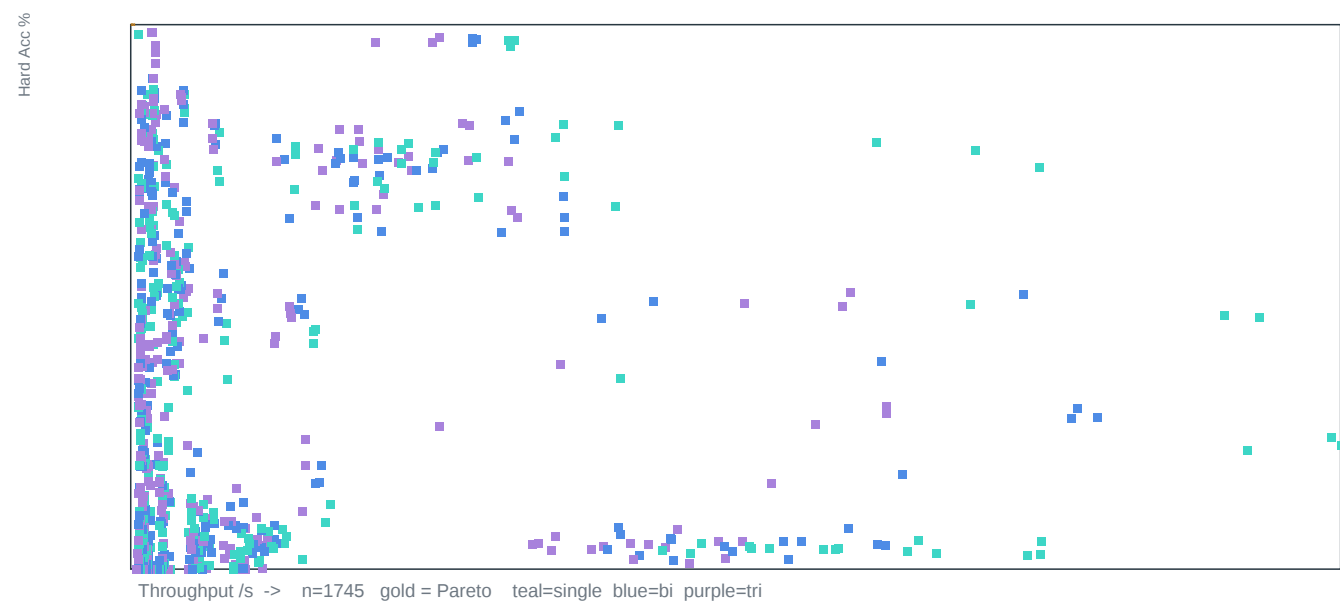
Mean Avail, every mode x arch



Pillars - Availability vs hard Acc

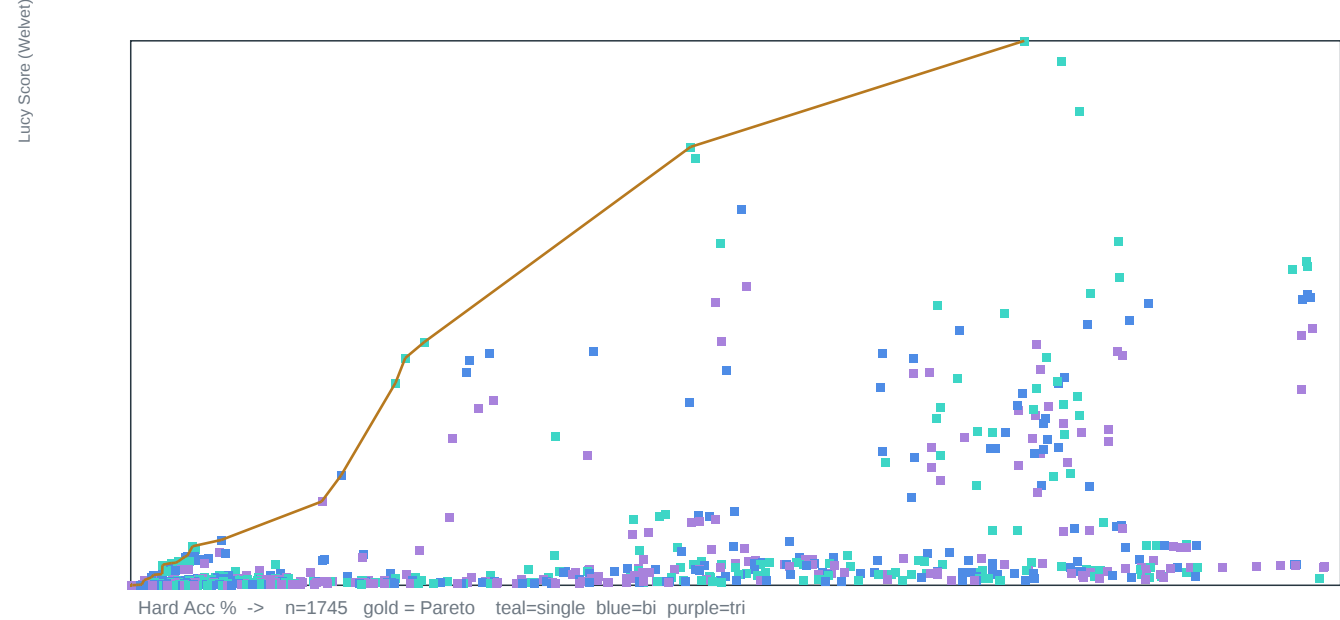


Pillars - Throughput vs hard Acc

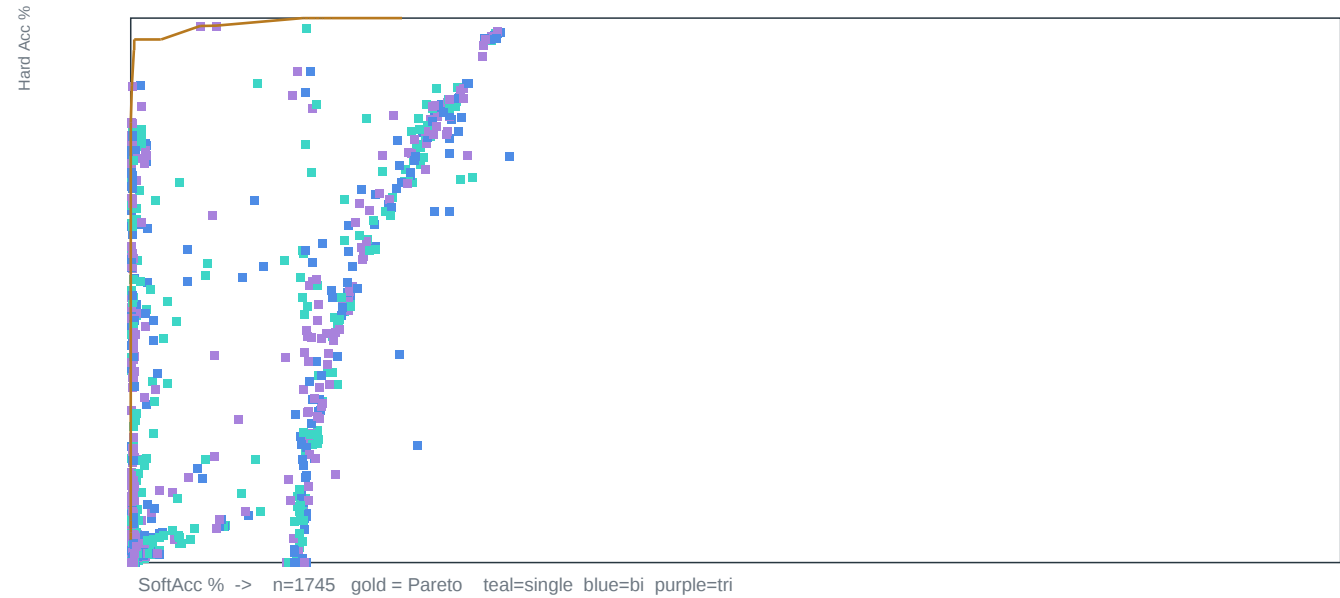


Pareto - hard Acc vs Lucy Score

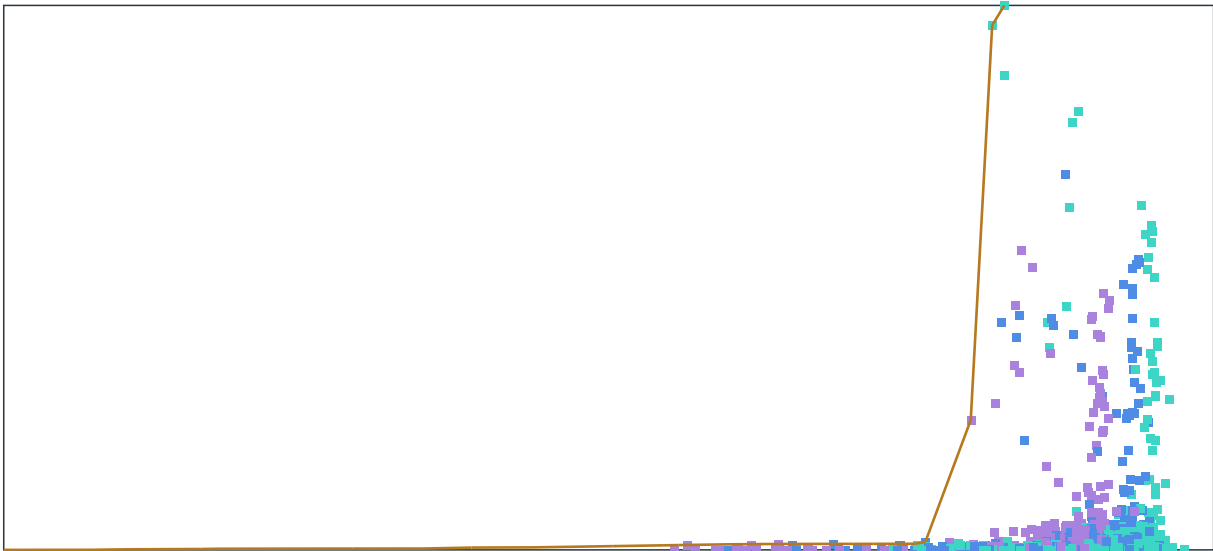
Pareto - hard Acc vs Lucy Score



SoftAcc (serve-confidence) vs hard Acc

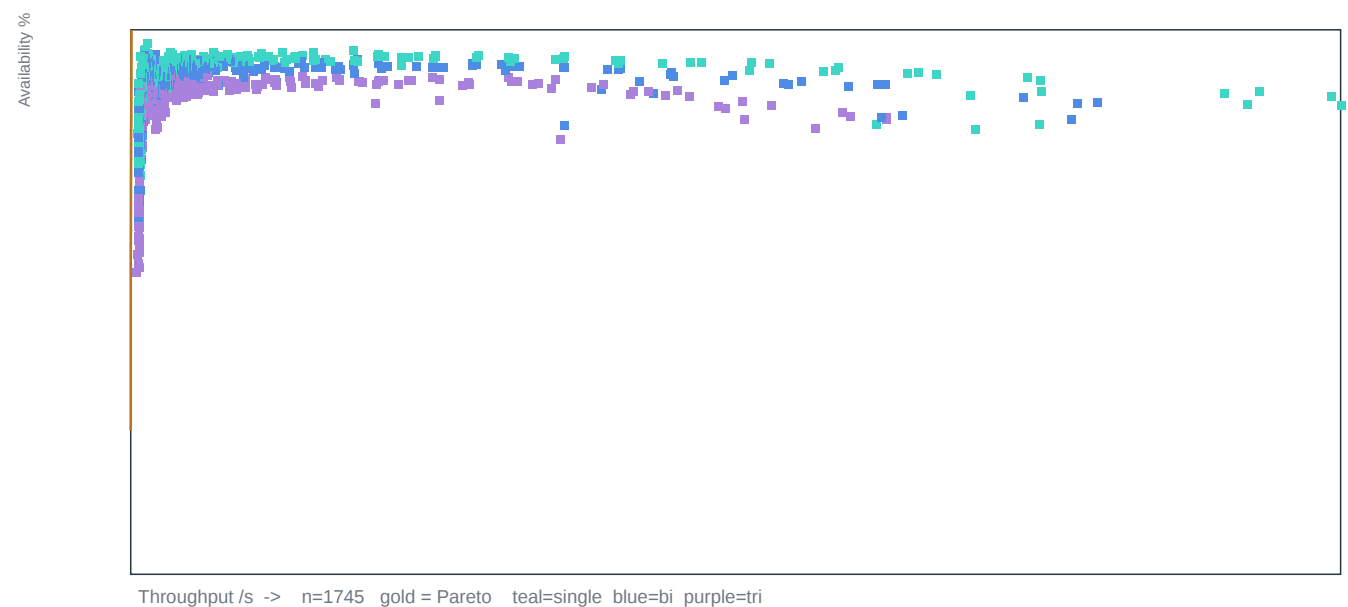


Avail vs Lucy Score (duty clock)



Lucy Score

Pillars - Throughput vs Availability



Consciousness - Acc, Throughput, Availability

Synthetic organism / Lucy density: can the net run and train at the same time in a small box. Lucy Score = Throughput x Availability x Acc / 10,000 (hard Acc; SoftAcc is serve-confidence only). SGD that blocks serve dies on Availability. Q = geomean Acc/Thru/Avail vs learner peaks (traps do not set Thru/Avail). LPD = Q x shrink vs Acc-champ RAM; 0 unless Acc keep >=70%. Gold = all 3 pillars >=80% at <=20% Acc-champ RAM. Gold-std = Acc >=80% plus Thru or Avail, then smallest then fastest. Score/MiB is the binary trap.

Acc champ flee|3x3x3|dense|fp8e4m3|lr=2|cam=3|StepTweenSplit Acc 100.0 Thru 5 Avail 65.8% 19.1 KiB (RAM reference)

Lucy Score champ (T x Avail x Acc) chase|1x1x1|dense|float64|lr=2|cam=1|StepTweenSplit Score 1264.7 Acc 73.9 Soft 21 49.2 KiB

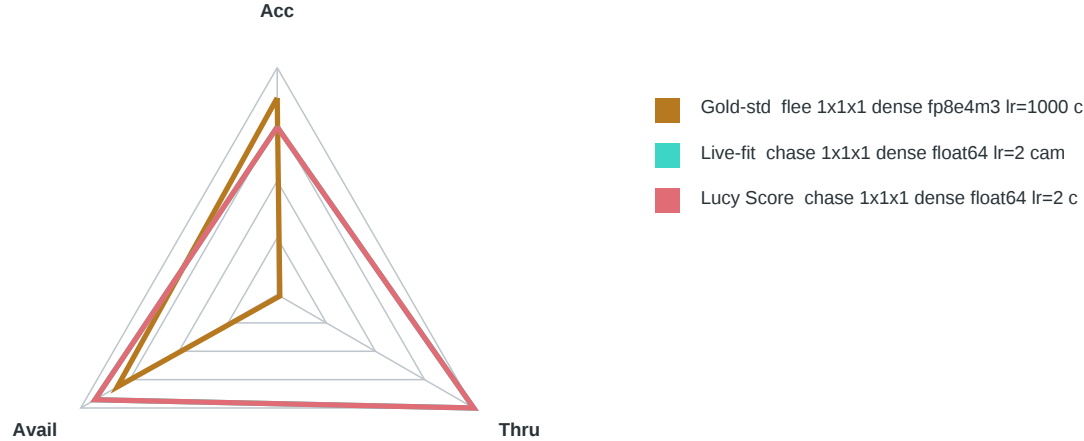
Live-fit champ (best Q) chase|1x1x1|dense|float64|lr=2|cam=1|StepTweenSplit Acc 73.9 Thru 1883 Avail 90.9% 49.2 KiB

Gold-std (2+ pillars, Acc keep >= 80%, then smallest then fastest): flee|1x1x1|dense|fp8e4m3|lr=1000|cam=1|StepTweenSplit mode Step[T][S] Acc 86.7 Thru 5 12.3 KiB

Board fastest chase|1x1x1|dense|float64|lr=0.02|cam=1|StepTweenSplit Thru 2507 (traps may own this) Best availability shock|2x2x2|dense|bfloat16|lr=10000|cam=2|StepTweenSplit 100.0%

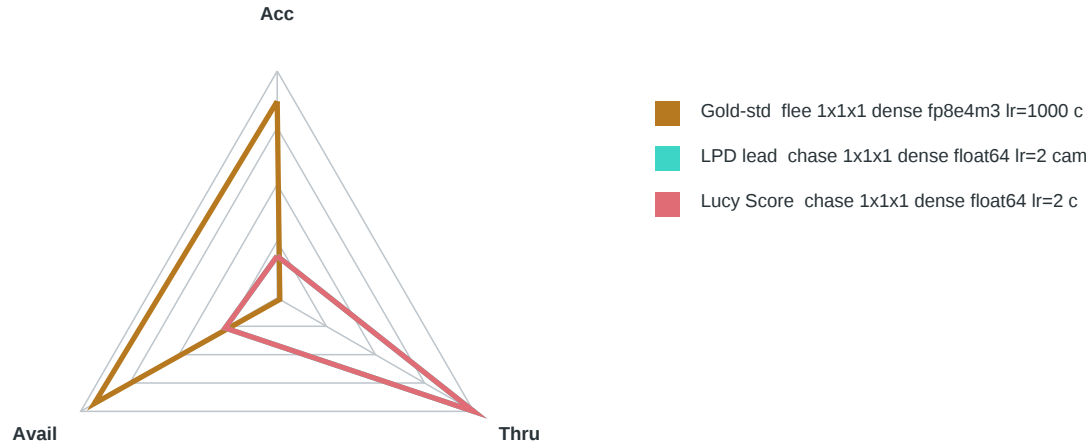
Learner Thru peak 1883 learner Avail peak 98.1%

Consciousness radar - Acc / Thru / Avail vs learner peaks



Memory density radar - same pillars x shrink vs Acc champ (traps sit at origin)

Memory density radar - same pillars x shrink vs Acc champ (traps sit at origin)



No gold cell yet. Need all three pillars at 80% of learner peaks in one fifth of Acc-champ RAM.

Gold-standard train modes - 2+ pillars, Acc keep >= 80%, smallest then fastest

| Mode       | n   | Acc   | KiB  | Thru | Cell                                                              |
|------------|-----|-------|------|------|-------------------------------------------------------------------|
| Step[T][S] | 131 | 100.0 | 12.3 | 1013 | flee 1x1x1 dense fp8e4m3 lr=1000 cam=1 StepTweenSplit / flee 2x2~ |

Lucy density (LPD) - Q x shrink vs Acc-champ RAM; 0 if Acc keep < 70%

| Band | Cell                                             | Acc% | Thru% | Avail% | Q% | RAM% | xSmall | LPD  | Acc  | Thru | KiB  |
|------|--------------------------------------------------|------|-------|--------|----|------|--------|------|------|------|------|
| -    | chase 1x1x1 dense float64 lr=2 cam=1 StepTween~  | 74   | 100   | 93     | 88 | 258  | 0.4    | 0.34 | 73.9 | 1883 | 49.2 |
| -    | chase 3x3x3 dense float64 lr=2 cam=1 StepTween~  | 77   | 93    | 92     | 87 | 258  | 0.4    | 0.34 | 76.9 | 1752 | 49.2 |
| -    | chase 2x2x2 dense float64 lr=2 cam=1 StepTween~  | 78   | 82    | 93     | 84 | 258  | 0.4    | 0.33 | 78.4 | 1546 | 49.2 |
| keep | flee 2x2x2 dense float64 lr=0.02 cam=1 StepTwee~ | 82   | 54    | 99     | 76 | 258  | 0.4    | 0.29 | 81.6 | 1013 | 49.2 |
| keep | flee 2x2x2 dense float64 lr=2 cam=1 StepTweenS~  | 97   | 42    | 99     | 74 | 258  | 0.4    | 0.29 | 97.1 | 797  | 49.2 |
| keep | flee 3x3x3 dense float64 lr=2 cam=1 StepTweenS~  | 97   | 42    | 99     | 74 | 258  | 0.4    | 0.29 | 97.2 | 784  | 49.2 |
| keep | flee 1x1x1 dense float64 lr=2 cam=1 StepTweenS~  | 96   | 42    | 99     | 74 | 258  | 0.4    | 0.29 | 96.0 | 788  | 49.2 |
| keep | flee 2x2x2 dense float64 lr=0.2 cam=1 StepTween~ | 82   | 48    | 99     | 73 | 258  | 0.4    | 0.28 | 81.7 | 899  | 49.2 |
| -    | flee 3x3x3 dense float64 lr=0.2 cam=1 StepTween~ | 79   | 47    | 99     | 72 | 258  | 0.4    | 0.28 | 79.3 | 882  | 49.2 |
| -    | flee 1x1x1 dense float64 lr=0.2 cam=1 StepTween~ | 72   | 48    | 99     | 70 | 258  | 0.4    | 0.27 | 72.2 | 900  | 49.2 |
| -    | flee 2x2x2 dense float64 lr=20 cam=1 StepTween~  | 76   | 38    | 99     | 66 | 258  | 0.4    | 0.26 | 75.6 | 719  | 49.2 |
| -    | flee 3x3x3 dense float64 lr=200 cam=1 StepTween~ | 77   | 34    | 99     | 64 | 258  | 0.4    | 0.25 | 76.6 | 634  | 49.2 |
| -    | flee 1x1x1 dense float64 lr=200 cam=1 StepTween~ | 75   | 33    | 99     | 63 | 258  | 0.4    | 0.24 | 74.8 | 629  | 49.2 |
| -    | flee 1x1x1 dense float64 lr=1000 cam=1 StepTwee~ | 78   | 31    | 99     | 62 | 258  | 0.4    | 0.24 | 78.2 | 576  | 49.2 |
| -    | flee 2x2x2 dense float64 lr=1000 cam=1 StepTwee~ | 77   | 30    | 98     | 61 | 258  | 0.4    | 0.24 | 77.1 | 564  | 49.2 |
| -    | flee 3x3x3 dense float64 lr=1000 cam=1 StepTwee~ | 75   | 30    | 99     | 61 | 258  | 0.4    | 0.23 | 74.6 | 563  | 49.2 |
| -    | flee 2x2x2 dense float64 lr=10000 cam=1 StepTwe~ | 78   | 27    | 100    | 60 | 258  | 0.4    | 0.23 | 78.4 | 516  | 49.2 |
| keep | flee 1x1x1 dense float64 lr=2 cam=2 StepTweenS~  | 97   | 38    | 99     | 72 | 316  | 0.3    | 0.23 | 97.3 | 718  | 60.5 |
| keep | flee 2x2x2 dense float64 lr=2 cam=2 StepTweenS~  | 98   | 38    | 99     | 71 | 316  | 0.3    | 0.23 | 97.5 | 709  | 60.5 |
| keep | flee 3x3x3 dense float64 lr=2 cam=2 StepTweenS~  | 97   | 38    | 99     | 71 | 316  | 0.3    | 0.22 | 96.8 | 709  | 60.5 |

Consciousness rank - Q = geomean Acc/Thru/Avail keep

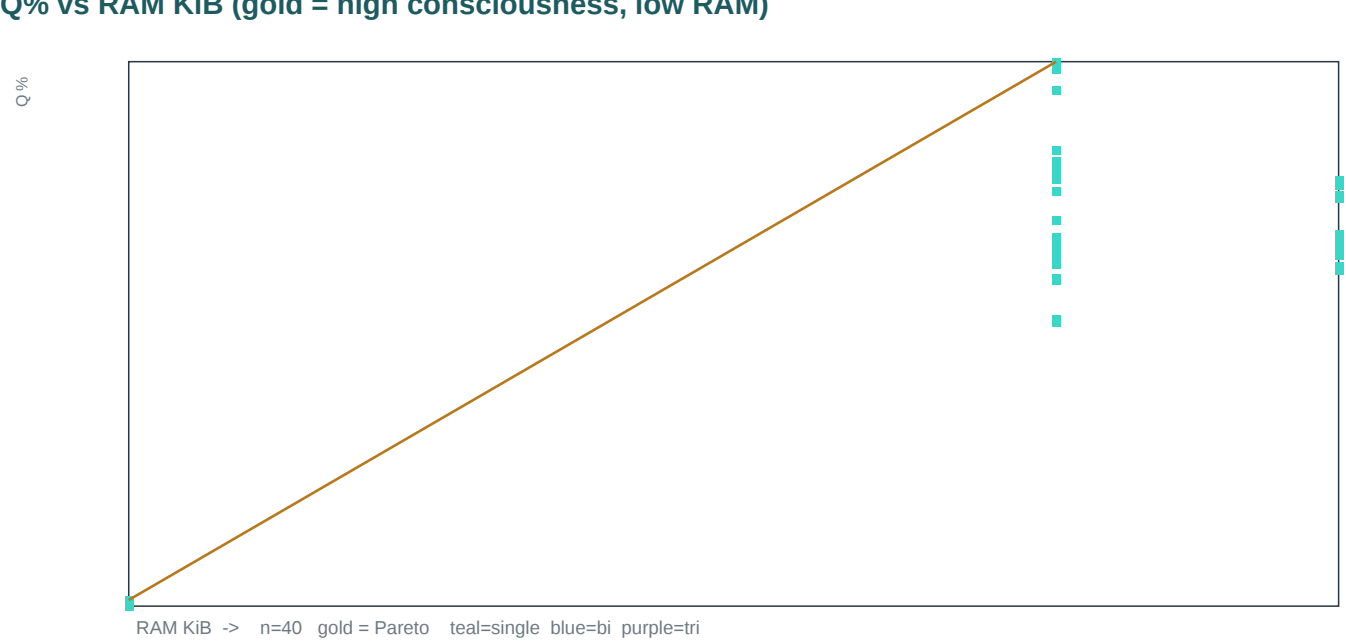
| Band | Cell                                                  | Acc% | Thru% | Avail% | Q% | LPD  | Thru | Avail |
|------|-------------------------------------------------------|------|-------|--------|----|------|------|-------|
| -    | chase 1x1x1 dense float64 lr=2 cam=1 StepTweenSplit   | 74   | 100   | 93     | 88 | 0.34 | 1883 | 90.9  |
| -    | chase 3x3x3 dense float64 lr=2 cam=1 StepTweenSplit   | 77   | 93    | 92     | 87 | 0.34 | 1752 | 90.4  |
| -    | chase 2x2x2 dense float64 lr=2 cam=1 StepTweenSplit   | 78   | 82    | 93     | 84 | 0.33 | 1546 | 90.9  |
| keep | flee 2x2x2 dense float64 lr=0.02 cam=1 StepTweenSplit | 82   | 54    | 99     | 76 | 0.29 | 1013 | 96.8  |

|      |                                                      |    |    |    |    |      |     |      |
|------|------------------------------------------------------|----|----|----|----|------|-----|------|
| keep | flee 2x2x2 dense float64 lr=2 cam=1 StepTweenSplit   | 97 | 42 | 99 | 74 | 0.29 | 797 | 97.3 |
| keep | flee 3x3x3 dense float64 lr=2 cam=1 StepTweenSplit   | 97 | 42 | 99 | 74 | 0.29 | 784 | 97.3 |
| keep | flee 1x1x1 dense float64 lr=2 cam=1 StepTweenSplit   | 96 | 42 | 99 | 74 | 0.29 | 788 | 97.0 |
| keep | flee 2x2x2 dense float64 lr=0.2 cam=1 StepTweenSplit | 82 | 48 | 99 | 73 | 0.28 | 899 | 97.3 |
| -    | flee 3x3x3 dense float64 lr=0.2 cam=1 StepTweenSplit | 79 | 47 | 99 | 72 | 0.28 | 882 | 97.2 |
| keep | flee 1x1x1 dense float64 lr=2 cam=2 StepTweenSplit   | 97 | 38 | 99 | 72 | 0.23 | 718 | 96.7 |

Acc keep % vs RAM KiB (gold = high Acc, low RAM vs Acc champ)



Q% vs RAM KiB (gold = high consciousness, low RAM)

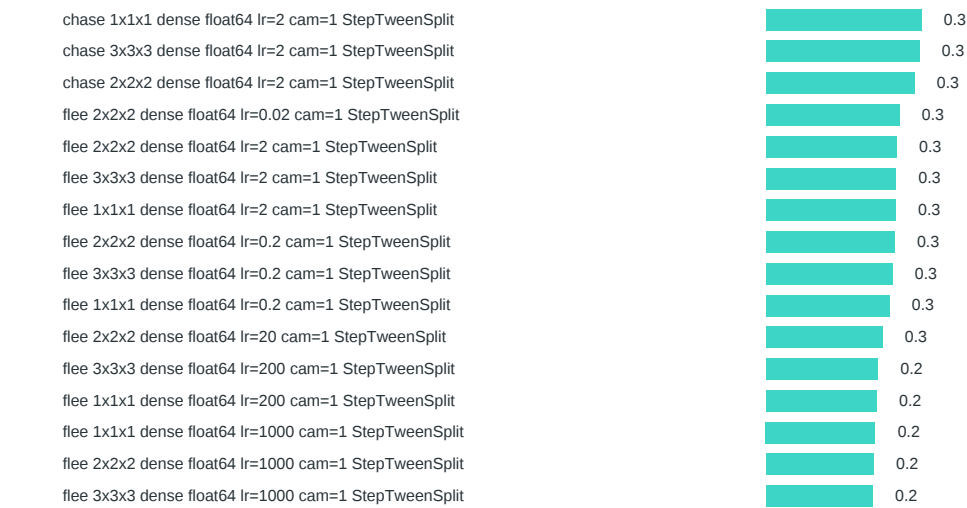


Q% vs shrink vs Acc champ (gold = upper right)

Q% vs shrink vs Acc champ (gold = upper right)



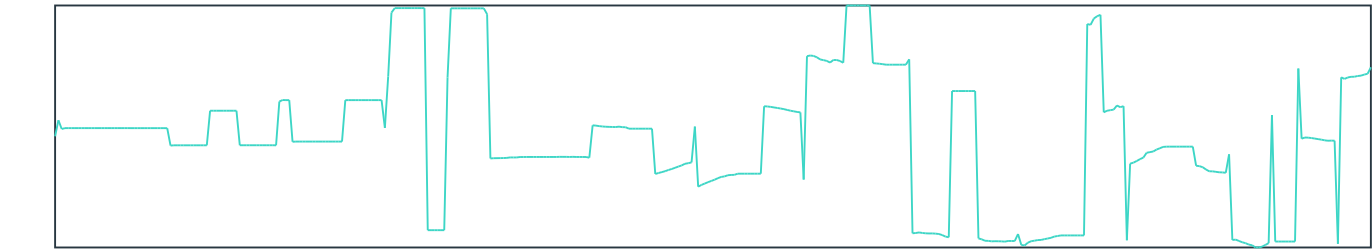
Top Lucy density (LPD)



Pulse Score - test51

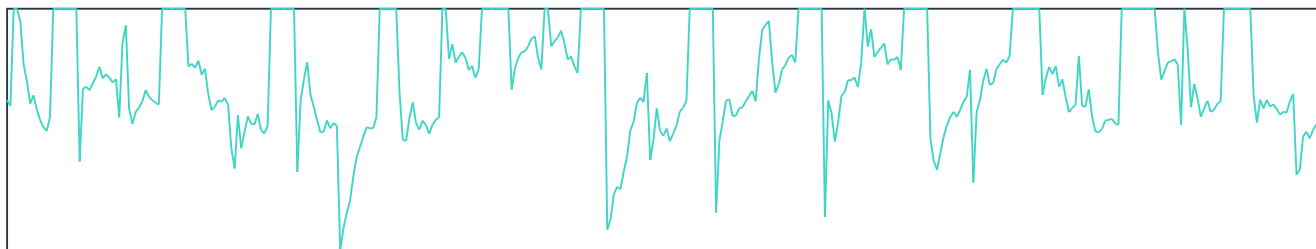


Pulse SoftAcc - test51



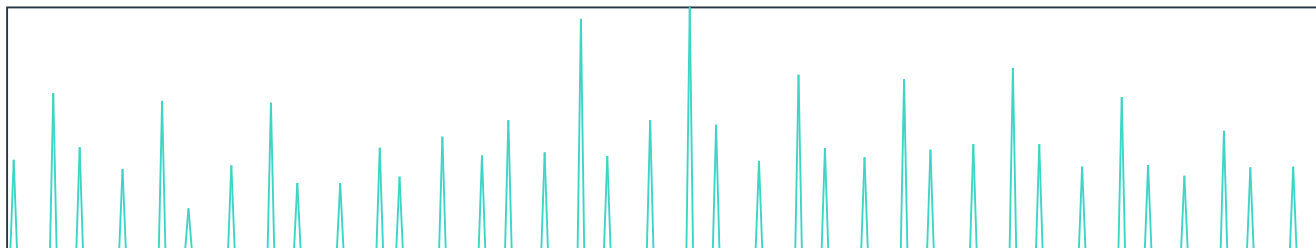
n=400 min=10.89 max=14.12

## Pulse Availability - test51



n=400 min=21.34 max=100.00

## Pulse Throughput - test51



n=400 min=3.33 max=2019.46

## Queue by train mode (this epoch)

| Mode            | Done | Run | Left  | Total |
|-----------------|------|-----|-------|-------|
| Step[T][S]      | 1745 | 1   | 10494 | 12240 |
| [T]Alt          | 0    | 0   | 12240 | 12240 |
| Step[T]Alt      | 0    | 0   | 12240 | 12240 |
| [T][S][HP]      | 0    | 0   | 12240 | 12240 |
| [T][S][L]       | 0    | 0   | 12240 | 12240 |
| [T][S][FP]      | 0    | 0   | 12240 | 12240 |
| [T][S][L]Cache  | 0    | 0   | 12240 | 12240 |
| [T][S][HP]Async | 0    | 0   | 12240 | 12240 |
| [T][S]Sparse    | 0    | 0   | 12240 | 12240 |
| Mesh[T][S]      | 0    | 0   | 12240 | 12240 |

# tide test51

Lucy Score = Throughput x Availability x Acc / 10,000. LPD condenses live-fit vs Acc-champ RAM.

[T]=Tween [S]=Split [FP]=FastProxy [L]=Linear [HP]=HeadProxy

running - epoch 1 - lr 0.05 - 2026-08-25 09:47:21 - 0.0.0.0:8080

This epoch 1766 / 122400 cells. Recorded 1766 results. Learning rate 0.05.

Score 0 usually means the cell finished before a Lucy pulse (Acc never sampled). Score is live-fit: Throughput x Availability x Acc.

SGD that blocks serve dies on Availability. SoftAcc is serve-confidence only.

think-race host - tree sweep feeds Tide Lucy reports

## Lucy champions (this tide)

| Axis                | Cell                                                | Score  | Soft | Acc   | Thru   | Avail |
|---------------------|-----------------------------------------------------|--------|------|-------|--------|-------|
| hard acc            | flee 1x1x1 dense fp8e4m3 lr=200 cam=1 NormalBP      | 2.11   | 90.1 | 93.3  | 4.5    | 50.3  |
| throughput          | chase 1x1x1 dense float64 lr=0.02 cam=1 NormalBP    | 385.30 | 14.0 | 29.6  | 1679.6 | 77.5  |
| availability        | teleport 3x3x3 dense float32 lr=0.02 cam=1 NormalBP | 8.82   | 13.0 | 29.4  | 33.9   | 88.5  |
| lucy score          | chase 2x2x2 dense float64 lr=2 cam=1 NormalBP       | 728.12 | 18.3 | 61.1  | 1495.7 | 79.7  |
| mobile score (trap) | chase 2x2x2 dense float64 lr=2 cam=1 NormalBP       | 728.12 | 18.3 | 61.1  | 1495.7 | 79.7  |
| acc/sec             | teleport 3x3x3 dense float16 lr=0.2 cam=2 NormalBP  | 6.50   | 22.9 | 100.0 | 12.7   | 51.3  |

## Lucy axes - test51

| Axis         | Mode | DType   | Arch         | Value    |
|--------------|------|---------|--------------|----------|
| hard_acc     | sgd  | float16 | singlex1     | 100.00   |
| throughput   | sgd  | float64 | singlex1     | 1679.56  |
| availability | sgd  | float32 | singlex1     | 88.54    |
| score        | sgd  | float64 | singlex1     | 728.12   |
| soft_acc     | sgd  | fp8e4m3 | singlex1     | 90.09    |
| acc_thru     | sgd  | float64 | singlex1     | 913.33   |
| realtime     | sgd  | float64 | singlex1     | 1300.93  |
| keep_learn   | sgd  | float16 | bicameralx2  | 33.30    |
| acc_per_sec  | sgd  | float16 | bicameralx2  | 33.30    |
| consistency  | sgd  | float64 | singlex1     | 100.00   |
| stability    | sgd  | fp8e4m3 | bicameralx2  | 100.00   |
| mobile_score | sgd  | float64 | singlex1     | 15138.89 |
| lpd          | sgd  | float64 | singlex1     | 0.29     |
| mspeed       | sgd  | float64 | tricameralx3 | 1.00     |
| mavail       | sgd  | float32 | singlex1     | 1.00     |
| mix          | sgd  | float64 | singlex1     | 0.93     |
| gold_std     | sgd  | float16 | singlex1     | 24.62    |

## Best settings per train mode

| Mode | DType   | Format | Score | Soft | Acc  | Avail | n    |
|------|---------|--------|-------|------|------|-------|------|
| sgd  | float64 | none   | 728.1 | 18.3 | 61.1 | 79.7  | 1766 |

## Best dtype per mode

| Mode | Winner dtype | Score | Soft | Acc  |
|------|--------------|-------|------|------|
| sgd  | float64      | 728.1 | 18.3 | 61.1 |

## Best mode per dtype

| DType    | Winner mode | Score | Soft | Acc  |
|----------|-------------|-------|------|------|
| float64  | sgd         | 728.1 | 18.3 | 61.1 |
| float32  | sgd         | 45.3  | 22.0 | 81.6 |
| float16  | sgd         | 12.5  | 17.6 | 90.7 |
| bfloat16 | sgd         | 5.6   | 23.0 | 86.7 |

|         |     |     |      |      |
|---------|-----|-----|------|------|
| fp8e4m3 | sgd | 2.7 | 19.8 | 86.7 |
|---------|-----|-----|------|------|

Leaderboard - test51

| #  | Cell                                            | Score | Soft | Acc  | Thru   | Avail |
|----|-------------------------------------------------|-------|------|------|--------|-------|
| 1  | chase 2x2x2 dense float64 lr=2 cam=1 NormalBP   | 728.1 | 18.3 | 61.1 | 1495.7 | 79.7  |
| 2  | chase 3x3x3 dense float64 lr=2 cam=1 NormalBP   | 677.0 | 18.4 | 62.0 | 1372.2 | 79.5  |
| 3  | flee 2x2x2 dense float64 lr=0.02 cam=1 NormalBP | 612.3 | 20.7 | 84.4 | 847.2  | 85.6  |
| 4  | chase 1x1x1 dense float64 lr=2 cam=1 NormalBP   | 603.0 | 18.1 | 59.8 | 1254.9 | 80.4  |
| 5  | flee 1x1x1 dense float64 lr=2 cam=1 NormalBP    | 596.3 | 26.6 | 97.1 | 705.4  | 87.0  |
| 6  | chase 3x3x3 dense float64 lr=0.2 cam=1 NormalBP | 595.6 | 15.6 | 46.8 | 1612.5 | 79.0  |
| 7  | chase 1x1x1 dense float64 lr=0.2 cam=1 NormalBP | 579.1 | 15.6 | 46.3 | 1585.9 | 78.8  |
| 8  | flee 3x3x3 dense float64 lr=2 cam=1 NormalBP    | 574.6 | 26.5 | 96.5 | 685.0  | 86.9  |
| 9  | chase 2x2x2 dense float64 lr=0.2 cam=1 NormalBP | 573.7 | 15.4 | 45.0 | 1599.4 | 79.7  |
| 10 | flee 2x2x2 dense float64 lr=2 cam=1 NormalBP    | 561.3 | 26.5 | 96.4 | 673.6  | 86.4  |
| 11 | flee 2x2x2 dense float64 lr=0.2 cam=1 NormalBP  | 540.6 | 22.0 | 80.3 | 769.4  | 87.5  |
| 12 | flee 1x1x1 dense float64 lr=0.2 cam=1 NormalBP  | 533.5 | 21.5 | 79.2 | 769.1  | 87.6  |
| 13 | chase 1x1x1 dense float64 lr=2 cam=2 NormalBP   | 521.7 | 19.1 | 66.0 | 1096.7 | 72.1  |
| 14 | chase 3x3x3 dense float64 lr=2 cam=2 NormalBP   | 515.4 | 19.5 | 68.3 | 1041.6 | 72.5  |
| 15 | flee 3x3x3 dense float64 lr=0.2 cam=1 NormalBP  | 512.2 | 21.8 | 79.8 | 737.6  | 87.1  |
| 16 | chase 2x2x2 dense float64 lr=2 cam=2 NormalBP   | 504.7 | 19.1 | 66.4 | 1061.0 | 71.6  |
| 17 | flee 3x3x3 dense float64 lr=0.02 cam=1 NormalBP | 504.3 | 17.3 | 68.8 | 843.6  | 86.9  |
| 18 | flee 1x1x1 dense float64 lr=0.02 cam=1 NormalBP | 489.0 | 19.1 | 78.3 | 723.8  | 86.3  |
| 19 | flee 1x1x1 dense float64 lr=2 cam=2 NormalBP    | 462.9 | 26.9 | 97.5 | 591.6  | 80.3  |
| 20 | flee 2x2x2 dense float64 lr=2 cam=2 NormalBP    | 452.1 | 27.1 | 97.5 | 576.2  | 80.5  |

Top scores - test51



Top scores - test51



Mean Score by train mode



Mean hard Acc by train mode



Mean SoftAcc by train mode



Mean Availability by train mode



Mean Throughput by train mode



Mean Score by dtype



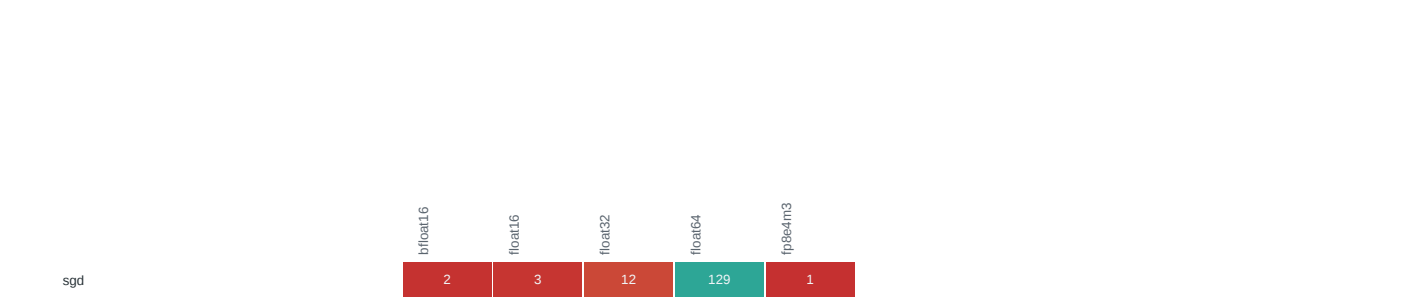
Mean hard Acc by dtype



Mean Score by arch



Honesty - mean Score, every mode x dtype



Honesty - mean hard Acc, every mode x dtype

Honesty - mean hard Acc, every mode x dtype

|     |          |         |         |         |         |
|-----|----------|---------|---------|---------|---------|
|     | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
| sgd | 39       | 35      | 38      | 40      | 25      |

Honesty - mean SoftAcc, every mode x dtype

|     |          |         |         |         |         |
|-----|----------|---------|---------|---------|---------|
|     | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
| sgd | 10       | 7       | 7       | 7       | 12      |

Honesty - mean Avail, every mode x dtype

|     |          |         |         |         |         |
|-----|----------|---------|---------|---------|---------|
|     | bfloat16 | float16 | float32 | float64 | fp8e4m3 |
| sgd | 60       | 59      | 76      | 80      | 54      |

Mean Score, every mode x arch

|     |             |          |              |
|-----|-------------|----------|--------------|
|     | bicameralx2 | singlex1 | tricameralx3 |
| sgd | 29          | 35       | 25           |

Mean hard Acc, every mode x arch

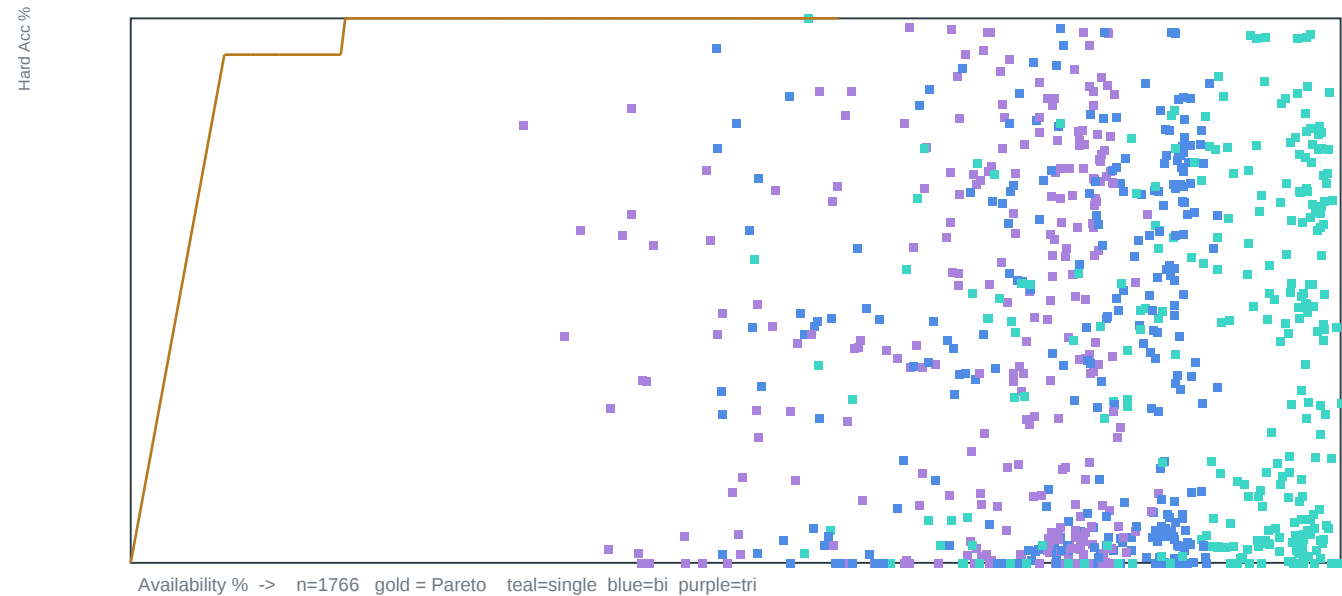
|     |             |          |              |
|-----|-------------|----------|--------------|
|     | bicameralx2 | singlex1 | tricameralx3 |
| sgd | 36          | 34       | 37           |

Mean Avail, every mode x arch

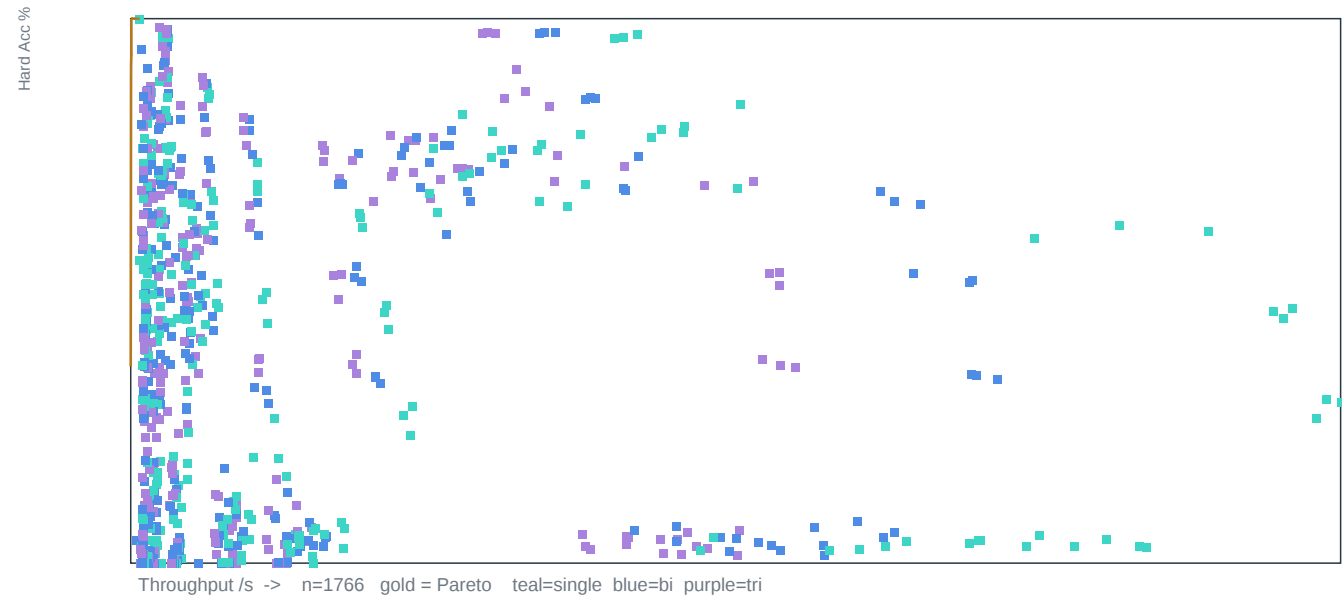
Mean Avail, every mode x arch



Pillars - Availability vs hard Acc

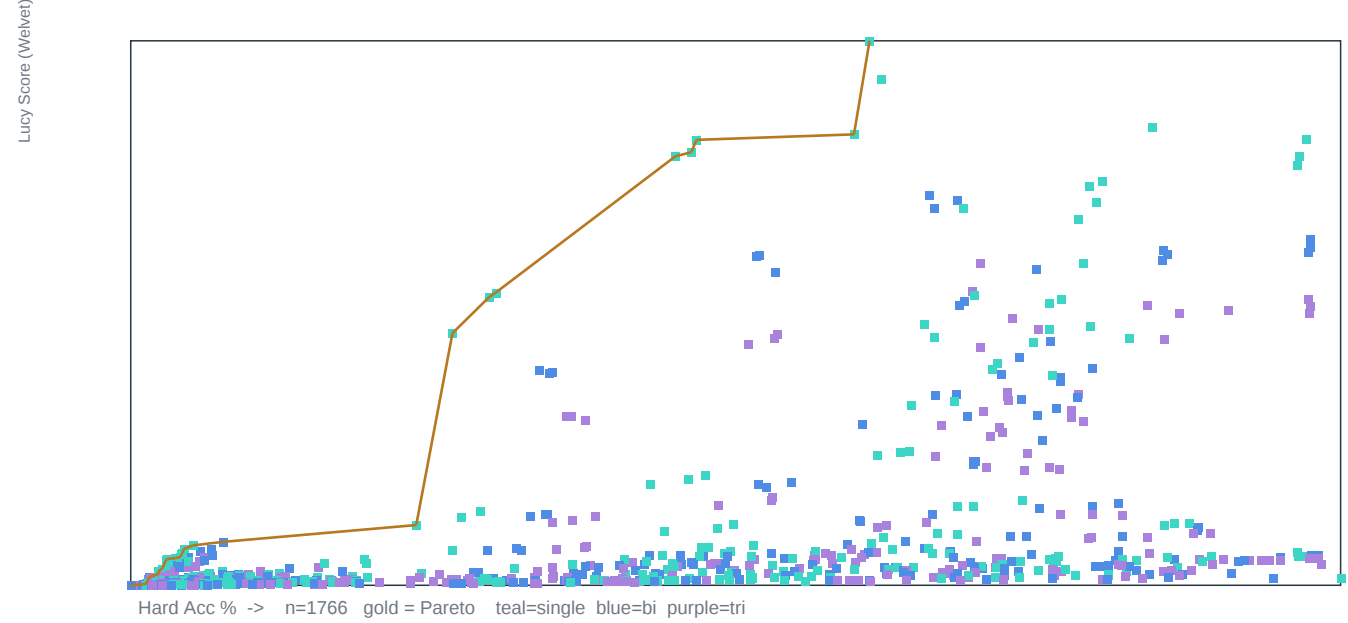


Pillars - Throughput vs hard Acc

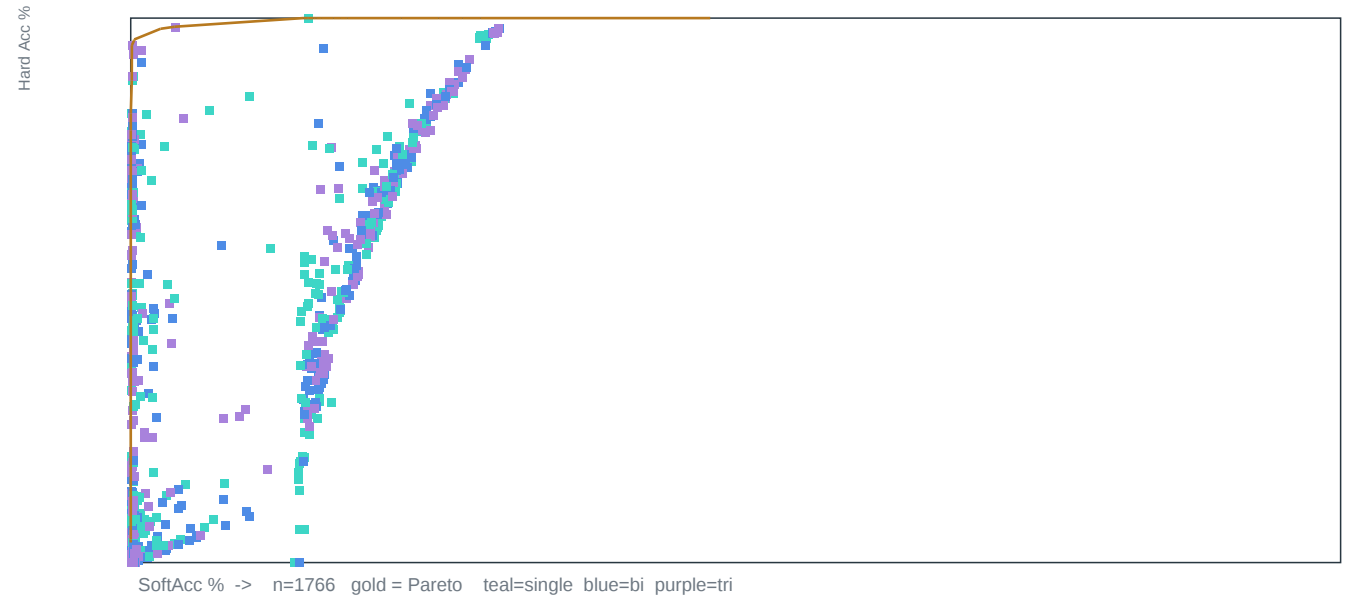


Pareto - hard Acc vs Lucy Score

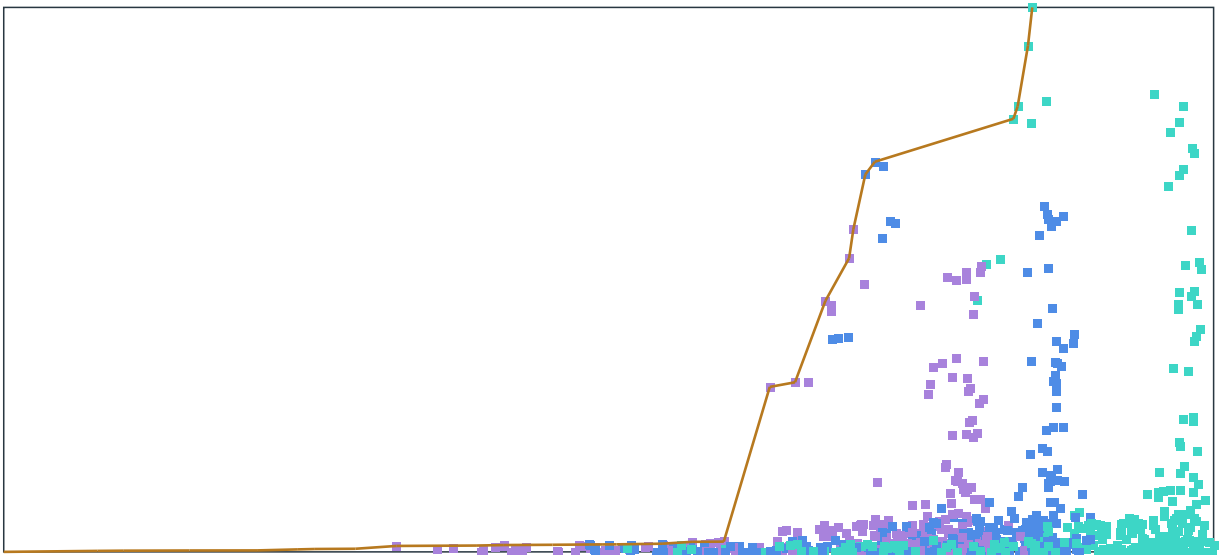
Pareto - hard Acc vs Lucy Score



SoftAcc (serve-confidence) vs hard Acc

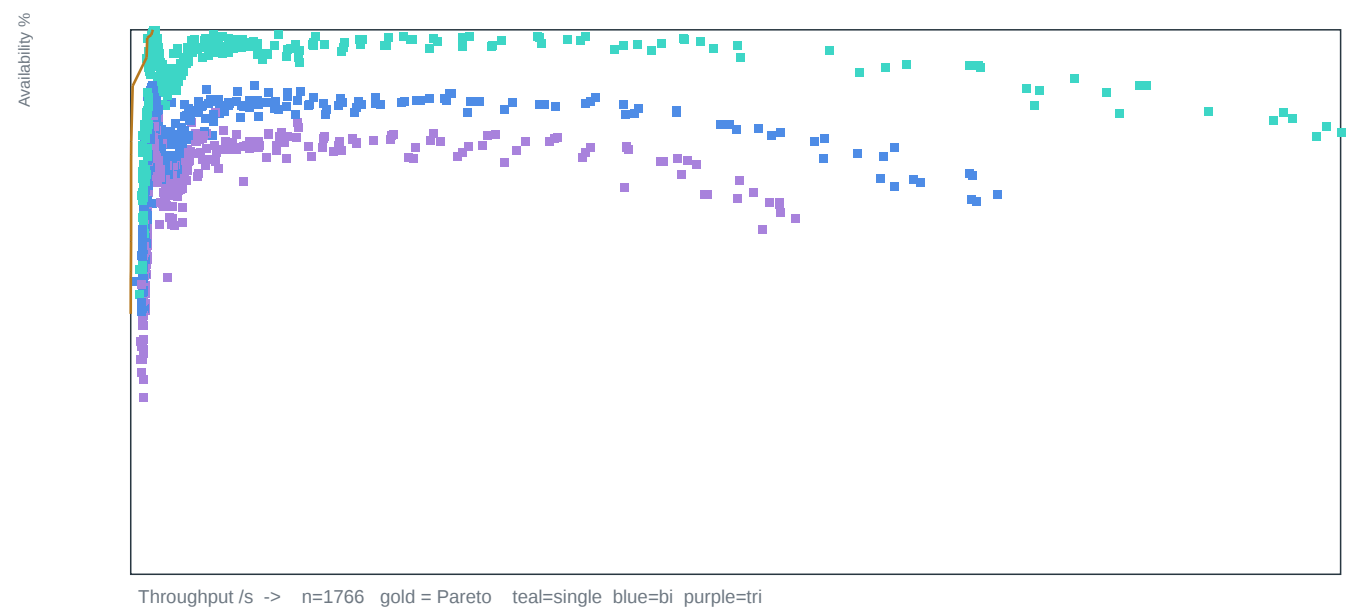


Avail vs Lucy Score (duty clock)





Pillars - Throughput vs Availability



Consciousness - Acc, Throughput, Availability

Synthetic organism / Lucy density: can the net run and train at the same time in a small box. Lucy Score = Throughput x Availability x Acc / 10,000 (hard Acc; SoftAcc is serve-confidence only). SGD that blocks serve dies on Availability. Q = geomean Acc/Thru/Avail vs learner peaks (traps do not set Thru/Avail). LPD = Q x shrink vs Acc-champ RAM; 0 unless Acc keep >=70%. Gold = all 3 pillars >=80% at <=20% Acc-champ RAM. Gold-std = Acc >=80% plus Thru or Avail, then smallest then fastest. Score/MiB is the binary trap.

Acc champ collect|3x3x3|dense|fp8e4m3|lr=20|cam=2|NormalBP    Acc 100.0    Thru 4    Avail 60.0%    15.1 KiB (RAM reference)

Lucy Score champ (T x Avail x Acc) chase|2x2x2|dense|float64|lr=2|cam=1|NormalBP    Score 728.1    Acc 61.1    Soft 18    49.2 KiB

Live-fit champ (best Q) flee|2x2x2|dense|float64|lr=0.02|cam=1|NormalBP    Acc 84.4    Thru 847    Avail 85.6%    49.2 KiB

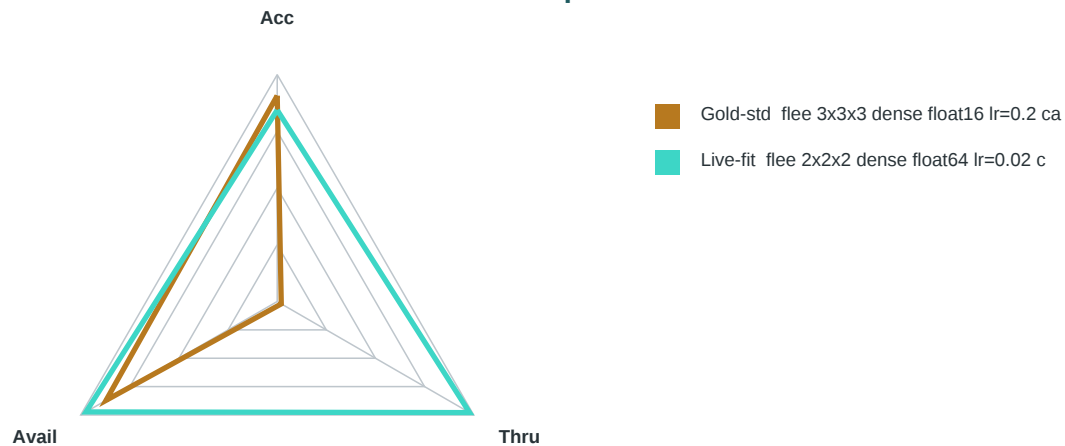
Gold-std (2+ pillars, Acc keep >= 80%, then smallest then fastest): flee|3x3x3|dense|float16|lr=0.2|cam=1|NormalBP    mode sgd    Acc 90.7    Thru 18    24.6 KiB

Board fastest chase|1x1x1|dense|float64|lr=0.02|cam=1|NormalBP    Thru 1680 (traps may own this)    Best availability

teleport|3x3x3|dense|float32|lr=0.02|cam=1|NormalBP    88.5%

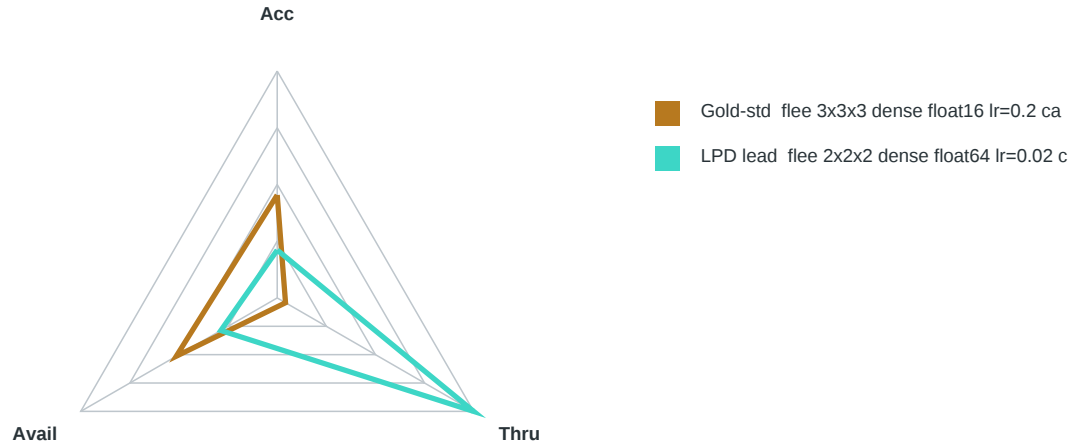
Learner Thru peak 865    learner Avail peak 88.0%

Consciousness radar - Acc / Thru / Avail vs learner peaks



Memory density radar - same pillars x shrink vs Acc champ (traps sit at origin)

Memory density radar - same pillars x shrink vs Acc champ (traps sit at origin)



No gold cell yet. Need all three pillars at 80% of learner peaks in one fifth of Acc-champ RAM.

Gold-standard train modes - 2+ pillars, Acc keep >= 80%, smallest then fastest

| Mode | n  | Acc  | KiB  | Thru | Cell                                                               |
|------|----|------|------|------|--------------------------------------------------------------------|
| sgd  | 75 | 98.1 | 24.6 | 847  | flee 3x3x3 dense float16 lr=0.2 cam=1 NormalBP / flee 2x2x2 dense~ |

Lucy density (LPD) - Q x shrink vs Acc-champ RAM; 0 if Acc keep < 70%

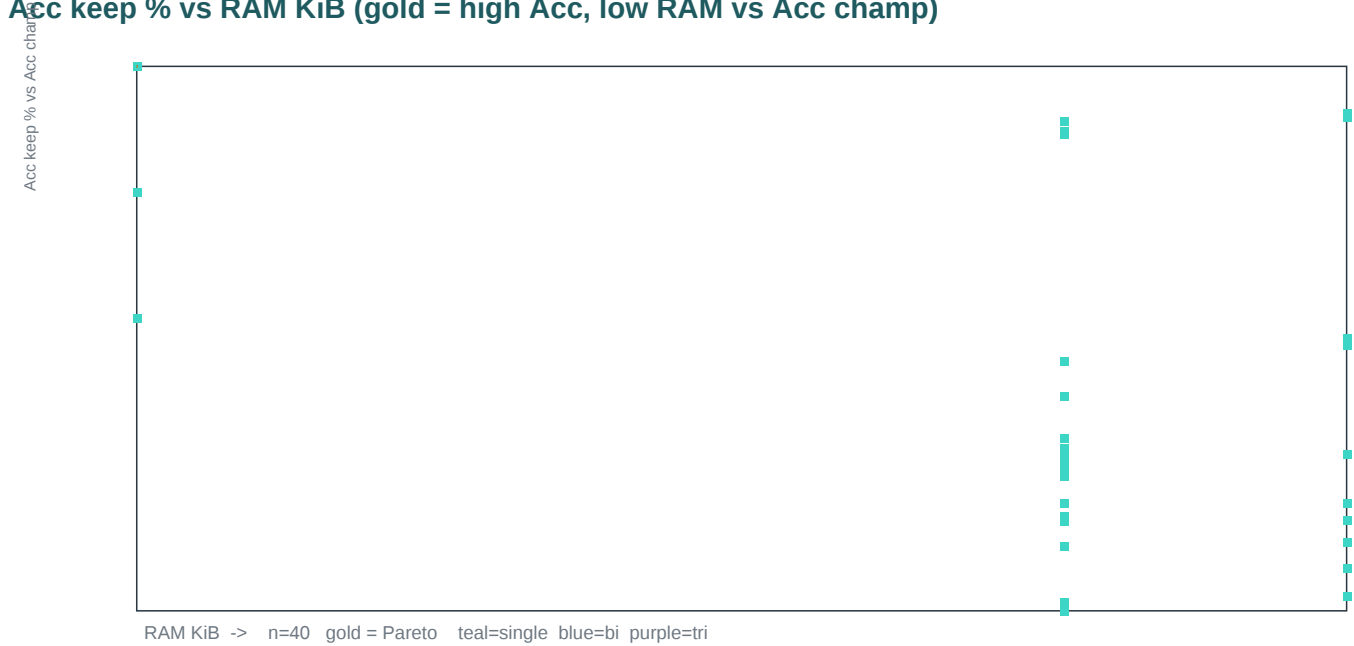
| Band | Cell                                              | Acc% | Thru% | Avail% | Q% | RAM% | xSmall | LPD  | Acc  | Thru | KiB  |
|------|---------------------------------------------------|------|-------|--------|----|------|--------|------|------|------|------|
| keep | flee 2x2x2 dense float64 lr=0.02 cam=1 NormalBP   | 84   | 98    | 97     | 93 | 326  | 0.3    | 0.29 | 84.4 | 847  | 49.2 |
| keep | flee 1x1x1 dense float64 lr=2 cam=1 NormalBP      | 97   | 82    | 99     | 92 | 326  | 0.3    | 0.28 | 97.1 | 705  | 49.2 |
| keep | flee 3x3x3 dense float64 lr=2 cam=1 NormalBP      | 97   | 79    | 99     | 91 | 326  | 0.3    | 0.28 | 96.5 | 685  | 49.2 |
| keep | flee 2x2x2 dense float64 lr=2 cam=1 NormalBP      | 96   | 78    | 98     | 90 | 326  | 0.3    | 0.28 | 96.4 | 674  | 49.2 |
| keep | flee 2x2x2 dense float64 lr=0.2 cam=1 NormalBP    | 80   | 89    | 99     | 89 | 326  | 0.3    | 0.27 | 80.3 | 769  | 49.2 |
| -    | flee 1x1x1 dense float64 lr=0.2 cam=1 NormalBP    | 79   | 89    | 100    | 89 | 326  | 0.3    | 0.27 | 79.2 | 769  | 49.2 |
| -    | flee 3x3x3 dense float64 lr=0.2 cam=1 NormalBP    | 80   | 85    | 99     | 88 | 326  | 0.3    | 0.27 | 79.8 | 738  | 49.2 |
| -    | flee 1x1x1 dense float64 lr=0.02 cam=1 NormalBP   | 78   | 84    | 98     | 86 | 326  | 0.3    | 0.26 | 78.3 | 724  | 49.2 |
| -    | flee 2x2x2 dense float64 lr=20 cam=1 NormalBP     | 79   | 72    | 99     | 83 | 326  | 0.3    | 0.25 | 78.7 | 626  | 49.2 |
| -    | flee 1x1x1 dense float64 lr=200 cam=1 NormalBP    | 77   | 66    | 99     | 80 | 326  | 0.3    | 0.24 | 76.9 | 572  | 49.2 |
| -    | flee 3x3x3 dense float64 lr=200 cam=1 NormalBP    | 76   | 65    | 100    | 79 | 326  | 0.3    | 0.24 | 75.9 | 566  | 49.2 |
| -    | flee 1x1x1 dense float64 lr=1000 cam=1 NormalBP   | 79   | 58    | 99     | 77 | 326  | 0.3    | 0.24 | 79.3 | 503  | 49.2 |
| -    | flee 2x2x2 dense float64 lr=1000 cam=1 NormalBP   | 76   | 60    | 99     | 77 | 326  | 0.3    | 0.24 | 75.9 | 516  | 49.2 |
| keep | flee 2x2x2 dense float64 lr=10000 cam=1 NormalBP  | 83   | 53    | 99     | 76 | 326  | 0.3    | 0.23 | 82.5 | 462  | 49.2 |
| -    | flee 3x3x3 dense float64 lr=1000 cam=1 NormalBP   | 75   | 58    | 99     | 75 | 326  | 0.3    | 0.23 | 74.6 | 502  | 49.2 |
| -    | flee 1x1x1 dense float64 lr=10000 cam=1 NormalBP  | 72   | 55    | 100    | 73 | 326  | 0.3    | 0.22 | 71.6 | 472  | 49.2 |
| -    | flee 3x3x3 dense float64 lr=10000 cam=1 NormalBP  | 71   | 54    | 100    | 72 | 326  | 0.3    | 0.22 | 71.2 | 463  | 49.2 |
| -    | flee 3x3x3 dense float64 lr=1e+06 cam=1 NormalBP~ | 76   | 49    | 100    | 72 | 326  | 0.3    | 0.22 | 76.2 | 422  | 49.2 |
| keep | flee 1x1x1 dense float64 lr=2 cam=2 NormalBP      | 97   | 68    | 91     | 85 | 400  | 0.2    | 0.21 | 97.5 | 592  | 60.5 |
| keep | flee 2x2x2 dense float64 lr=2 cam=2 NormalBP      | 98   | 67    | 91     | 84 | 400  | 0.2    | 0.21 | 97.5 | 576  | 60.5 |

Consciousness rank - Q = geomean Acc/Thru/Avail keep

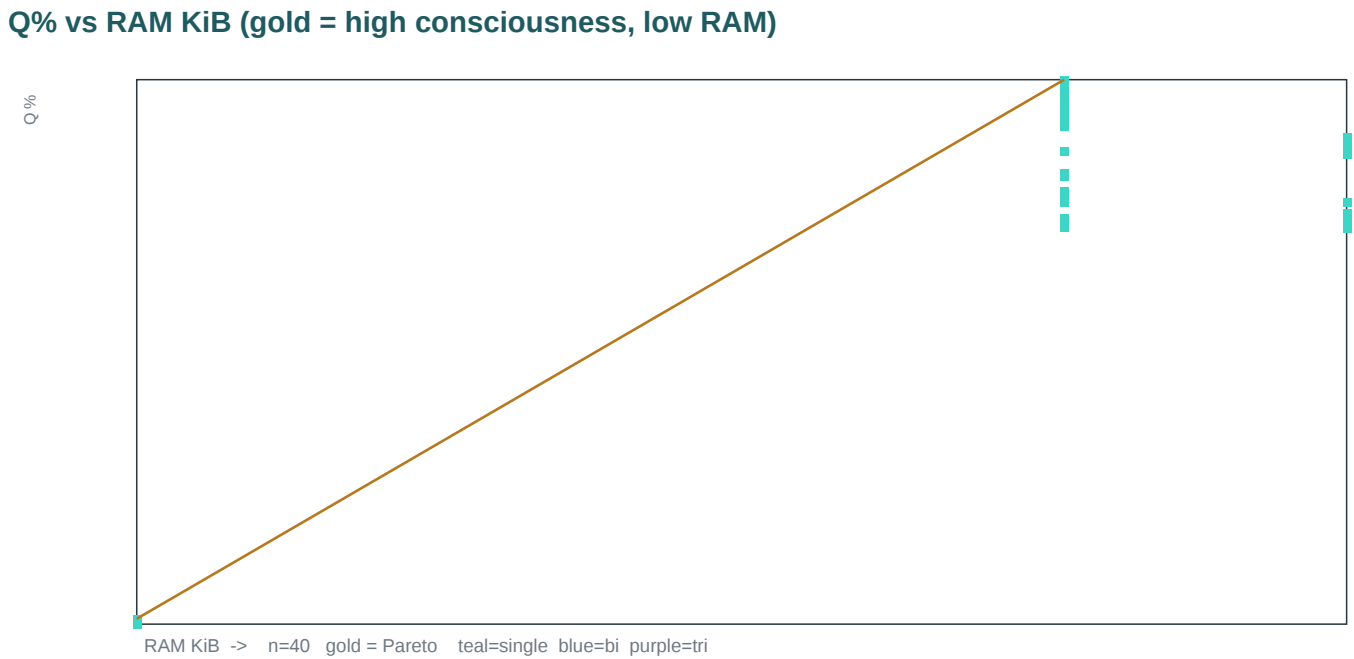
| Band | Cell                                            | Acc% | Thru% | Avail% | Q% | LPD  | Thru | Avail |
|------|-------------------------------------------------|------|-------|--------|----|------|------|-------|
| keep | flee 2x2x2 dense float64 lr=0.02 cam=1 NormalBP | 84   | 98    | 97     | 93 | 0.29 | 847  | 85.6  |
| keep | flee 1x1x1 dense float64 lr=2 cam=1 NormalBP    | 97   | 82    | 99     | 92 | 0.28 | 705  | 87.0  |
| keep | flee 3x3x3 dense float64 lr=2 cam=1 NormalBP    | 97   | 79    | 99     | 91 | 0.28 | 685  | 86.9  |
| keep | flee 2x2x2 dense float64 lr=2 cam=1 NormalBP    | 96   | 78    | 98     | 90 | 0.28 | 674  | 86.4  |

|      |                                                 |    |    |     |    |      |     |      |
|------|-------------------------------------------------|----|----|-----|----|------|-----|------|
| keep | flee 2x2x2 dense float64 lr=0.2 cam=1 NormalBP  | 80 | 89 | 99  | 89 | 0.27 | 769 | 87.5 |
| -    | flee 1x1x1 dense float64 lr=0.2 cam=1 NormalBP  | 79 | 89 | 100 | 89 | 0.27 | 769 | 87.6 |
| -    | flee 3x3x3 dense float64 lr=0.2 cam=1 NormalBP  | 80 | 85 | 99  | 88 | 0.27 | 738 | 87.1 |
| -    | flee 1x1x1 dense float64 lr=0.02 cam=1 NormalBP | 78 | 84 | 98  | 86 | 0.26 | 724 | 86.3 |
| keep | flee 1x1x1 dense float64 lr=2 cam=2 NormalBP    | 97 | 68 | 91  | 85 | 0.21 | 592 | 80.3 |
| keep | flee 2x2x2 dense float64 lr=2 cam=2 NormalBP    | 98 | 67 | 91  | 84 | 0.21 | 576 | 80.5 |

Acc keep % vs RAM KiB (gold = high Acc, low RAM vs Acc champ)



Q% vs RAM KiB (gold = high consciousness, low RAM)



Q% vs shrink vs Acc champ (gold = upper right)

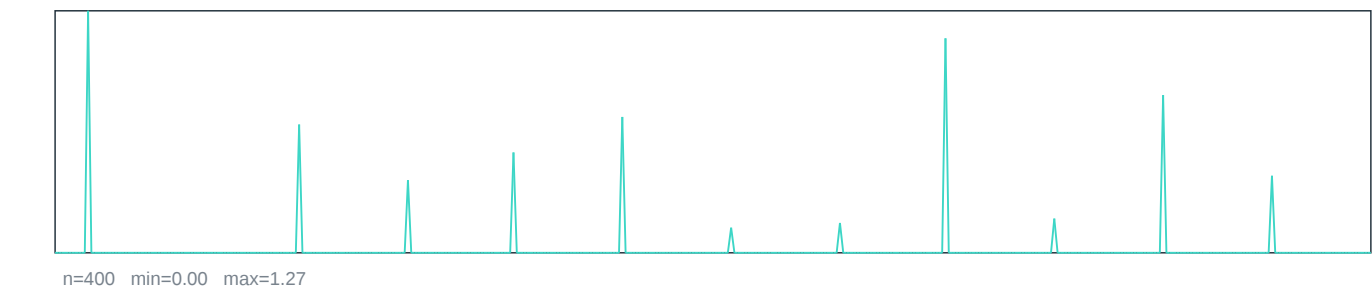
Q% vs shrink vs Acc champ (gold = upper right)



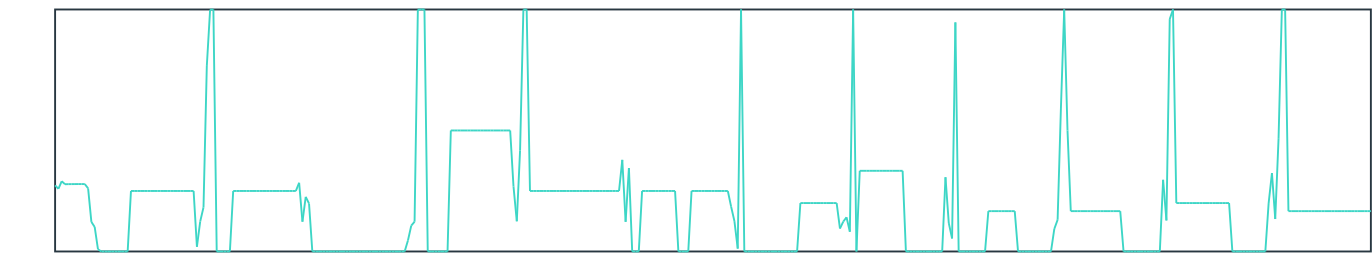
Top Lucy density (LPD)

|                                                  |     |
|--------------------------------------------------|-----|
| flee 2x2x2 dense float64 lr=0.02 cam=1 NormalBP  | 0.3 |
| flee 1x1x1 dense float64 lr=2 cam=1 NormalBP     | 0.3 |
| flee 3x3x3 dense float64 lr=2 cam=1 NormalBP     | 0.3 |
| flee 2x2x2 dense float64 lr=2 cam=1 NormalBP     | 0.3 |
| flee 2x2x2 dense float64 lr=0.2 cam=1 NormalBP   | 0.3 |
| flee 1x1x1 dense float64 lr=0.2 cam=1 NormalBP   | 0.3 |
| flee 3x3x3 dense float64 lr=0.2 cam=1 NormalBP   | 0.3 |
| flee 1x1x1 dense float64 lr=0.02 cam=1 NormalBP  | 0.3 |
| flee 2x2x2 dense float64 lr=20 cam=1 NormalBP    | 0.3 |
| flee 1x1x1 dense float64 lr=200 cam=1 NormalBP   | 0.2 |
| flee 3x3x3 dense float64 lr=200 cam=1 NormalBP   | 0.2 |
| flee 1x1x1 dense float64 lr=1000 cam=1 NormalBP  | 0.2 |
| flee 2x2x2 dense float64 lr=1000 cam=1 NormalBP  | 0.2 |
| flee 2x2x2 dense float64 lr=10000 cam=1 NormalBP | 0.2 |
| flee 3x3x3 dense float64 lr=1000 cam=1 NormalBP  | 0.2 |
| flee 1x1x1 dense float64 lr=10000 cam=1 NormalBP | 0.2 |

Pulse Score - test51

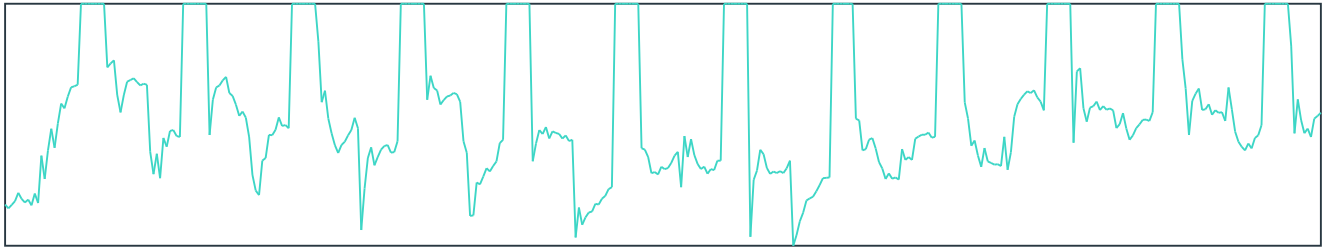


Pulse SoftAcc - test51



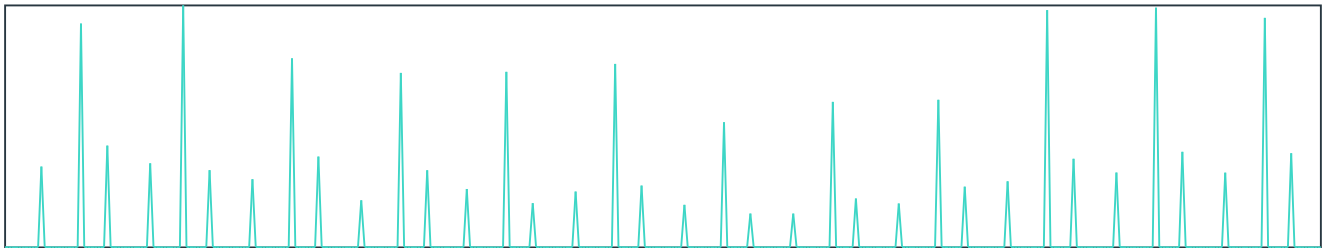
n=400 min=0.00 max=100.00

## Pulse Availability - test51



n=400 min=23.44 max=100.00

## Pulse Throughput - test51



n=400 min=3.22 max=2166.95

## Queue by train mode (this epoch)

| Mode             | Done | Run | Left  | Total |
|------------------|------|-----|-------|-------|
| sgd              | 1766 | 1   | 10473 | 12240 |
| step_sgd         | 0    | 0   | 12240 | 12240 |
| tween            | 0    | 0   | 12240 | 12240 |
| tween_chain      | 0    | 0   | 12240 | 12240 |
| step_tween       | 0    | 0   | 12240 | 12240 |
| step_tween_chain | 0    | 0   | 12240 | 12240 |
| MeshBP           | 0    | 0   | 12240 | 12240 |
| Mesh[T]          | 0    | 0   | 12240 | 12240 |
| Mesh[T]Chain     | 0    | 0   | 12240 | 12240 |
| [T][S]           | 0    | 0   | 12240 | 12240 |