**Zero-Shot Learning**

Latent Embeddings for Zero-Shot Image Classification  
Xian et al., CVPR 16 & CVPR 17

- Linear compatibility function: large errors (left).  
- Piecewise-linear: significantly improves results (right).

Multi-Cue Zero-Shot Learning with Strong Supervision  
Akata et al., CVPR 16

- Attributes: costly but good, W2V: cheap but weak.  
- Strong visual supervision: to compensate weak W2V.

**Generating: Vision + Language**

Generative Adversarial Text to Image Synthesis  
Reed et al. ICML’16

- GAN conditioned on sentences: real/fake, matching/not

Generates pixels from characters: intuitive  
Language compensates lack of large # training images

**Learning Deep Representations of Fine-Grained Visual Descriptions**  
Reed et al., CVPR’16

- CNN-RNN: fast + models sequence of words or characters  
- With >4 sentences: outperforms SoA with attributes

**Gaze Embeddings for Zero-Shot Image Classification**  
Karessli et al., CVPR’17

- Gaze Embeddings
- Gaze Features
- Gaze Heatmap

Outlier removal  
Gaze data collection

**Generating Visual Explanations**  
Hendricks et al. ECCV’16

- This is a Downy Woodpecker because...  
- This is a Downy Woodpecker because...

Class + image conditional LSTM & Reinforcement Loss  
Learns to mention class-specific and visible properties