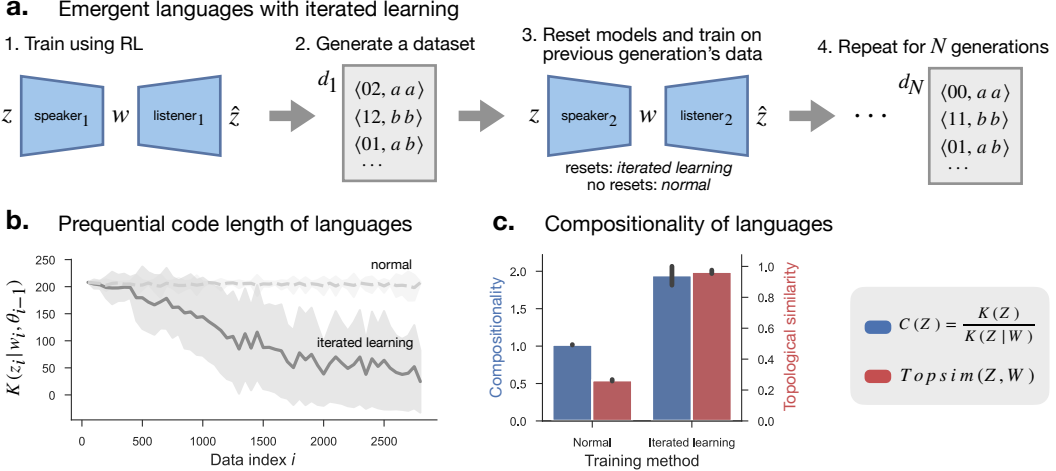
a.
Emergent languages with iterated learning
1. Train using RL
z
speaker1
w
listener1
ẑ
2. Generate a dataset
d1
⟨02, a a⟩
⟨12, b b⟩
⟨01, a b⟩
3. Reset models and train on previous generation's data
z
speaker2
w
listener2
ẑ
resets: iterated learning
no resets: normal
4. Repeat for N generations
dN
⟨00, a a⟩
⟨11, b b⟩
⟨01, a b⟩
b.
Prequential code length of languages
normal
iterated learning
K(zi | wi; θi−1)
Data index i
c.
Compositionality of languages
Compositionality
Topological similarity
Normal
Iterated learning
Training method
C(Z) = K(Z) / K(Z|W)
Topsim(Z, W)