

4th International Aiwolf Contest Algorithm Description

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Abstract—Our approach is to use the parameters of the agents generated by the aiwolf generator that participated in the previous competition as a base, and search its neighborhood to find agents with higher win rates.

When searching the neighborhood of the parameters, the larger the variance among the base agents, the larger the neighborhood was searched.

Through simulated matches, we examined the best parameters for each position and combined them to create the final agent.

I. BASE AGENTS

As a base, we obtained the parameters of the following four agents.

- 2nd International Aiwolf Contest finalists
 - J0hnDoe
 - cube
 - Tomo
 - simipu
- 3rd International Aiwolf Contest finalists
 - KP22
 - SYu
 - CanisLupus
 - Tomatoken
 - SORA
 - Hideto

For the parameters p used by these agents, we examined the mean μ_p and variance σ_p^2 of each.

II. NEIGHBOR SEARCH

Using a normal distribution, we generated 50 agents with random parameters p_n .

$$p_n = N(\mu_p, \sigma_p^2)$$

III. REFINEING

We repeated a series of simulated matches with 50 generated agents in each of the 5-player and 15-player games. Then, for each position, we collected the parameters of the three agents that had the highest win rate.

By randomly combining these parameters, five new agents were created. After adding these agents, we repeated the simulated game again. The agent with the highest win rate was submitted as the final version.

IV. PARAMETERS OF THE SUBMITTED AGENT

Listing 1. params.json

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2   "p5": {
3     "v": {
4       "PPVCO": {
5         "type": "double",
6         "value": 0.0,
7         "desc": "PP\u6642\u6751\u4ebaCO\u7387"
8       },
9       "PPWCO": {
10        "type": "double",
11        "value":
12          0.49473870248525786,
13        "desc": "PP\u6642\u4eba\u72fcCO\u7387"
14      },
15      "PPPCO": {
16        "type": "double",
17        "value": 0.0,
18        "desc": "PP\u6642\u88cf\u5207\u308a\u8005CO\u7387"
19      },
20      "LR": {
21        "type": "double",
22        "value":
23          0.47604011323890993,
24        "desc": "\u7656\u306e\u5b66\u7fd2"
25      },
26      "vote": {
27        "type": "select",
28        "desc": "\u6295\u7968",
29        "value": {
30          "w": 1.0,
31          "v": 0.0,
32          "p": 0.0,
33          "s":
34            -0.28875466483130524,
35          "b": 0.0,
36          "m": 0.0,
```

```

34     "EVoted":
35         0.007549048595714794,
36     "WR": 0.0,
37     "FW": 0.0,
38     "Black": 0.0,
39     "White": 0.0
40 }
41 },
42 "talk": {
43     "type": "select",
44     "desc": "\u6295\u7968\u767a\u
45         u8a00",
46     "value": {
47         "w": 0.0,
48         "v": 0.0,
49         "p": 0.0,
50         "s": 0.0,
51         "B": 0.0,
52         "M": 0.0,
53         "EVoted":
54             0.35745099540851094,
55         "WR": 0.0,
56         "FW": 0.0,
57         "Black": 0.0,
58         "White": 0.0
59     }
60 },
61 "S": {
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64         "value": 0.0,
65         "desc": "PP\u6642\u6751\u
66             u4ebaCO\u7387"
67     },
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69         "type": "double",
70         "value": 0.0,
71         "desc": "PP\u6642\u4eba\u
72             u72fcCO\u7387"
73     },
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78         "desc": "PP\u6642\u88cf\u5207
79             \u308a\u8005CO\u7387"
80     },
81     "LR": {
82         "type": "double",
83         "value":
84             -0.4027688636970692,
85         "desc": "\u7656\u306e\u5b66\u
86             u7fd2"
87     },
88     "vote": {
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90         "desc": "\u6295\u7968",
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93             "v": 0.0,
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98             "EVoted":
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100            "WR": 0.0,
101            "FW": 0.0,
102            "Black": 0.0,
103            "White": 0.0
104        }
105    },
106    "talk": {
107        "type": "select",
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109            u8a00",
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113            "p": 0.0,
114            "s": 0.0,
115            "B": 0.0,
116            "M": 0.0,
117            "EVoted":
118                0.007522709170870682,
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120            "FW": 0.0,
121            "Black": 0.0,
122            "White": 0.0
123        }
124    },
125    "talkDivineW": {
126        "type": "select",
127        "desc": "\u5360\u3044\u5831\u
128            u544a\uuff08\u767d\u9099",
129        "value": {
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131            "v": 0.0,
132            "p": 0.0,
133            "s": 0.0,
134            "B": 0.0,
135            "M": 0.0,
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138            "FW": 0.0,
139            "Black": 0.0,
140            "White": 0.0
141        }
142    },
143    "talkDivineB": {
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145        "desc": "\u5360\u3044\u5831\u
146            u544a\uuff08\u9ed2\u9099",
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149            "v": 0.0,
150            "p": 0.03972491830913042,

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139     "B": 0.0,
140     "M": 0.0,
141     "EVoted": 0.0,
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147 },
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162       "FW": 0.0,
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164       "White": 0.0
165     }
166   },
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168     "SCO": {
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172         \u7387"
173     },
174     "PPVCO": {
175       "type": "double",
176       "value": 0.0,
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178         u4ebaCO\u7387"
179     },
180     "PPWCO": {
181       "type": "double",
182       "value":
183         0.6473350820506706,
184       "desc": "PP\u6642\u4eba\u
185         u72fcCO\u7387"
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187     "PPPCO": {
188       "type": "double",

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189     "value":
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191     "desc": "\u7656\u306e\u5b66\u
192       u7fd2"
193   },
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196     "desc": "\u6295\u7968",
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206       "WR": 0.0,
207       "FW": 0.0,
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210     }
211   },
212   "talk": {
213     "type": "select",
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215       u8a00",
216     "value": {
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218       "V": 0.0,
219       "P": 0.0,
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223       "EVoted":
224         1.3697122431628295,
225       "WR": 0.0,
226       "FW": 0.0,
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229     }
230   },
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241       "EVoted": 0.0,
242       "WR": 1.3511827237290668,
243       "FW": 0.0,
244       "Black": 0.0,
245       "White": 0.0
246     }
247   }
248 },

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243 "talkDivineW": {
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245   "desc": "\u5360\u3044\u5831\u544a\u00ff08\u767d\u00ff09",
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248     "V": 0.0,
249     "P": 0.0,
250     "S": 0.0,
251     "B": 0.0,
252     "M": 0.0,
253     "EVoted": 0.0,
254     "WR": 0.0,
255     "FW": 0.0,
256     "Black": 0.0,
257     "White": 0.0
258   }
259 },
260 "talkDivineB": {
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262   "desc": "\u5360\u3044\u5831\u544a\u00ff08\u9ed2\u00ff09",
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265     "V": 0.0,
266     "P": 0.0,
267     "S": 0.0,
268     "B": 0.0,
269     "M": 0.0,
270     "EVoted": 0.0,
271     "WR": 0.0,
272     "FW": 0.0,
273     "Black": 0.0,
274     "White": 0.0
275   }
276 }
277 },
278 "P": {
279   "SCO": {
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285   "PPVCO": {
286     "type": "double",
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290   "PPWCO": {
291     "type": "double",
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295   "PPPCO": {
296     "type": "double",

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298   "desc": "PP\u6642\u88cf\u5207\u308a\u8005CO\u7387"
299 },
300 "LR": {
301   "type": "double",
302   "value":
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304   "desc": "\u7656\u306e\u5b66\u7fd2"
305 },
306 "vote": {
307   "type": "select",
308   "desc": "\u6295\u7968",
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312     "P": 0.0,
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314       -0.27997306109509973,
315     "B": 0.0,
316     "M": 0.0,
317     "EVoted":
318       0.26214064530953246,
319     "WR": 0.0,
320     "FW": 0.0,
321     "Black": 0.0,
322     "White": 0.0
323   }
324 },
325 "talk": {
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333     "B": 0.0,
334     "M": 0.0,
335     "EVoted":
336       0.22655216738767575,
337     "WR": 0.0,
338     "FW": 0.0,
339     "Black": 0.0,
340     "White": 0.0
341   }
342 },
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345   "desc": "\u5360\u3044\u5831\u544a\u00ff08\u767d\u00ff09",
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348     "V": 0.0,
349     "P": 0.0,
350     "S": 0.0,

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346     "B": 0.0,
347     "M": 0.0,
348     "EVoted": 0.0,
349     "WR": 0.0,
350     "FW": 0.0,
351     "Black": 0.0,
352     "White": 0.0
353   }
354 },
355   "talkDivineB": {
356     "type": "select",
357     "desc": "\u5360\u3044\u5831\u544a\u08\u9ed2\u09",
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360       "v": -0.2686412752080959,
361       "p": 0.0,
362       "s": 0.0,
363       "B": 0.0,
364       "M": 0.0,
365       "EVoted": 0.0,
366       "WR": 0.0,
367       "FW": 0.0,
368       "Black": 0.0,
369       "White": 0.0
370     }
371   }
372 },
373 },
374   "p15": {
375     "v": {
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377         "type": "double",
378         "value": 0.0,
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381       "PPWCO": {
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384         "desc": "PP\u6642\u4eba\u72fcCO\u7387"
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388         "value": 0.4,
389         "desc": "PP\u6642\u88cf\u5207\u308a\u8005CO\u7387"
390       },
391       "LR": {
392         "type": "double",
393         "value": 0.5,
394         "desc": "\u7656\u306e\u5b66\u7fd2"
395       },
396       "vote": {
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398         "desc": "\u6295\u7968",
399         "value": {

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404     "B": -0.25,
405     "M": -0.3,
406     "EVoted": 0.0,
407     "WR": 0.0,
408     "FW": 0.0,
409     "Black": 0.0,
410     "White": 0.0
411   }
412 },
413   "talk": {
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418       "v": 0.0,
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420       "s": 0.0,
421       "B": 0.0,
422       "M": 0.0,
423       "EVoted": 0.0,
424       "WR": 0.0,
425       "FW": 0.0,
426       "Black": 0.0,
427       "White": 0.0
428     }
429   },
430 },
431   "s": {
432     "PPVCO": {
433       "type": "double",
434       "value": 0.0,
435       "desc": "PP\u6642\u6751\u4ebaCO\u7387"
436     },
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438       "type": "double",
439       "value": 0.0,
440       "desc": "PP\u6642\u4eba\u72fcCO\u7387"
441     },
442     "PPPCO": {
443       "type": "double",
444       "value": 0.0,
445       "desc": "PP\u6642\u88cf\u5207\u308a\u8005CO\u7387"
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450         0.9615901763249097,
451       "desc": "\u7656\u306e\u5b66\u7fd2"
452     },
453     "vote": {

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```

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460   "B": -0.287432887721899,
461   "M": -0.3,
462   "EVoted":
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465   "Black": 0.0,
466   "White": 0.0
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468 },
469 "talk": {
470   "type": "select",
471   "desc": "\u6295\u7968\u767a\u
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474     "v": 0.0,
475     "p": 0.0,
476     "s": 0.0,
477     "B": 0.0,
478     "M": 0.0,
479     "EVoted":
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481     "FW": 0.0,
482     "Black": 0.0,
483     "White": 0.0
484   }
485 },
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491     "v": 0.0,
492     "p": 0.0,
493     "s": 0.0,
494     "B": 0.0,
495     "M": 0.0,
496     "EVoted": 0.0,
497     "WR": 0.0,
498     "FW": 0.0,
499     "Black": 0.0,
500     "White": 1.0
501   }
502 },
503 "talkDivineB": {
504   "type": "select",
505   "desc": "\u5360\u3044\u5831\u
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```

```

506   "value": {
507     "w": 0.0,
508     "v": 0.0,
509     "p": 0.0,
510     "s": 0.0,
511     "B": 0.0,
512     "M": 0.0,
513     "EVoted": 0.0,
514     "WR": 0.0,
515     "FW": 0.0,
516     "Black": 1.0,
517     "White": 0.0
518   }
519 },
520 "divine": {
521   "type": "select",
522   "desc": "\u5360\u3044\u5148",
523   "value": {
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525     "v": 0.0,
526     "p": 0.0,
527     "s": 0.0,
528     "B": 0.0,
529     "M": 0.0,
530     "EVoted":
        0.007495728721836054,
531     "WR": 0.5215897773487995,
532     "FW": 0.0,
533     "Black": 0.0,
534     "White": 0.0
535   }
536 },
537 },
538 "B": {
539   "PPVCO": {
540     "type": "double",
541     "value": 0.0,
542     "desc": "PP\u6642\u6751\u
      u4ebaCO\u7387"
543   },
544   "PPWCO": {
545     "type": "double",
546     "value": 0.0,
547     "desc": "PP\u6642\u4eba\u
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548   },
549   "PPPCO": {
550     "type": "double",
551     "value": 0.0,
552     "desc": "PP\u6642\u88cf\u5207
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553   },
554   "LR": {
555     "type": "double",
556     "value": 0.0,
557     "desc": "\u7656\u306e\u5b66\u
      u7fd2"
558   },
559   "vote": {

```

```

560 "type": "select",
561 "desc": "\u6295\u7968",
562 "value": {
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564   "v": 0.0,
565   "p": 0.0,
566   "s": -0.3,
567   "B": -0.3,
568   "M": -0.3,
569   "EVoted": 0.01,
570   "WR": 0.0,
571   "FW": 0.0,
572   "Black": 0.0,
573   "White": 0.0
574 }
575 },
576 "talk": {
577   "type": "select",
578   "desc": "\u6295\u7968\u767a\u
579     u8a00",
580   "value": {
581     "w": 1.0,
582     "v": 0.0,
583     "p": 0.0,
584     "s": 0.0,
585     "B": 0.0,
586     "M": 0.0,
587     "EVoted": 0.01,
588     "WR": 0.0,
589     "FW": 0.0,
590     "Black": 0.0,
591     "White": 0.0
592   }
593 },
594 "guard": {
595   "type": "select",
596   "desc": "\u8b77\u885b",
597   "value": {
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599     "v": 0.1,
600     "p": 0.0,
601     "s": 0.8,
602     "B": 0.0,
603     "M": 0.1,
604     "EVoted": 0.0,
605     "WR": 0.0,
606     "FW": 0.0,
607     "Black": 0.0,
608     "White": 0.0
609   }
610 },
611 "M": {
612   "PPVCO": {
613     "type": "double",
614     "value": 0.0,
615     "desc": "PP\u6642\u6751\u
616     u4ebaCO\u7387"

```

```

617 "PPWCO": {
618   "type": "double",
619   "value": 0.0,
620   "desc": "PP\u6642\u4eba\u
621     u72fcCO\u7387"
622 },
623 "PPPCO": {
624   "type": "double",
625   "value": 0.0,
626   "desc": "PP\u6642\u88cf\u5207
627     \u308a\u8005CO\u7387"
628 },
629 "LR": {
630   "type": "double",
631   "value":
632     0.5793651398058567,
633   "desc": "\u7656\u306e\u5b66\u
634     u7fd2"
635 },
636 "vote": {
637   "type": "select",
638   "desc": "\u6295\u7968",
639   "value": {
640     "w": 1.0,
641     "v": 0.0,
642     "p": 0.0,
643     "s": -0.3,
644     "B":
645       -0.28652736216297126,
646     "M": -0.3,
647     "EVoted":
648       0.007537092718965342,
649     "WR": 0.0,
650     "FW": 0.0,
651     "Black": 0.0,
652     "White": 0.0
653   }
654 },
655 "talk": {
656   "type": "select",
657   "desc": "\u6295\u7968\u767a\u
658     u8a00",
659   "value": {
660     "w": 0.6125215027823978,
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662     "p": 0.0,
663     "s": 0.0,
664     "B": 0.0,
665     "M": 0.0,
666     "EVoted":
667       0.9656482849271462,
668     "WR": 0.0,
669     "FW": 0.0,
670     "Black": 0.0,
671     "White": 0.0
672   }
673 },
674 "W": {

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668 "SCO": {
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670   "value": 0.0,
671   "desc": "\u5360\u3044\u5e2bcO
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673 "PPVCO": {
674   "type": "double",
675   "value": 0.0,
676   "desc": "PP\u6642\u6751\
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678 "PPWCO": {
679   "type": "double",
680   "value": 0.0,
681   "desc": "PP\u6642\u4eba\
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683 "PPPCO": {
684   "type": "double",
685   "value": 0.0,
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688 "LR": {
689   "type": "double",
690   "value":
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691   "desc": "\u7656\u306e\u5b66\
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692 },
693 "vote": {
694   "type": "select",
695   "desc": "\u6295\u7968",
696   "value": {
697     "w": 0.4122584847803139,
698     "v": 0.0,
699     "p": 0.0,
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705     "FW":
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706     "Black": 0.0,
707     "White": 0.0
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709 },
710 "talk": {
711   "type": "select",
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715     "v": 0.0,
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717     "s": 0.0,
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721     "WR": 0.0,
722     "FW": 0.0,
723     "Black": 0.0,
724     "White": 0.0
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726 },
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733     "p": 0.0,
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736     "M": 0.16528811278063957,
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738     "WR":
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739     "FW": 0.0,
740     "Black": 0.0,
741     "White": 0.0
742   }
743 },
744 "talkDivineW": {
745   "type": "select",
746   "desc": "\u5360\u3044\u5831\
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747   "value": {
748     "w": 0.0,
749     "v": 0.0,
750     "p": 0.0,
751     "s": 0.0,
752     "B": 0.0,
753     "M": 0.0,
754     "EVoted": 0.0,
755     "WR": 0.0,
756     "FW": 0.0,
757     "Black": 0.0,
758     "White": 0.0
759   }
760 },
761 "talkDivineB": {
762   "type": "select",
763   "desc": "\u5360\u3044\u5831\
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764   "value": {
765     "w": 0.0,
766     "v": 0.0,
767     "p": 0.0,
768     "s": 0.0,
769     "B": 0.0,
770     "M": 0.0,
771     "EVoted": 0.0,

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772     "WR": 0.0,
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775     "White": 0.0
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778 },
779 "P": {
780   "SCO": {
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782     "value":
783       -0.14897200843252745,
784     "desc": "\u5360\u3044\u5e2bCO
785       \u7387"
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787   "PPVCO": {
788     "type": "double",
789     "value": 0.0,
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791       u4ebaCO\u7387"
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793   "PPWCO": {
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795     "value": 0.0,
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797       u72fcCO\u7387"
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801     "value": 0.0,
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805   "LR": {
806     "type": "double",
807     "value": 1.843146255634664,
808     "desc": "\u7656\u306e\u5b66\u
809       u7fd2"
810   },
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813     "desc": "\u6295\u7968",
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823       "WR": 0.0,
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827     }
828   },
829   "talk": {
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824     "desc": "\u6295\u7968\u767a\u
825       u8a00",
826     "value": {
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828       "V": 0.17217051908624414,
829       "P": 0.0,
830       "S": 0.0,
831       "B": 0.45431485764930823,
832       "M": 0.0,
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835       "WR": 0.0,
836       "FW": 0.0,
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841   "talkDivineW": {
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844       u544a\uuff08\u767d\uuff09",
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848       "P": 0.0,
849       "S": 0.0,
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852       "EVoted": 0.0,
853       "WR": 0.0,
854       "FW": 0.0,
855       "Black": 0.0,
856       "White": 0.0
857     }
858   },
859   "talkDivineB": {
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862       u544a\uuff08\u9ed2\uuff09",
863     "value": {
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865       "V": 0.0,
866       "P": 0.0,
867       "S": 0.0,
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871       "WR": 0.0,
872       "FW": 0.0,
873       "Black": 0.0,
874       "White": 0.0
875     }
876   }
877 }
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