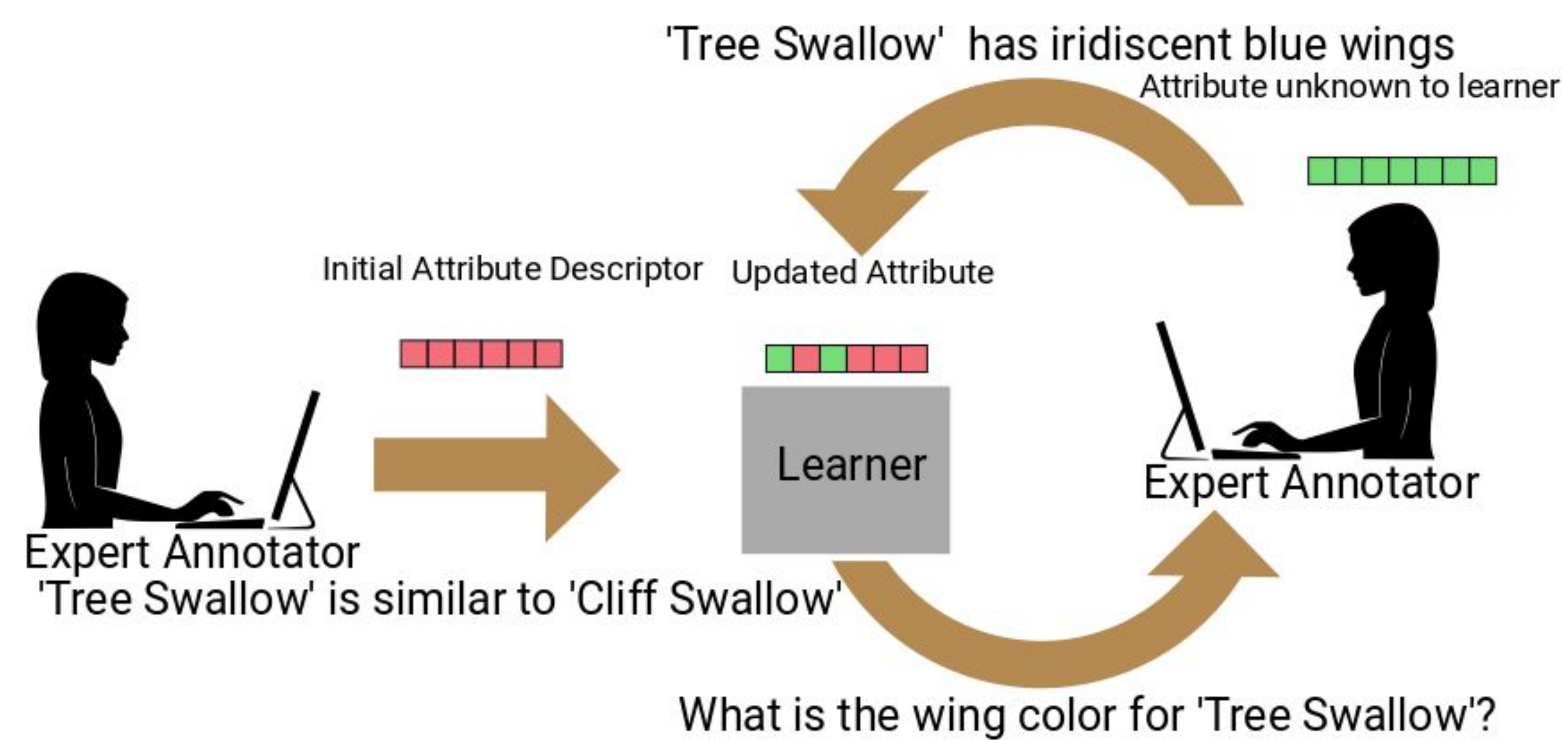


Contributions



Reducing the annotation cost for zero-shot learning.

- A new **field-guide-inspired** interactive ZSL approach.
- **New query strategies**, to actively query expert attributes to rapidly train the learner.

Problem

Zero-shot learning is not really "zero-shot".
100s of annotations are required for each class.
Can this annotation cost be reduced?

Field-guides

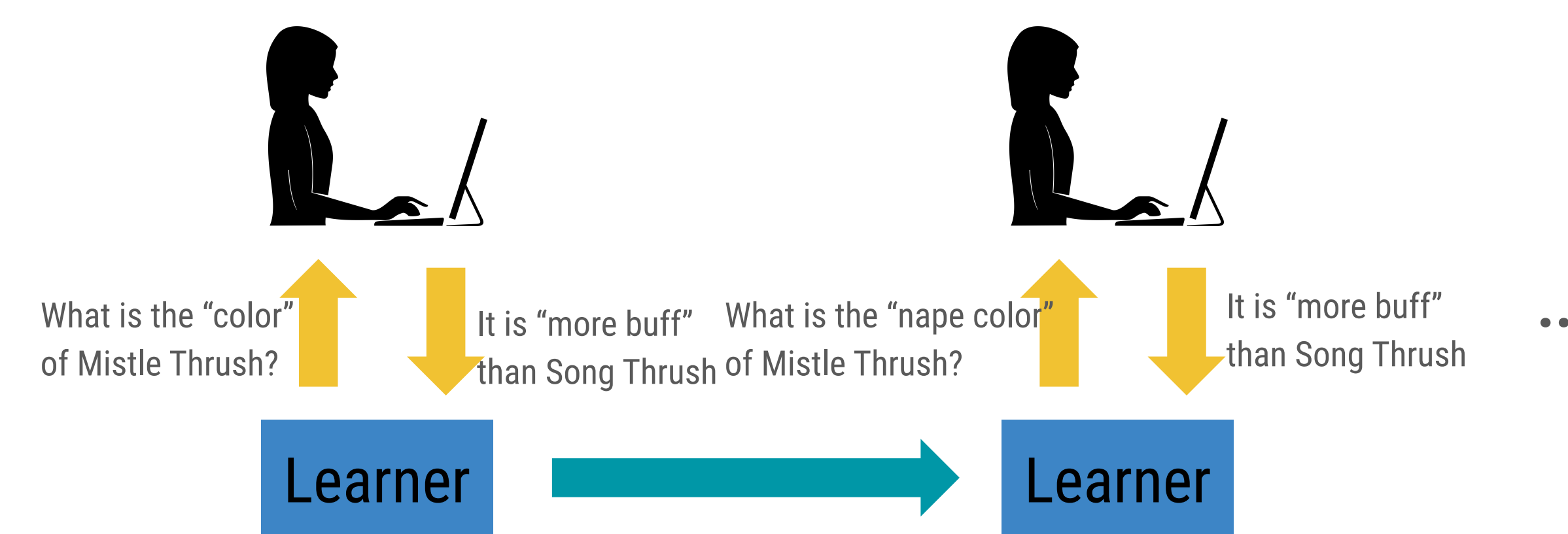
English Name: Mistle Thrush
Scientific Name: *Turdus viscivorus*
Description:

1. Plain greyish brown backs and neatly round-spotted underparts
2. Larger than the Song Thrush but the breast has much less buff



Field-guide authors do not describe all the attributes for a novel category.

Interface



Instead of letting annotators choose attributes to label, the learner chooses the useful attributes first.

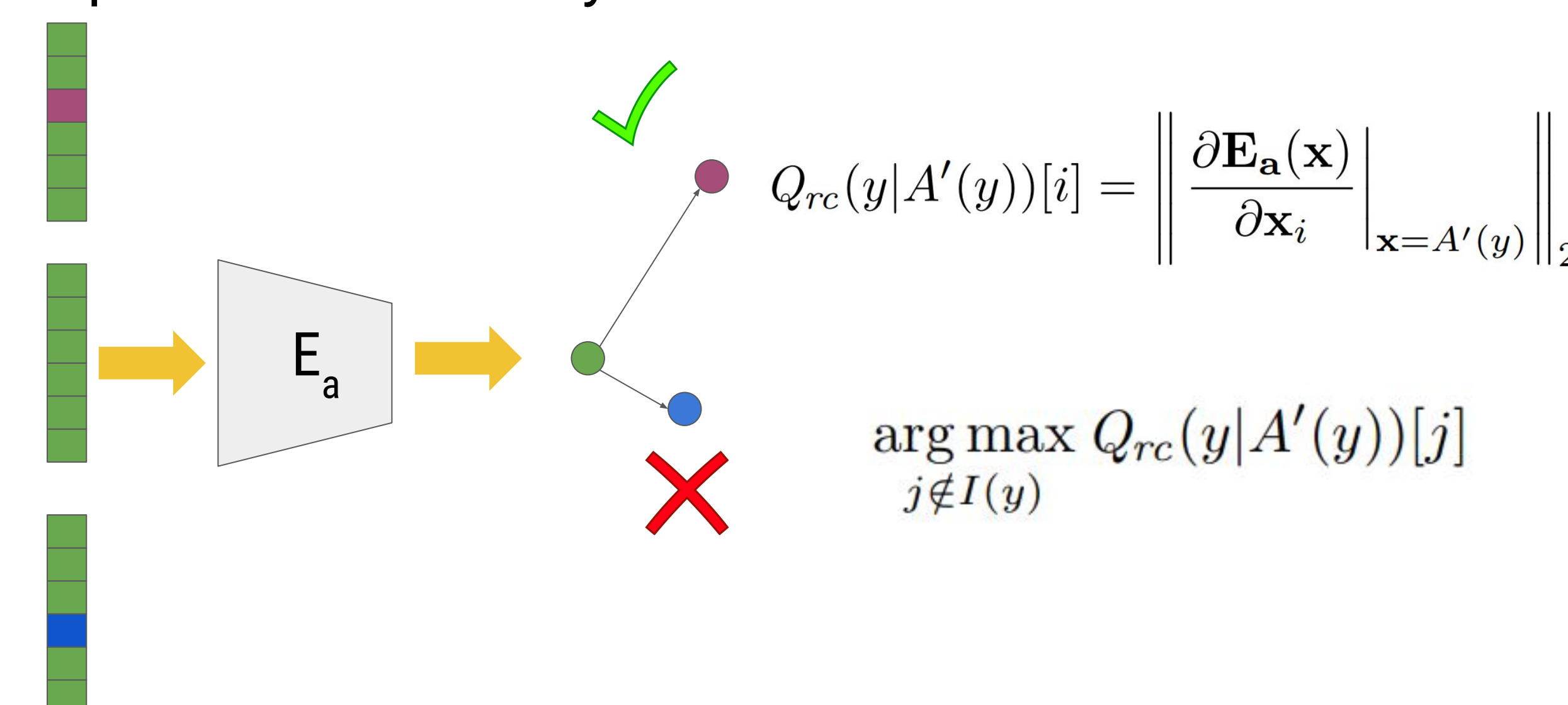
Querying Policy

1. **Sibling-variance:**
 - Select attributes with higher variance in a taxonomy branch.
 - Requires taxonomy for base classes.

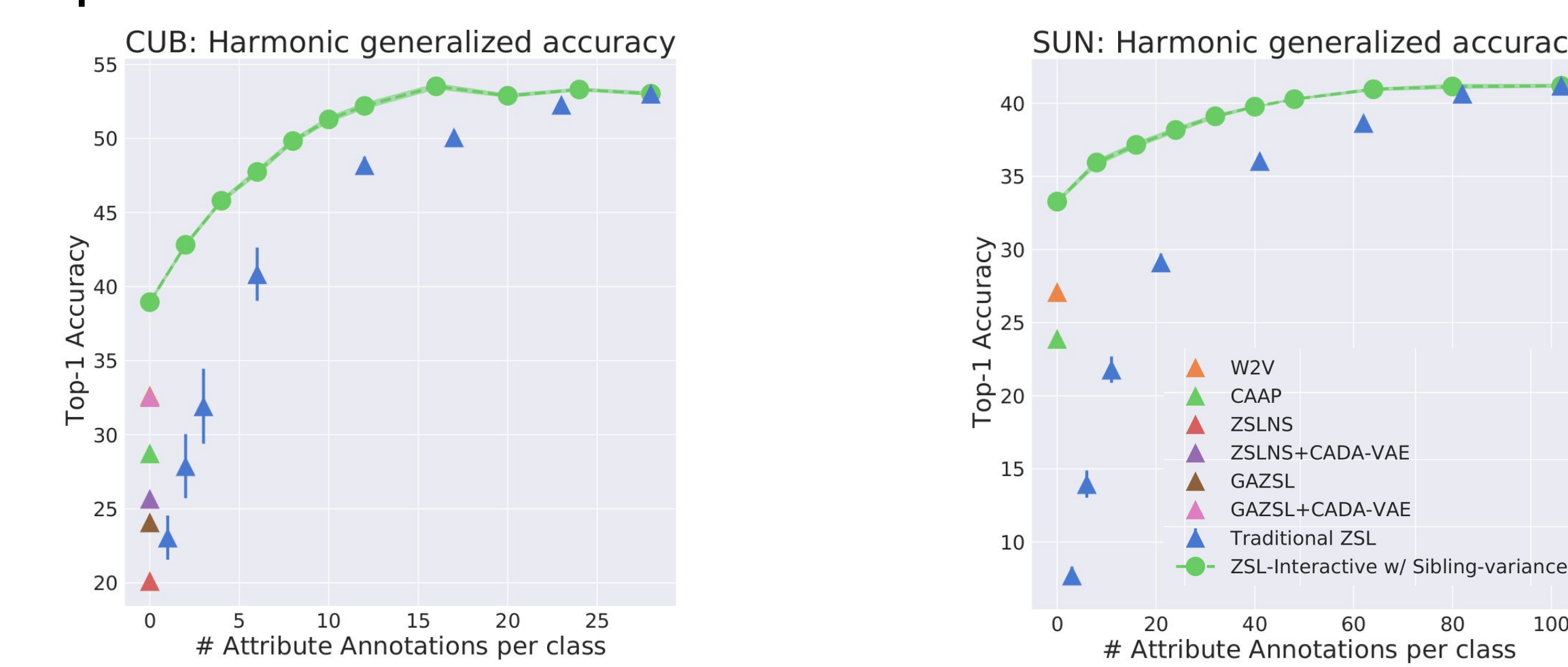


✗ Low variance attributes: wings shape, body color, bill shape
✓ High variance attribute: nape color

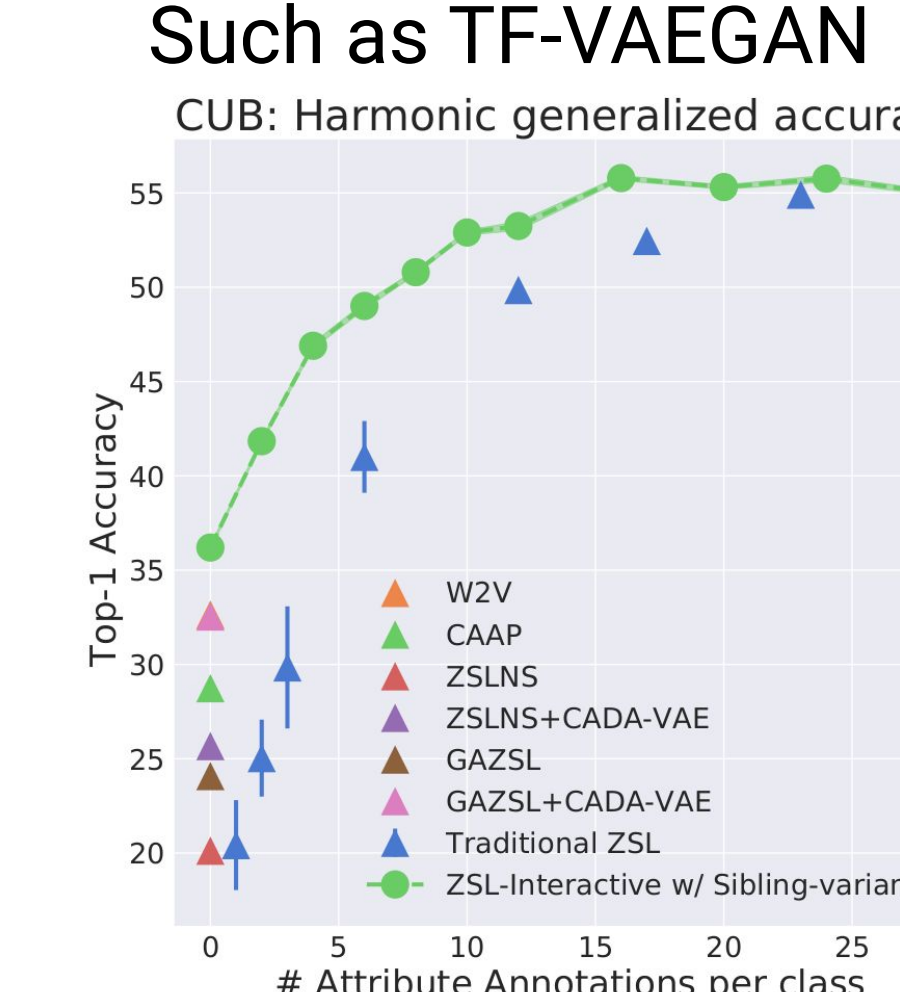
2. **Representation-change:**
 - Select attribute resulting in most change in latent representation locally



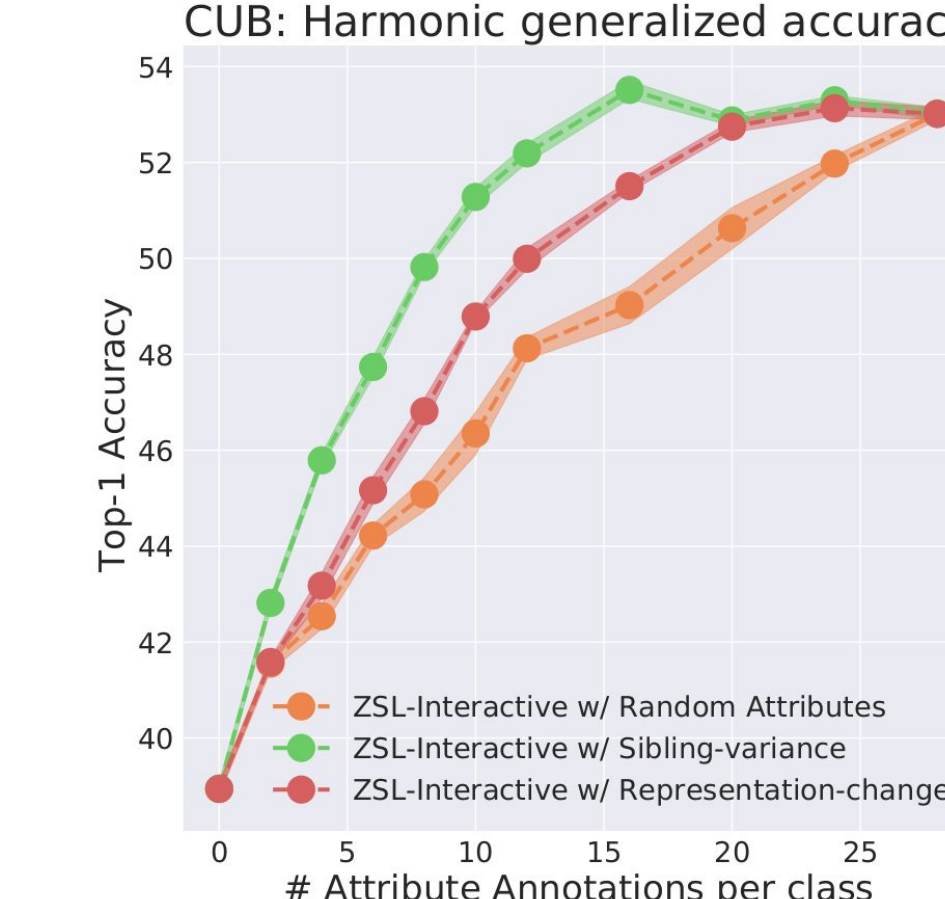
Field-guide way of annotations is better than traditional ZSL and unsupervised ZSL.



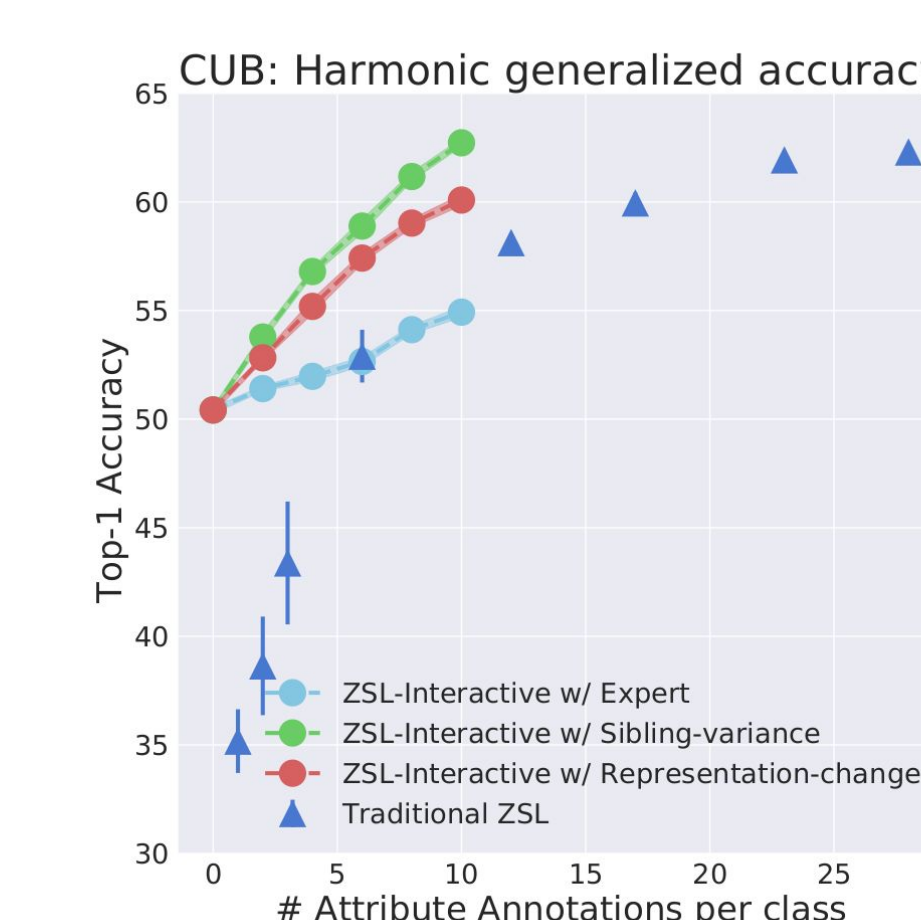
Generalized to other ZSL models
Such as TF-VAEGAN



Both querying policies improve the performance of field-guide

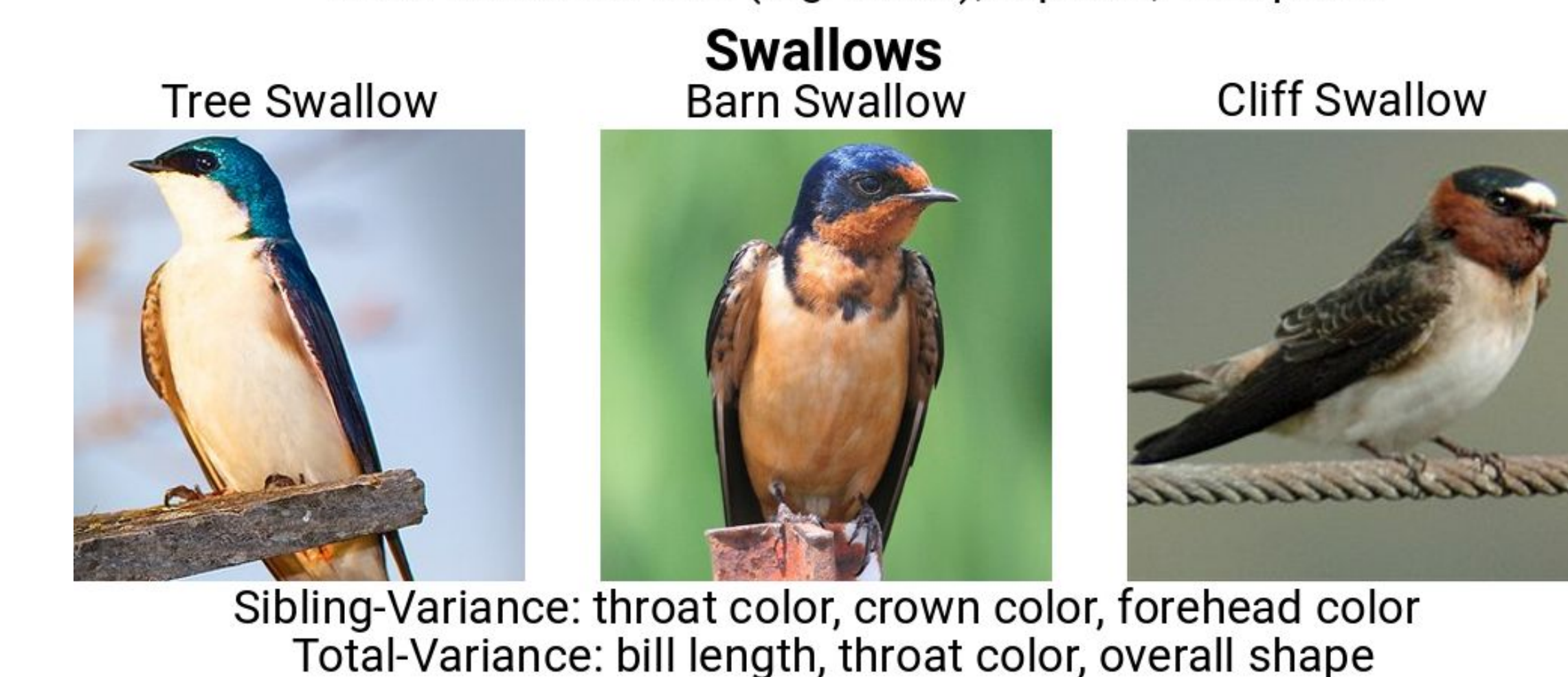
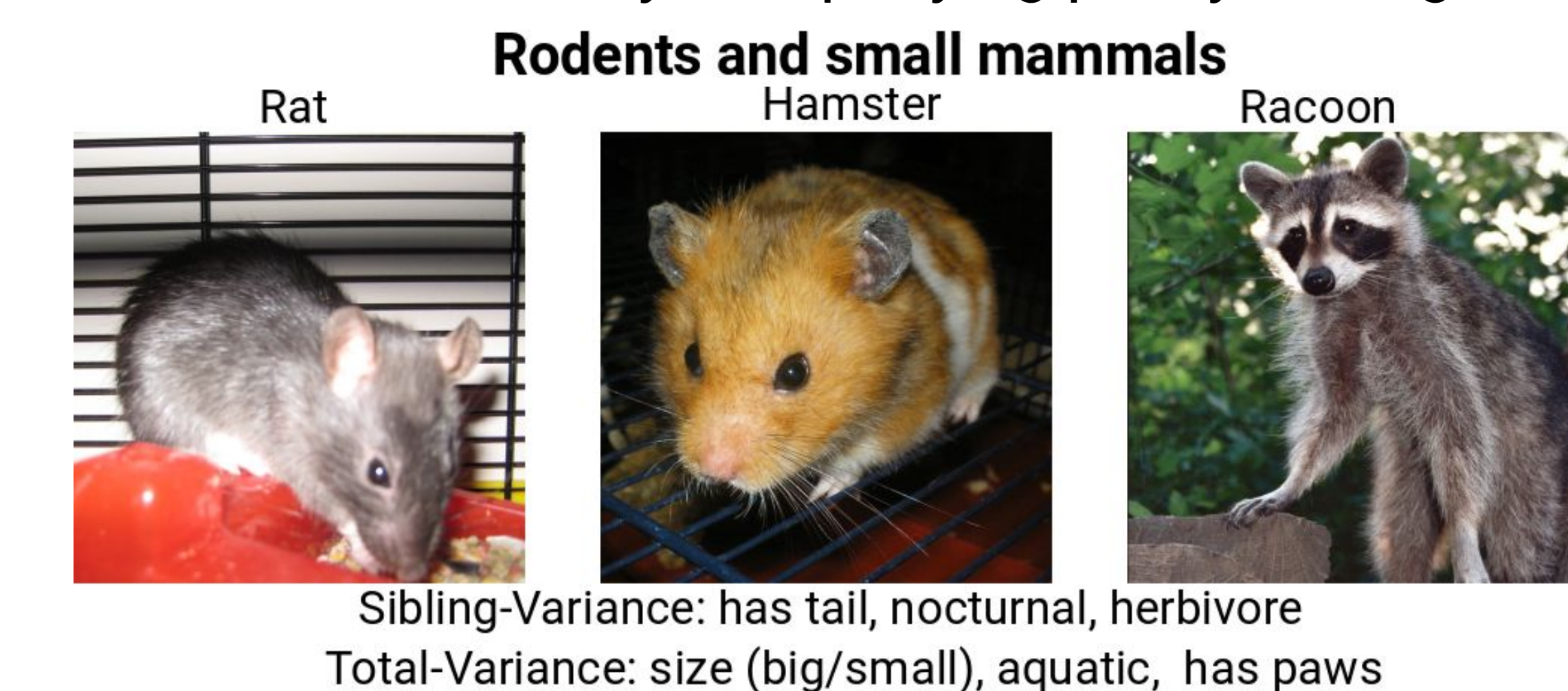


Querying policies are better than human experts.

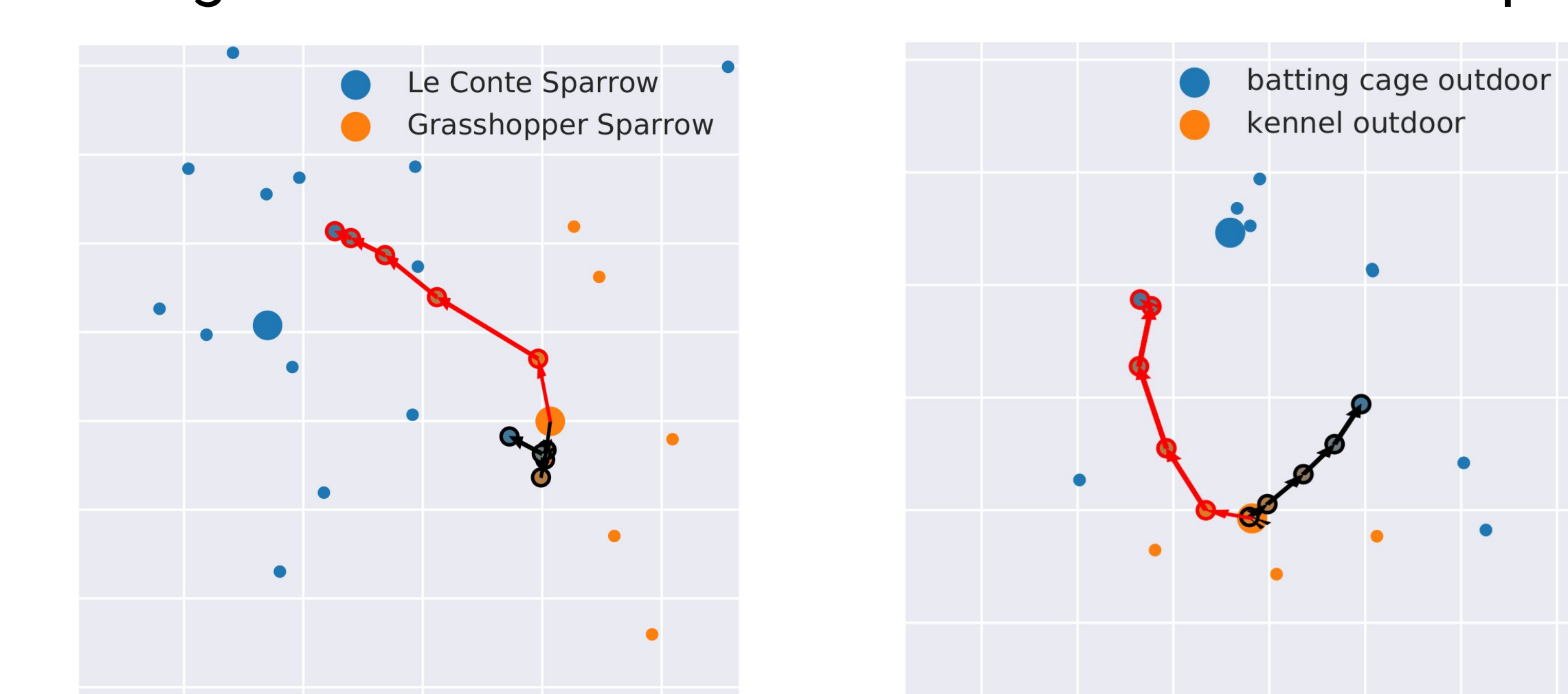


Results

Attributes asked by our querying policy are logical.



Sibling-variance creates more accurate attributes quicker.



Take-away

- With **only 35%** of total annotations, one can get full model performance on SUN and CUB. Saving more than **32 hours!** of expert annotation cost on CUB.
- Field-guide annotation interface are **more efficient** and **practical** to use with experts.
- **Learner oriented** querying policies lead to better performance.

Future Work

- Policies that can choose different number of attributes.
- Bridging the gap between attribute understanding of humans and machines.
- Policies leveraging already selected attributes.

Acknowledgment

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