Causality-guided Sampling of Software Configuration Spaces

Kallistos Weis

Clemens Dubslaff

Christel Baier

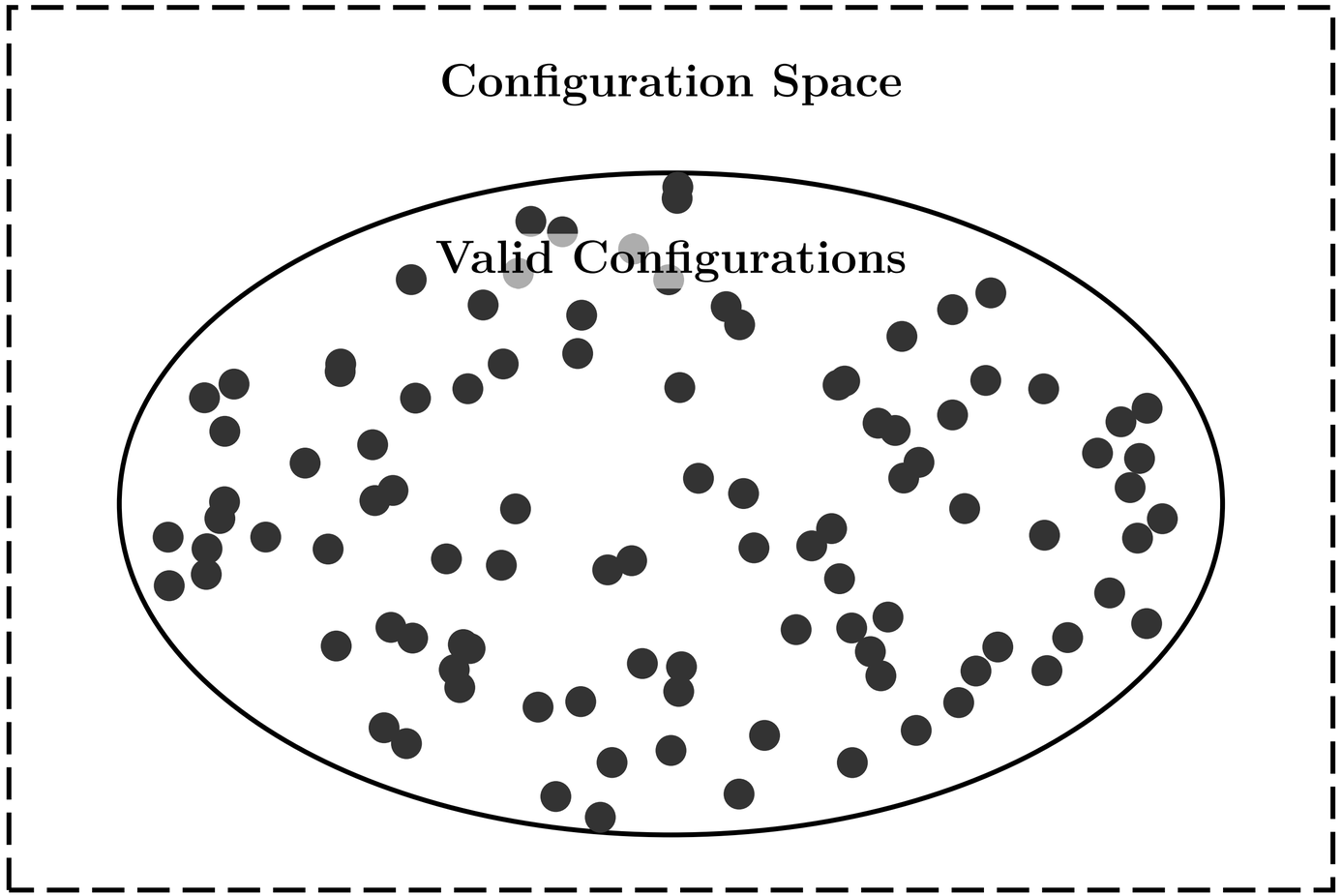
Sven Apel

UNIVERSITÄT DES SAARLANDES

TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

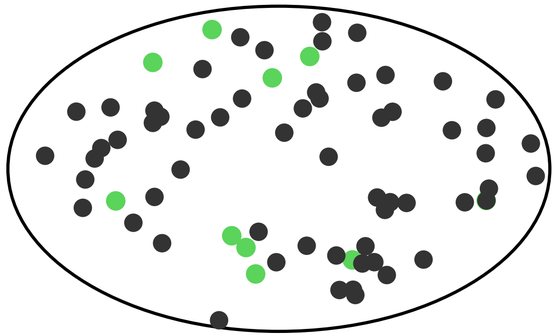
TECHNISCHE UNIVERSITÄT DRESDEN

Why Sampling?



Sampling Strategies

Random/Uniform



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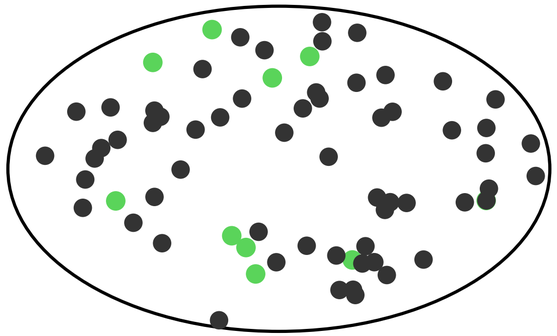

Coverage-Based

```
#ifdef A
  // code 1
#endif

#ifdef B
  // code 2
#else
  // code 3
#endif

#ifdef C
  // code 4
#endif
```

pair-wise

config-1:	!A	!B	C
config-2:	!A	B	!C
config-3:	A	!B	!C
config-4:	A	B	C

one-enabled

config-1:	A	!B	!C
config-2:	!A	B	!C
config-3:	!A	!B	C

one-disabled

config-1:	!A	B	C
config-2:	A	!B	C
config-3:	A	B	!C

most-enabled-disabled

config-1:	A	B	C
config-2:	!A	!B	!C

statement-coverage

config-1:	A	B	C
config-2:	A	!B	C

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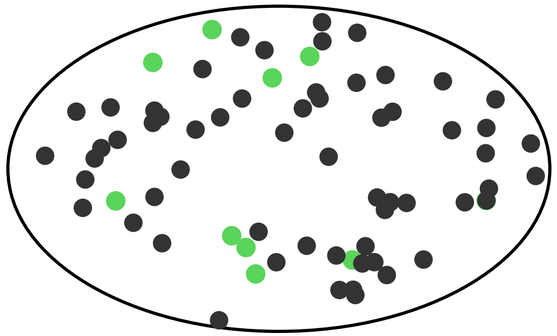

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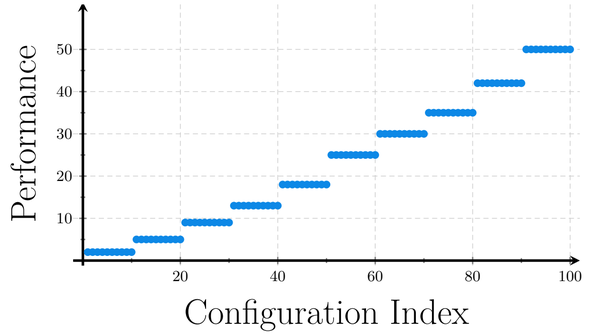
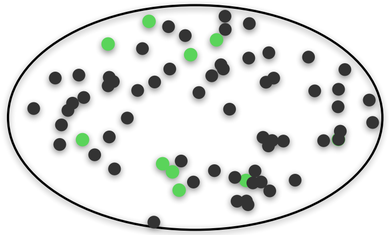
Sampling on Characteristics



Causality-guided Sampling



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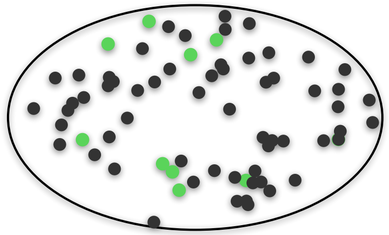

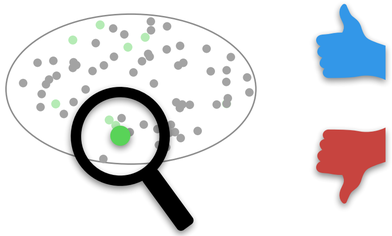

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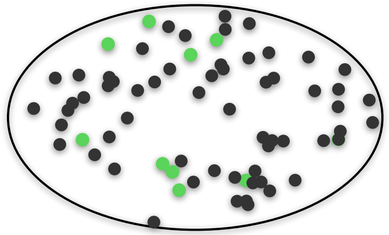

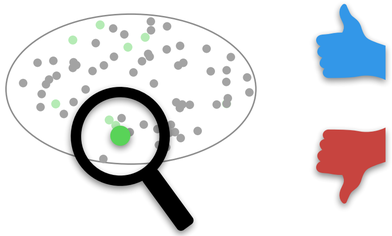

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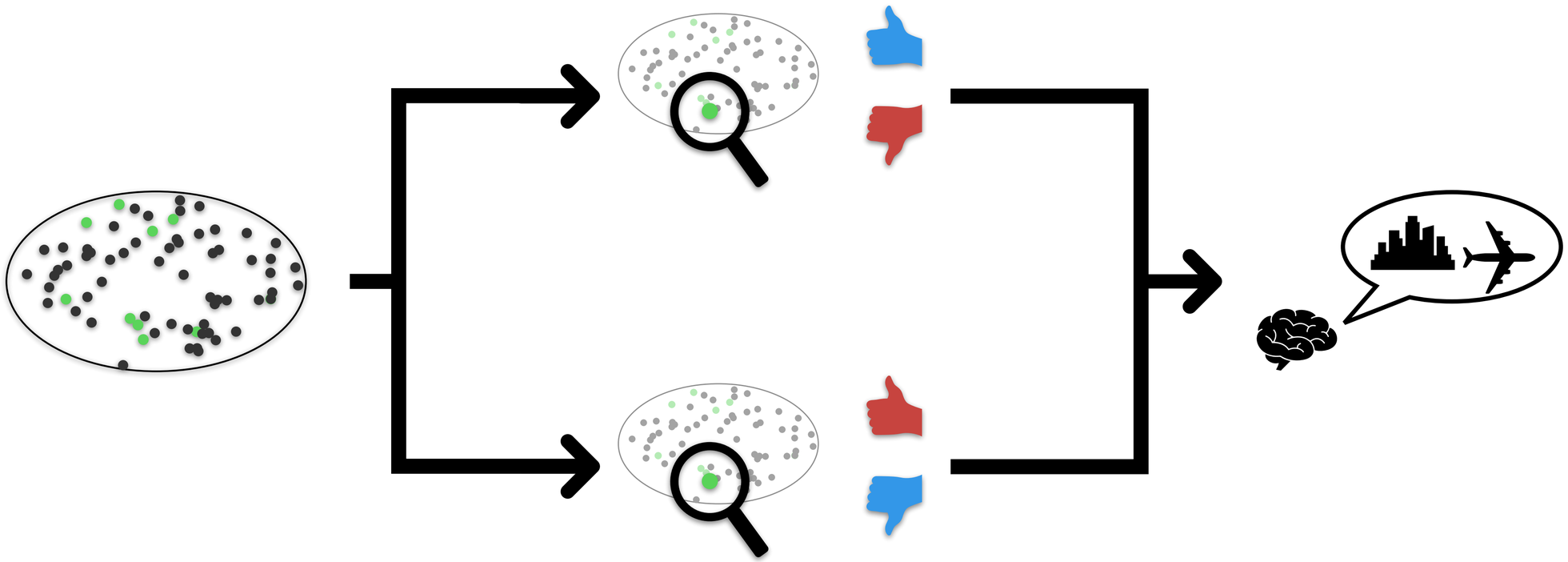

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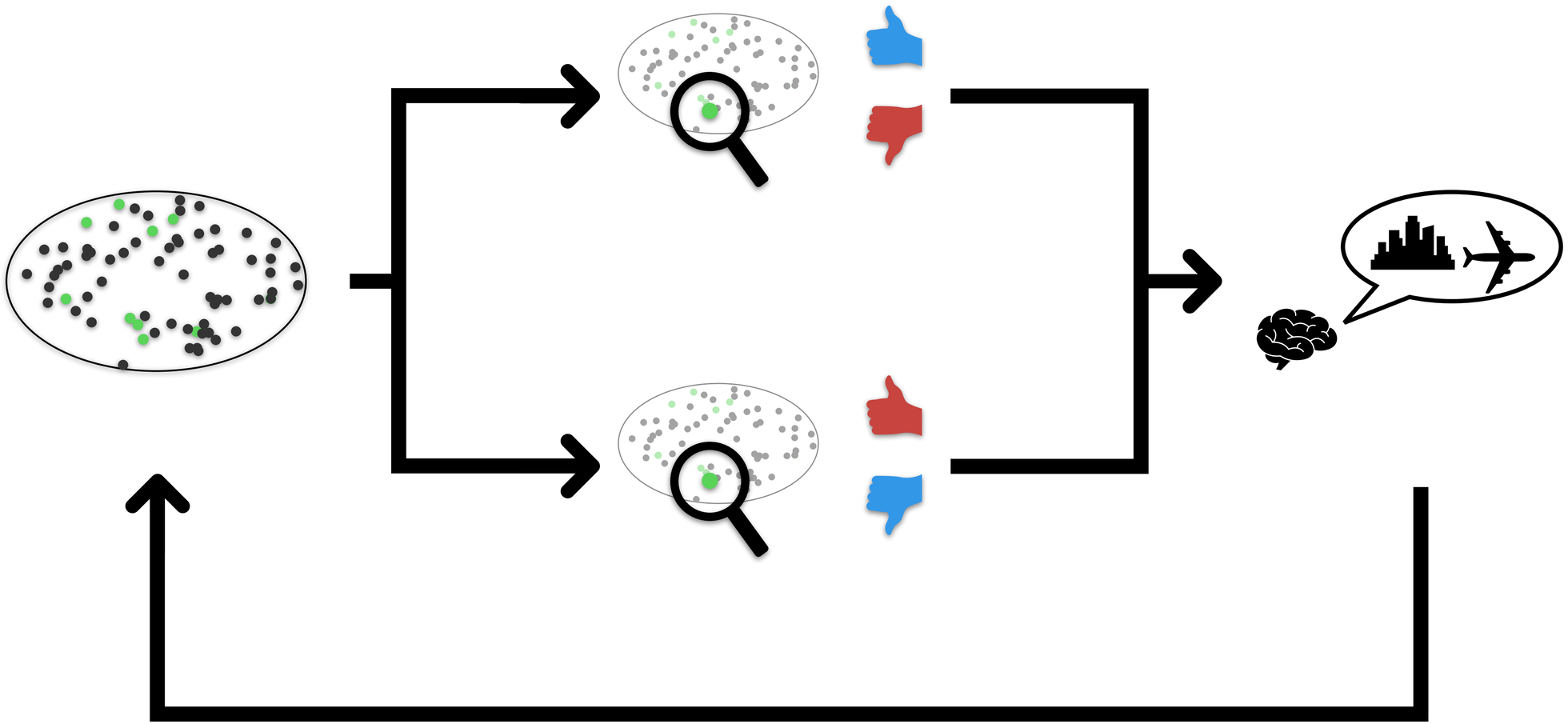

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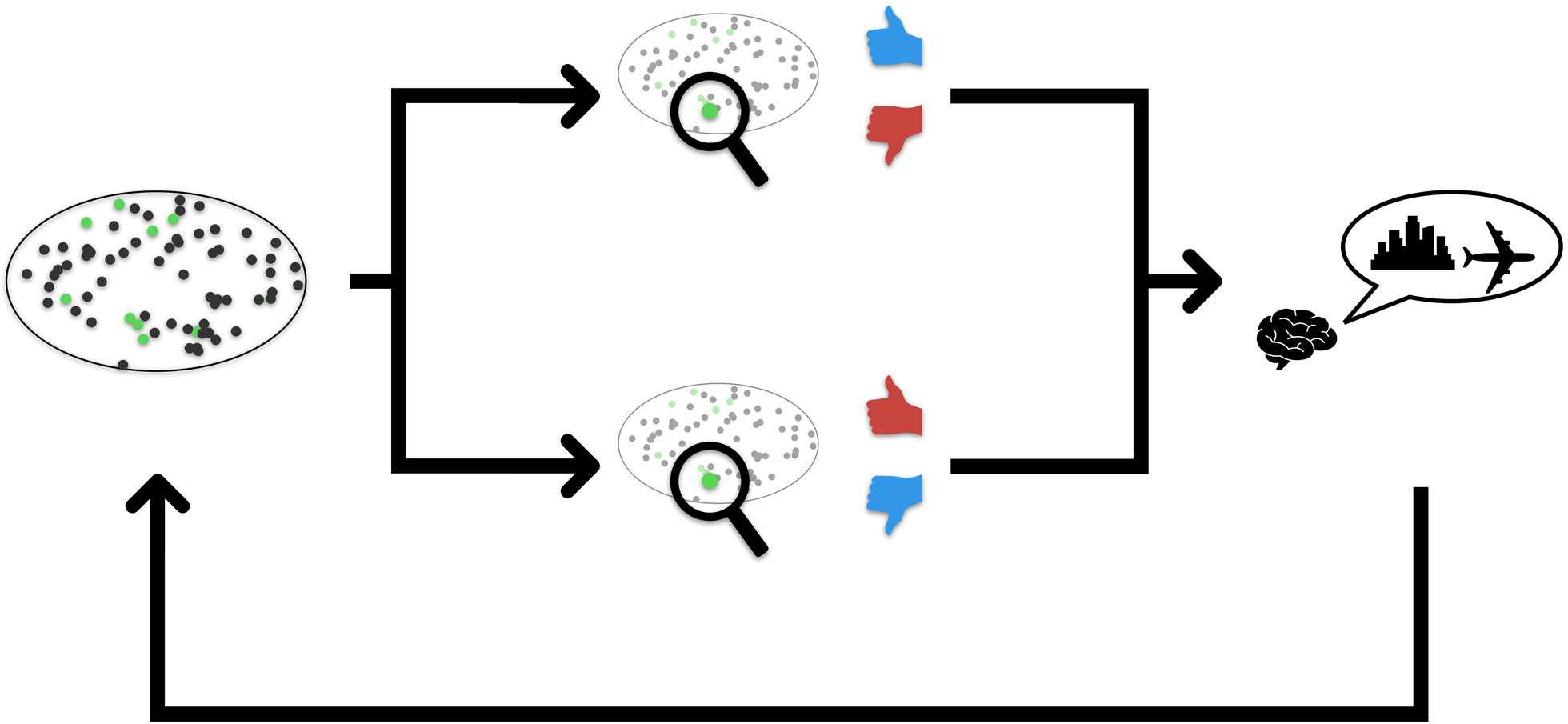

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$$[\![\gamma \uparrow_x]\!] \cap \mathrm{NE}^* \neq \emptyset \text{ for all } x \in \mathrm{supp}(\gamma)$$

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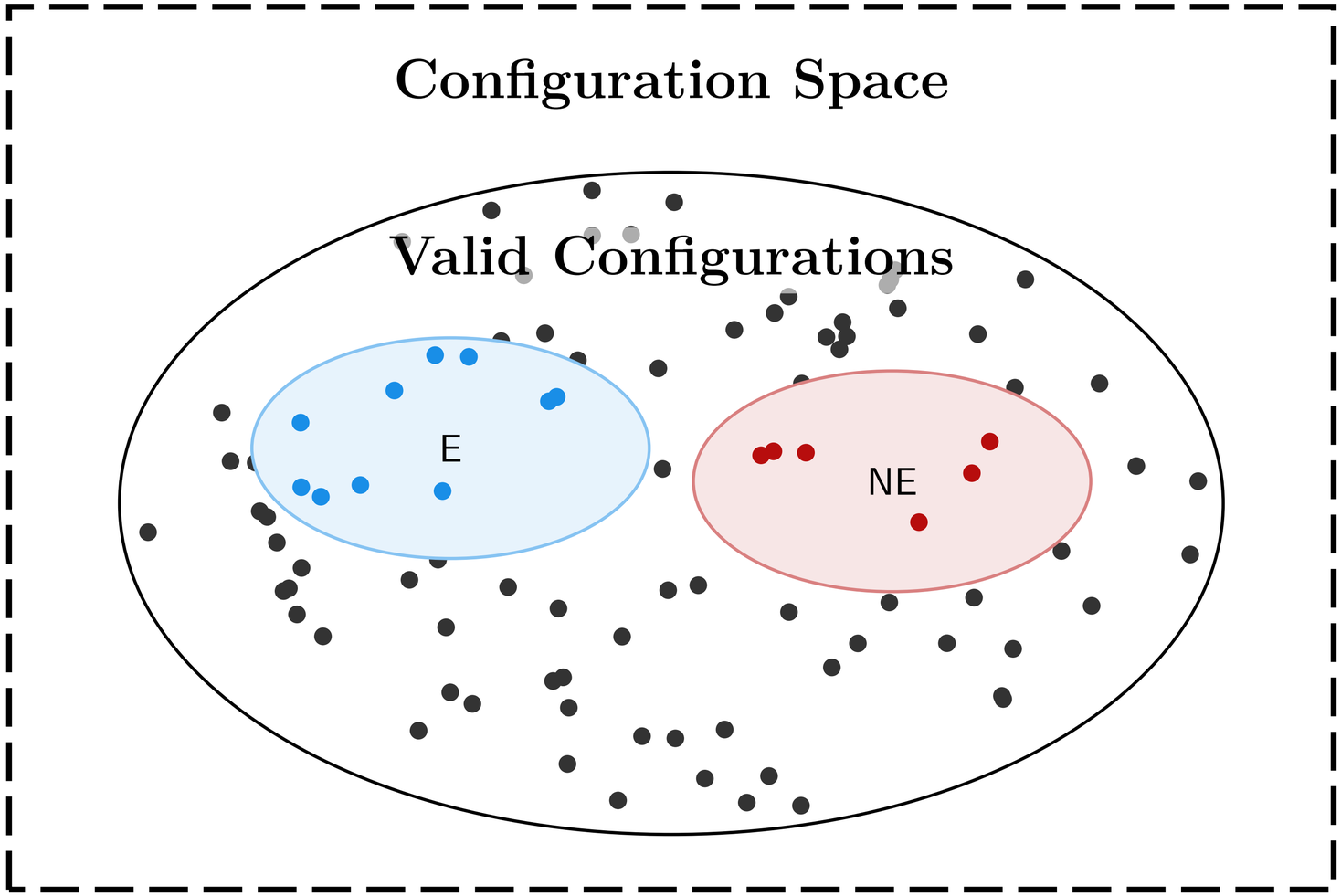

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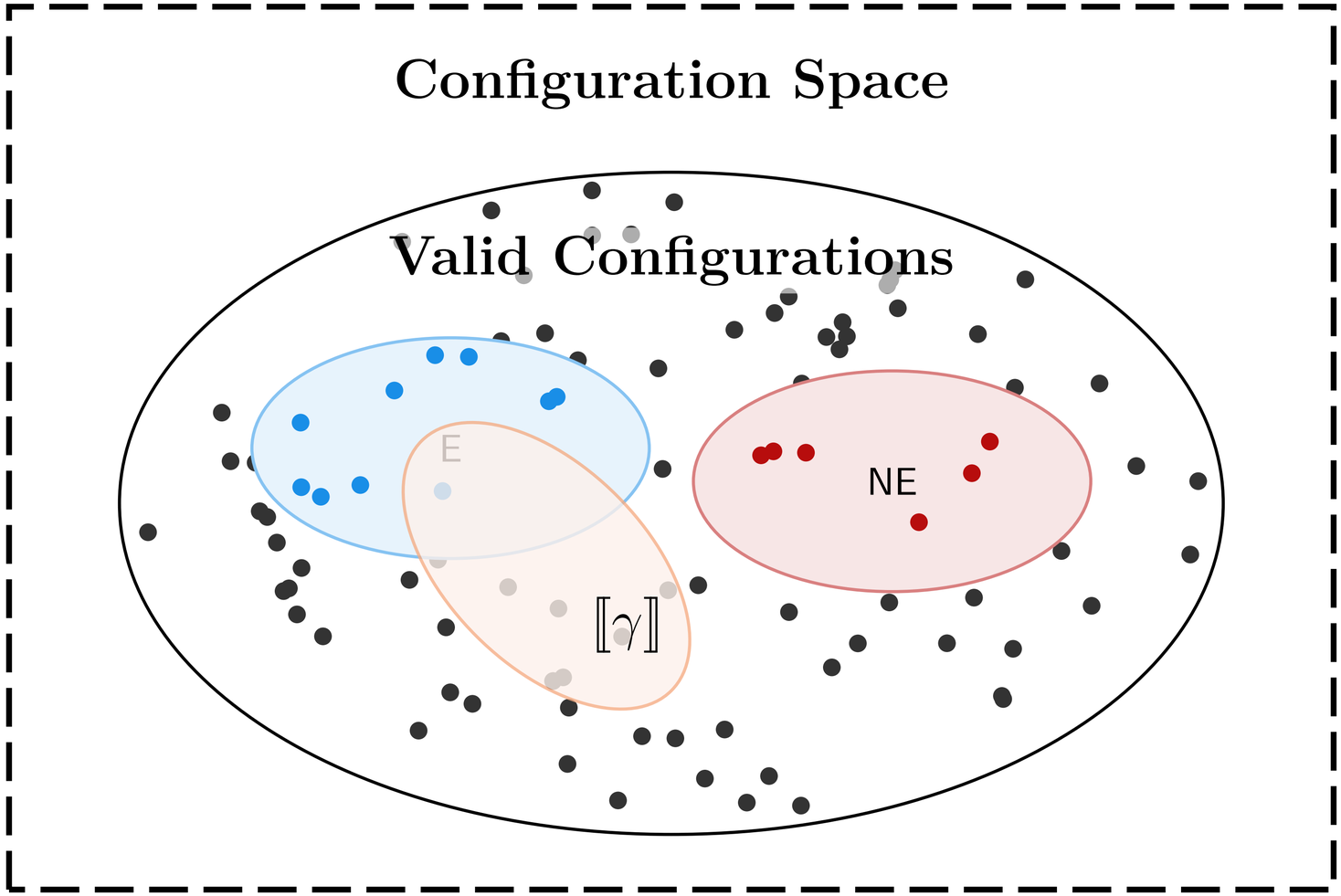

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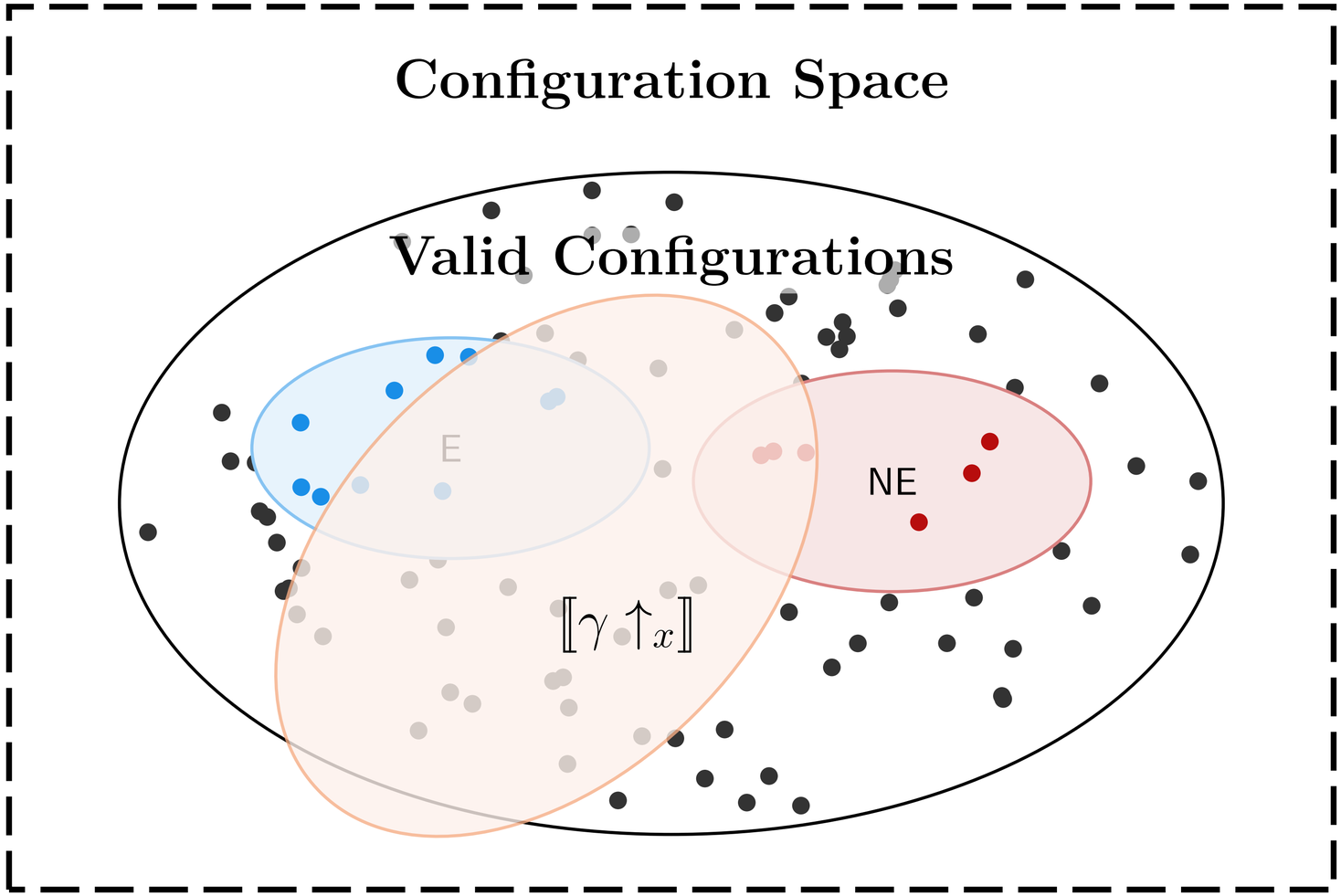

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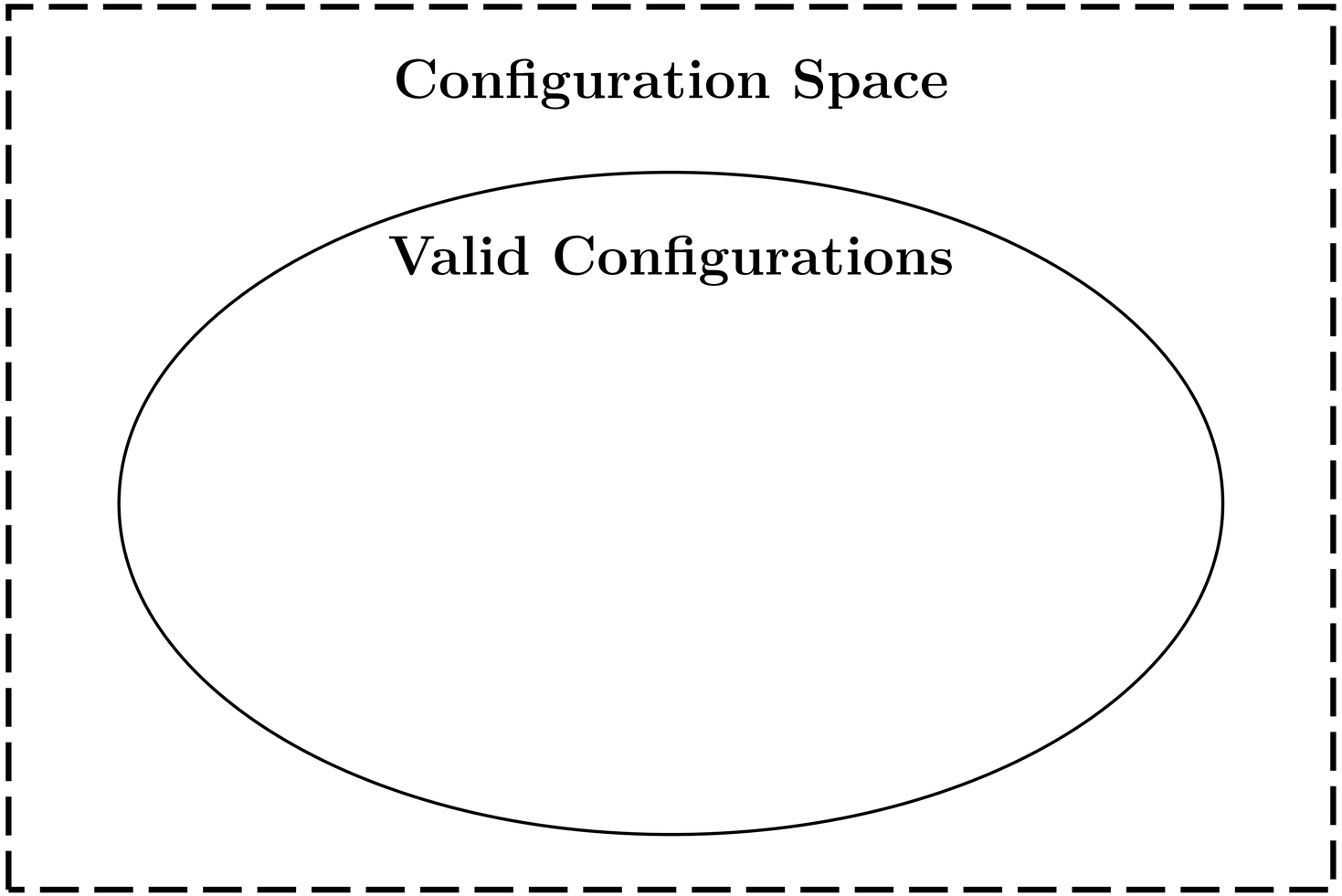

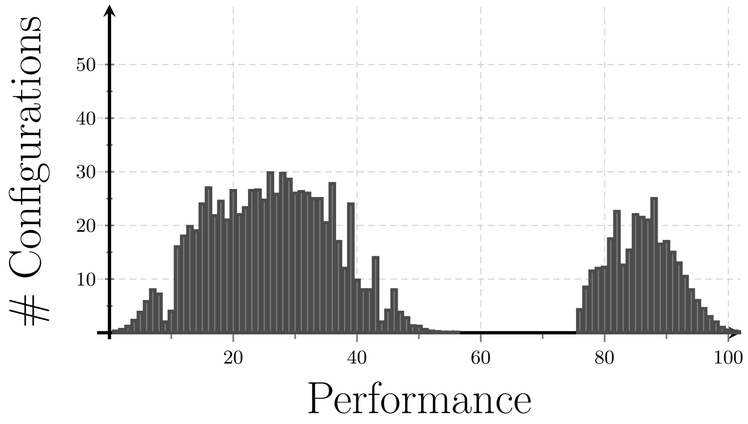

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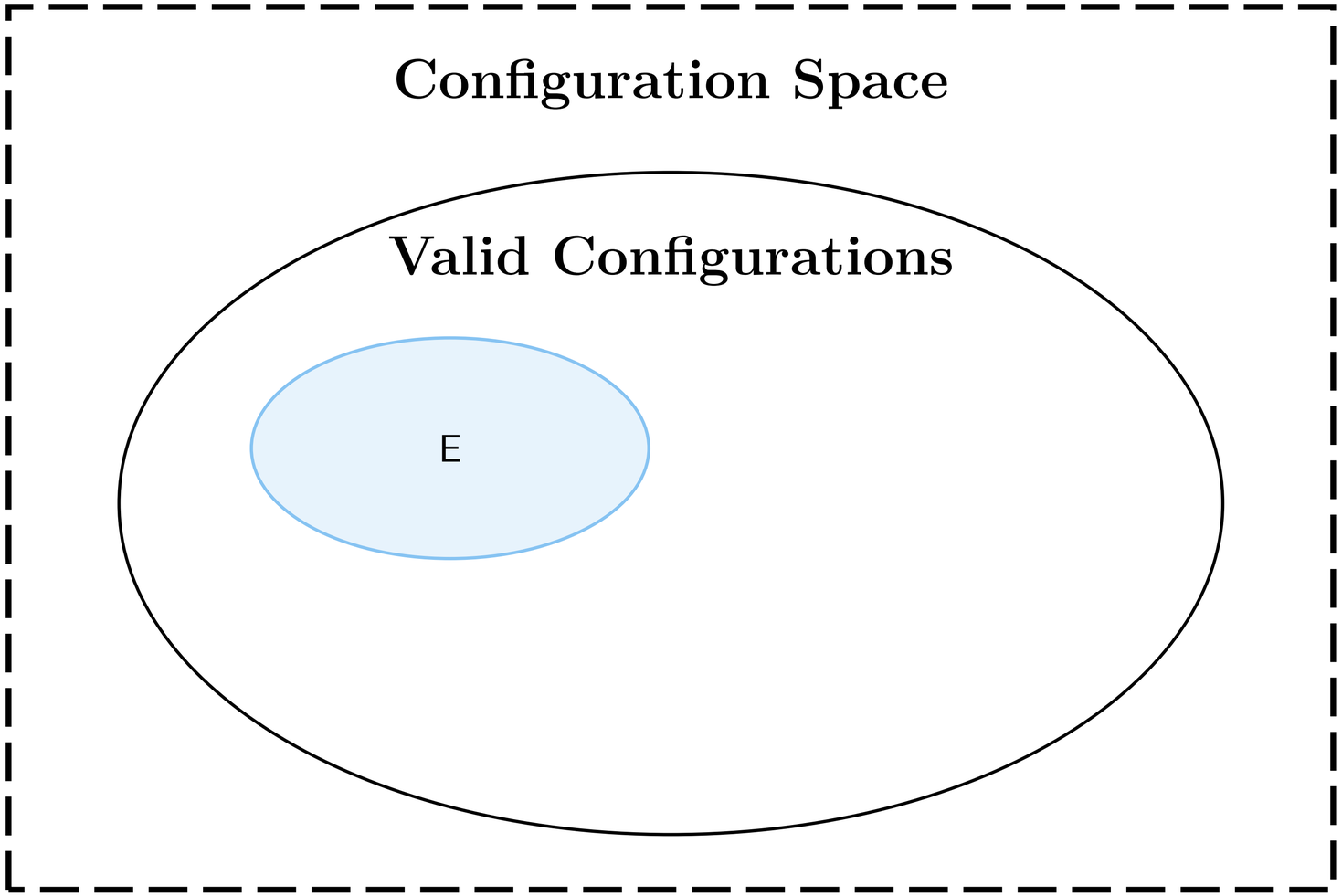

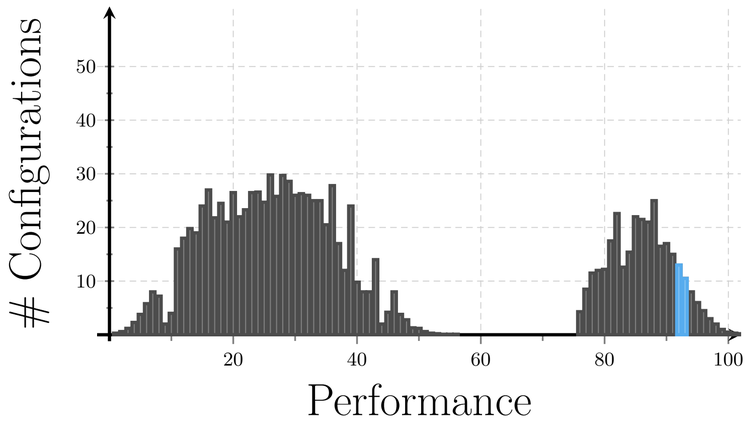

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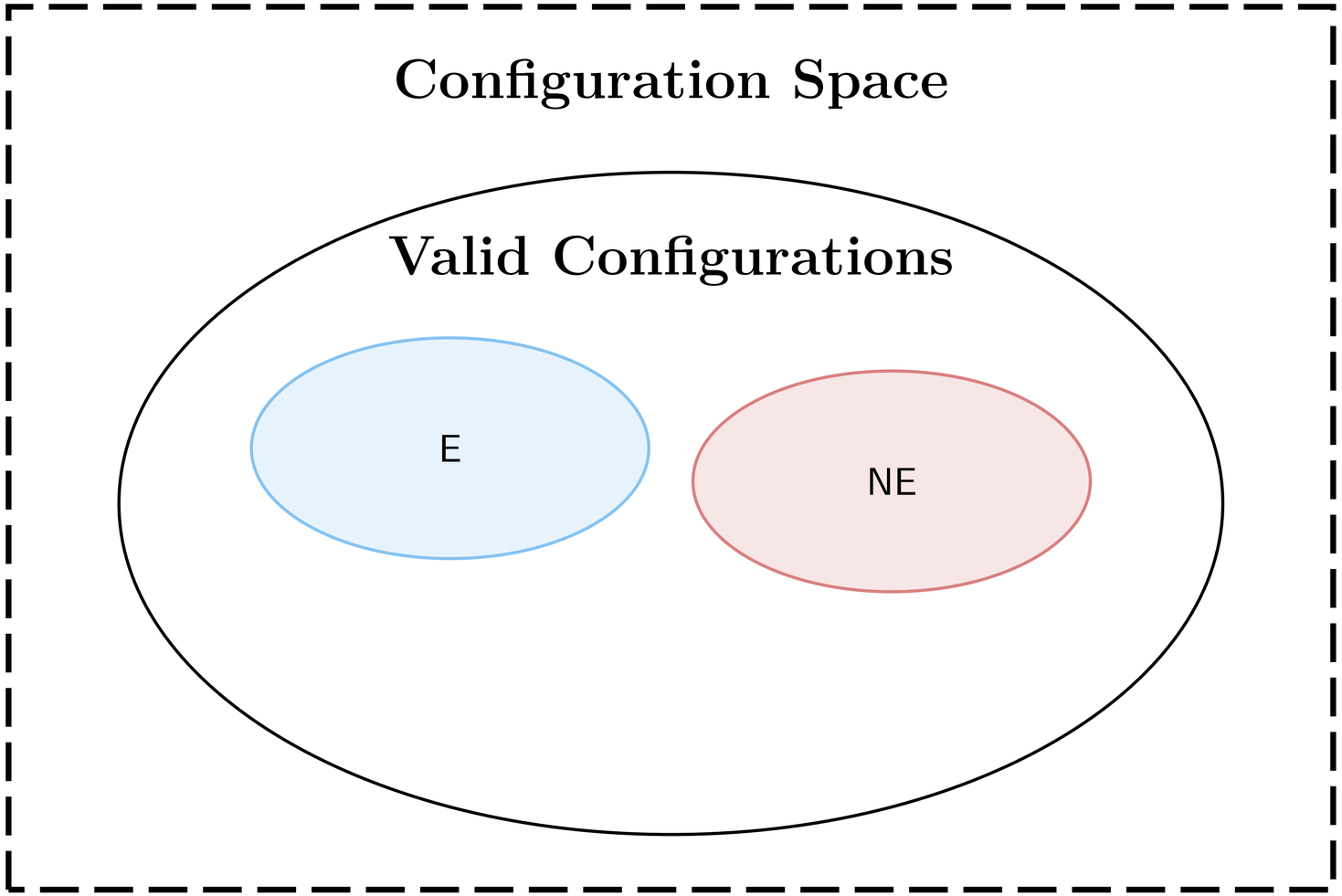

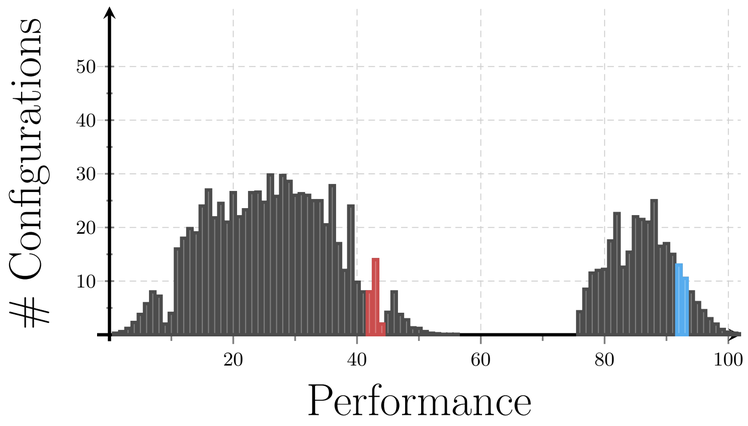

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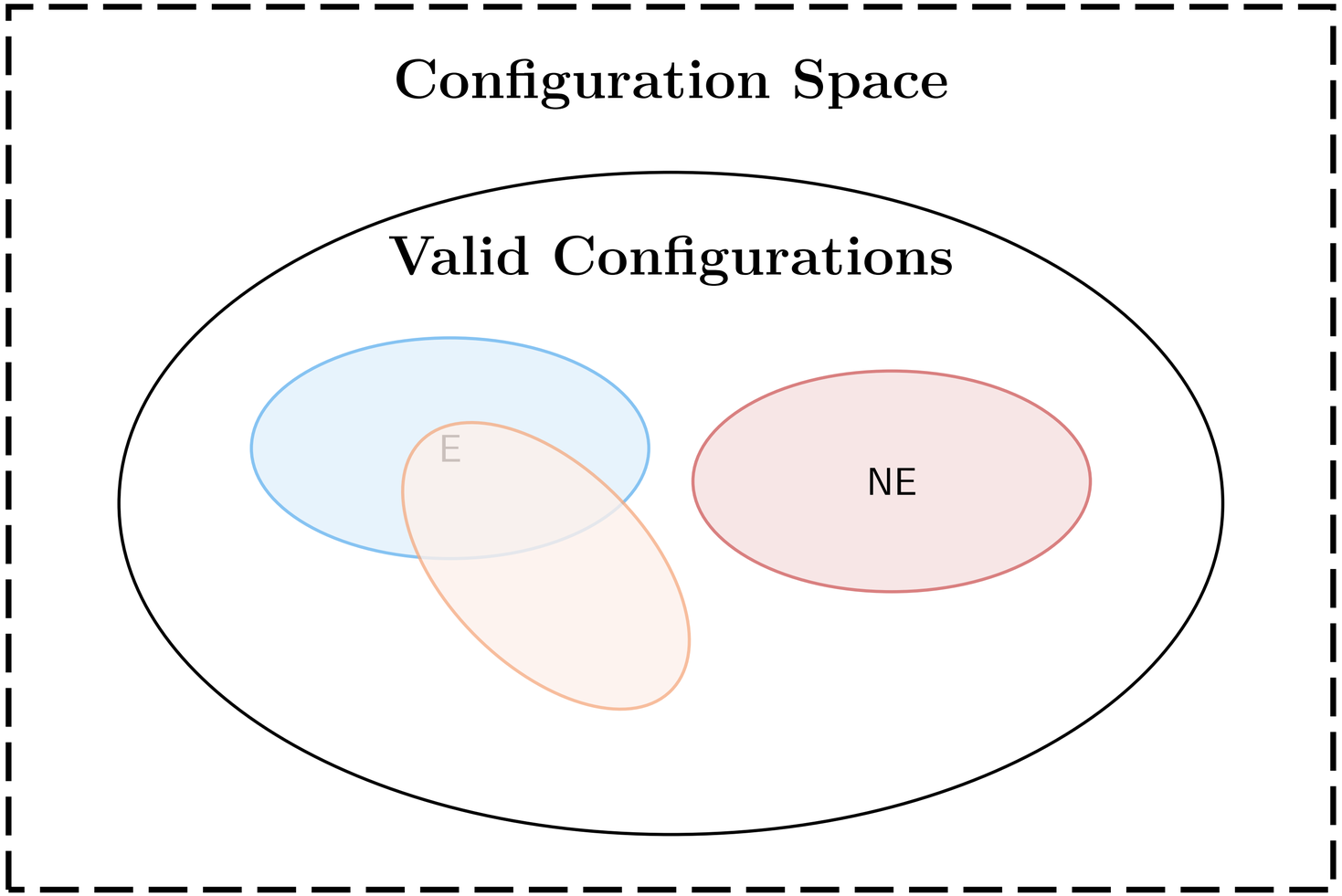

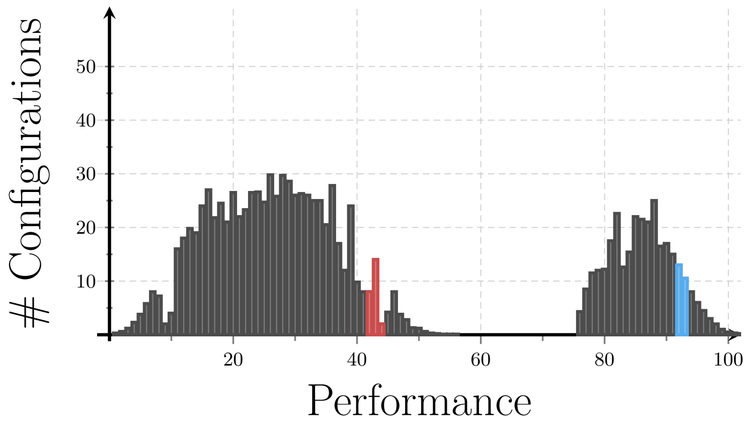

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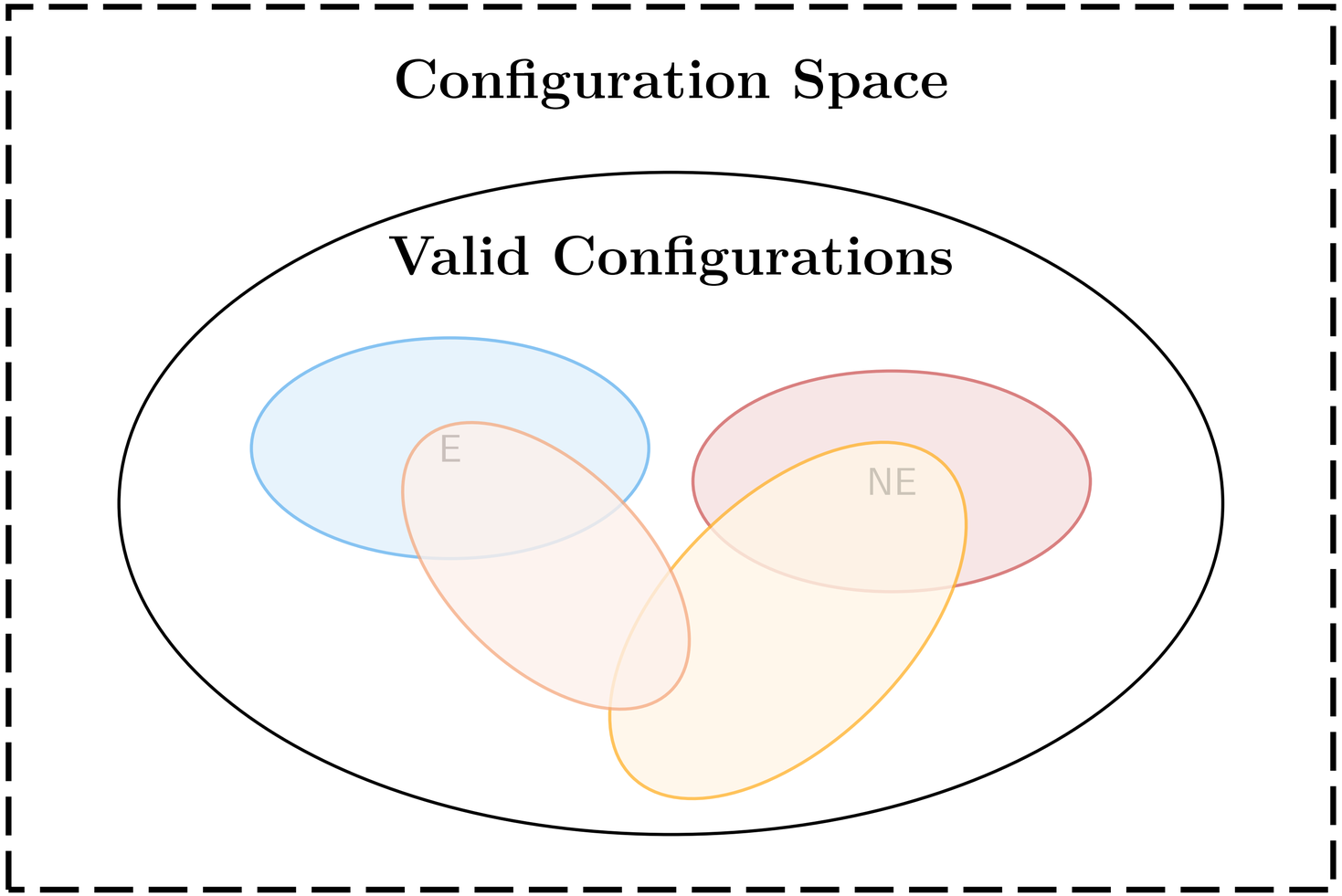

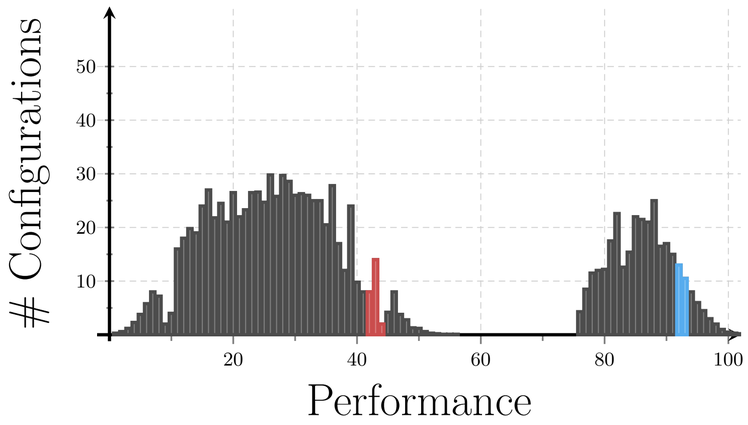

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