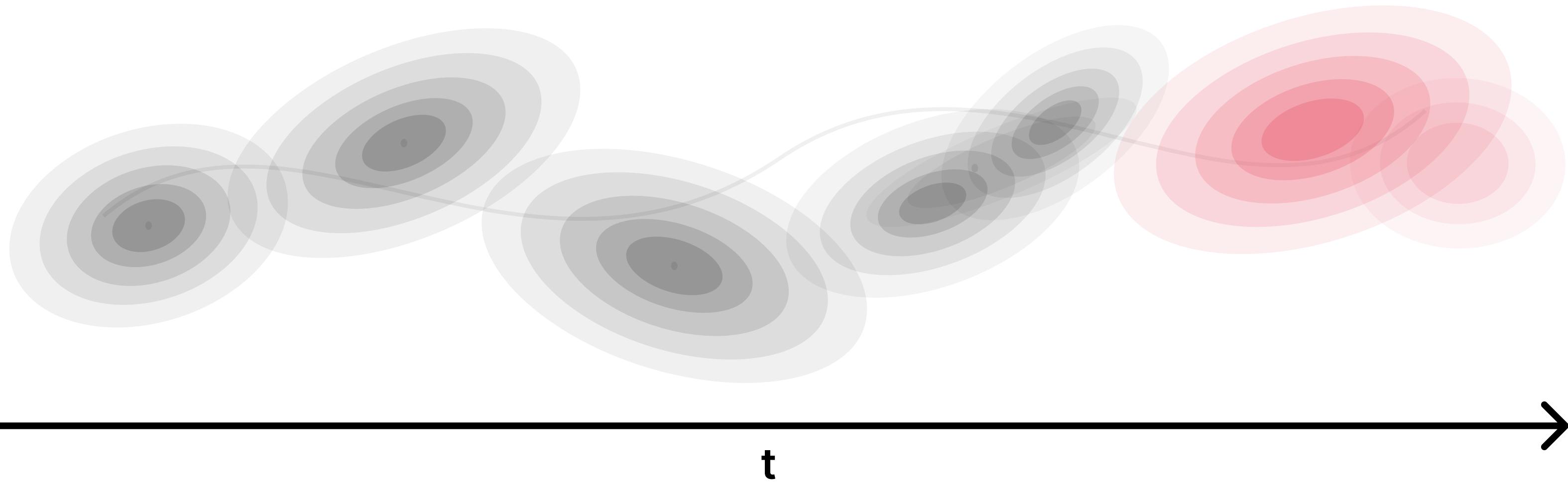


a.

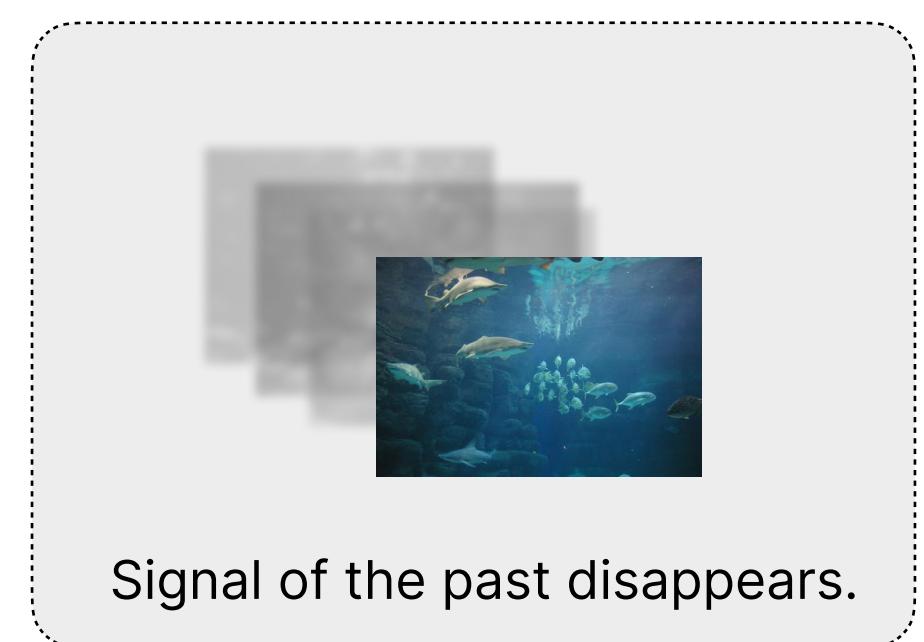
# World is not static. Continual Learning is a generalization of Empirical Risk Minimization



b.

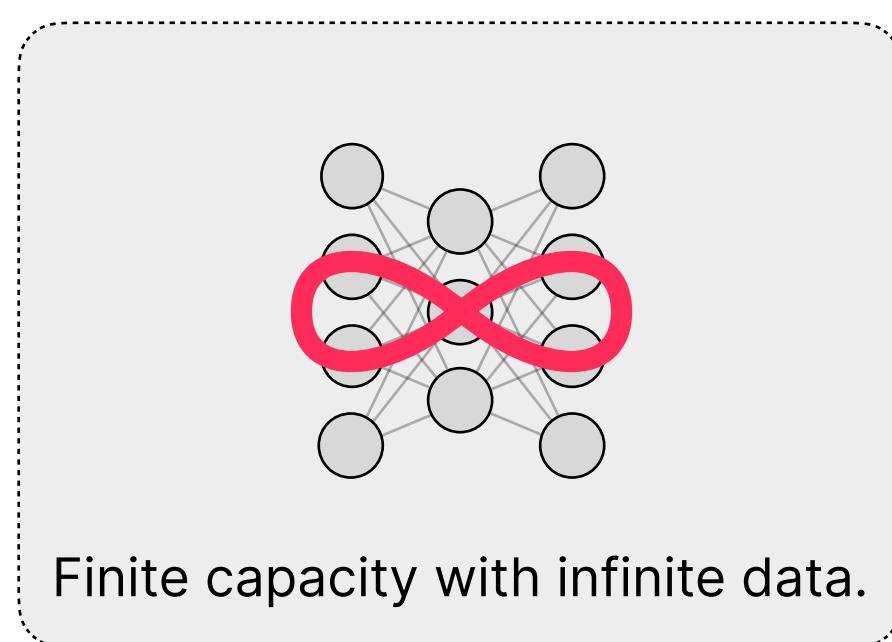
## Three Obstacles for Continual Learning:

### Information



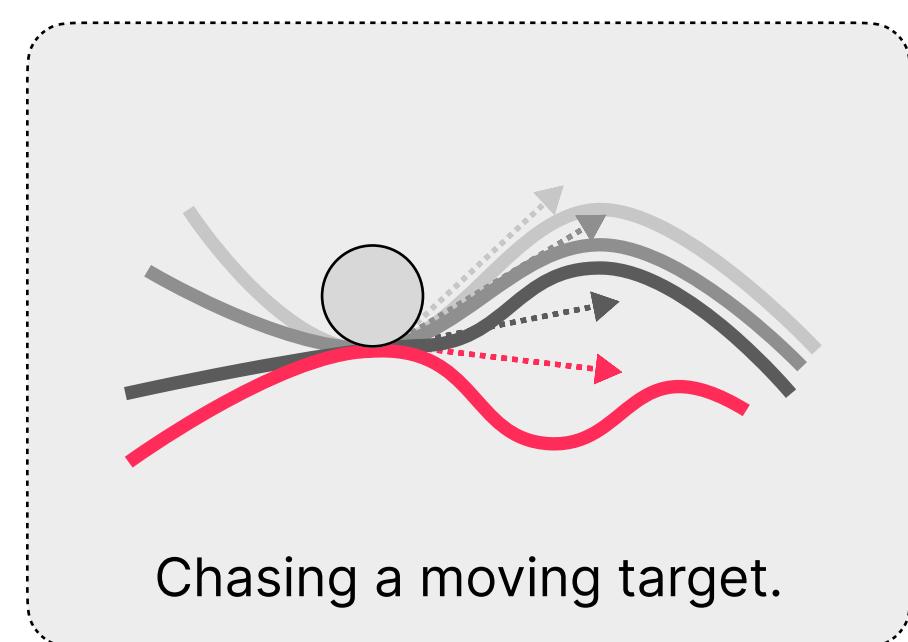
Signal of the past disappears.

### Capacity



Finite capacity with infinite data.

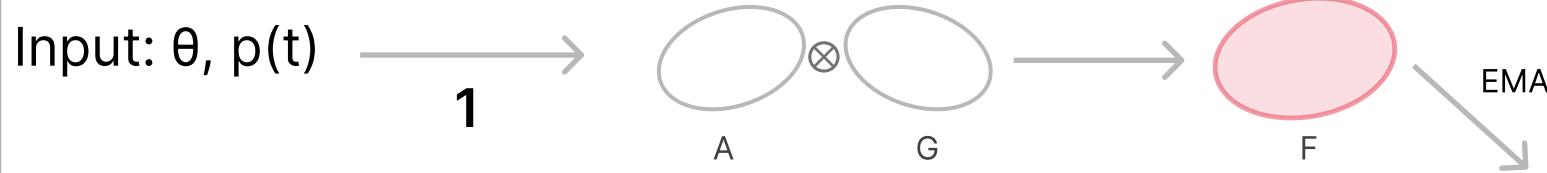
### Non-stationary



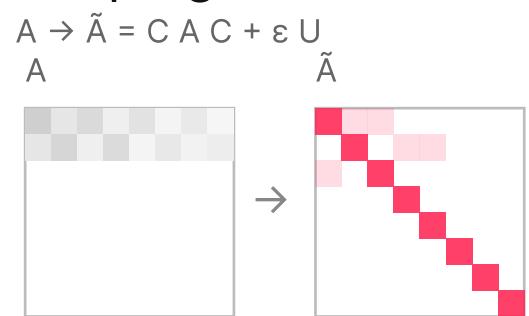
Chasing a moving target.

## c. Continual Learning as a Geometric Flow

### c1. EMA K-FAC Metric



#### 3 Shaping the statistic

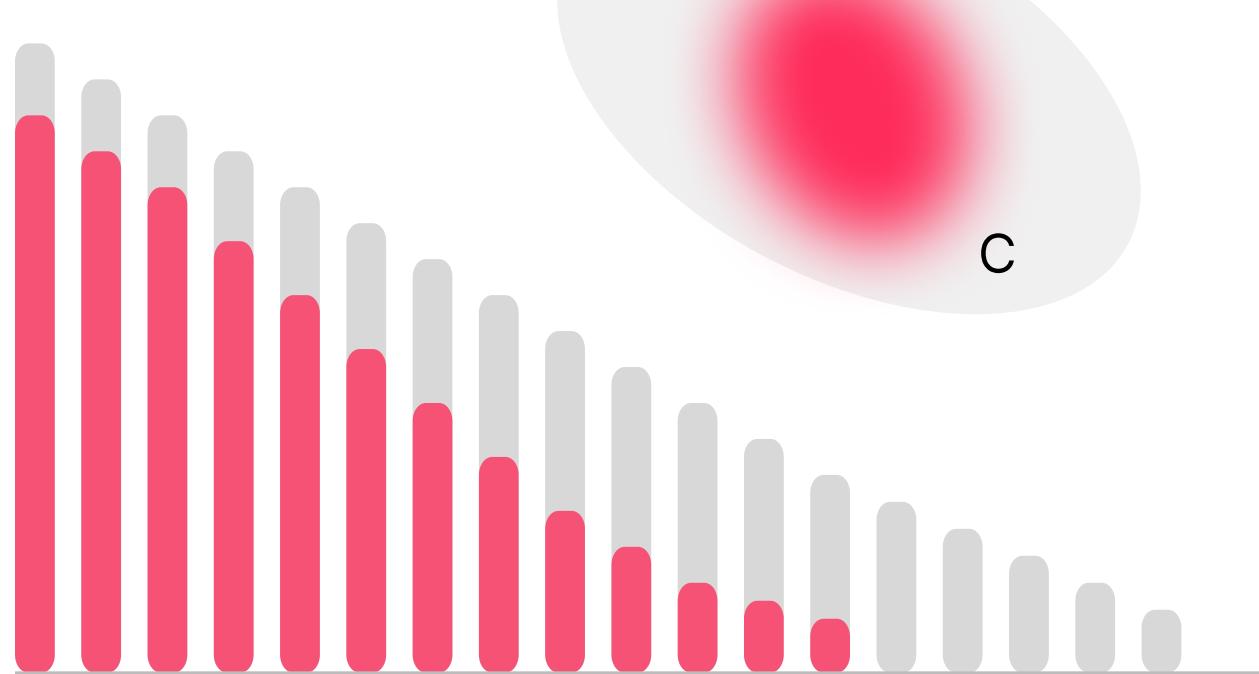


5 Change θ  
Affect Next F

4 Provide ΔA

### c2. Conceptor

$$c_i = \lambda_i / (\lambda_i + \alpha^{-2})$$



2 Provide λ from A

### c3. Circulation

$$E = \|C^{\frac{1}{2}} \Delta AU^{\frac{1}{2}}\|_F^2 + \|U^{\frac{1}{2}} \Delta AC^{\frac{1}{2}}\|_F^2$$

$$4 U = I - C$$

