0. Motivation

- Question: To render a beautiful scene, what should GAN know?

256x256 images synthesized by a Progressive GAN [Karras, et al 2017]
0. Motivation

- Question: What causes the mistakes?

Bedroom

1. Methodology

- Question: Which units **correlate** to an object class

```
Z → generator → featuremap → upsample → thresholded
single unit u

generated image → segment → agreement
iou
```

\[ \text{IoU} = \ldots \]
1. Methodology

Church samples
Unit #119
Tree
Unit #32
Dome

Dining room samples
Unit #139
Window
Unit #65
Table
2. Adding/Removing Units

- Question: Which units **cause** an object class

- Number of tree units ablated:
  - 0
  - 5
  - 10
  - 20

- Effect of ablating units for tree
  - Units by ACS
  - Top units by HLU

Graph showing the effect of ablating units for tree with number of tree units ablated on the x-axis and effect on the y-axis.
3. Comparing Datasets

Top objects: ceiling, wall, person, table...
Scene: conference room

Top objects: ceiling, window, chair, table...
Scene: dining room
3. Comparing Datasets

4. Comparing Layers

Hard to find object concepts
4. Comparing Layers

Objects and object parts

Texture, color, edges
5. Debugging and Improving

Example artifact-causing units

Ablating “artifact” units improves results

Bedroom images with artifacts

6. Object-Scene Relationship

Ablating Conference Room Generator Units

- ablate person units
- ablate curtain units
- ablate window units
- ablate table units
- ablate chair units
6. Object-Scene Relationship

Yellow bounding box: highlight every location where we can insert doors.
7. Paint with GANs

Link

Thank you