Altarpiece I

Balashova Ekaterina

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0. Prepare

Load the required libraries

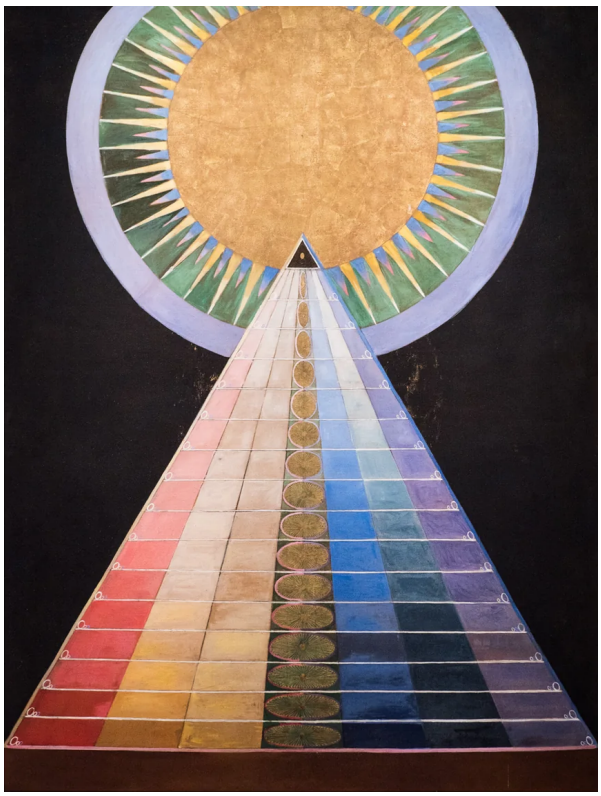
```
library(ggplot2)
library(ggforce)
library(grid)
library(dplyr)
library(ggpattern)
```

Set theme

```
theme_set(theme_void())
```

1. Load and show the original image

```
img <- png::readPNG("altarpiece_original.png")

g <- rasterGrob(img, interpolate = TRUE)

ggplot() +
  annotation_custom(g, xmin = 0, xmax = 1, ymin = 0, ymax = 1) +
  coord_fixed()
```



Get the dimensions

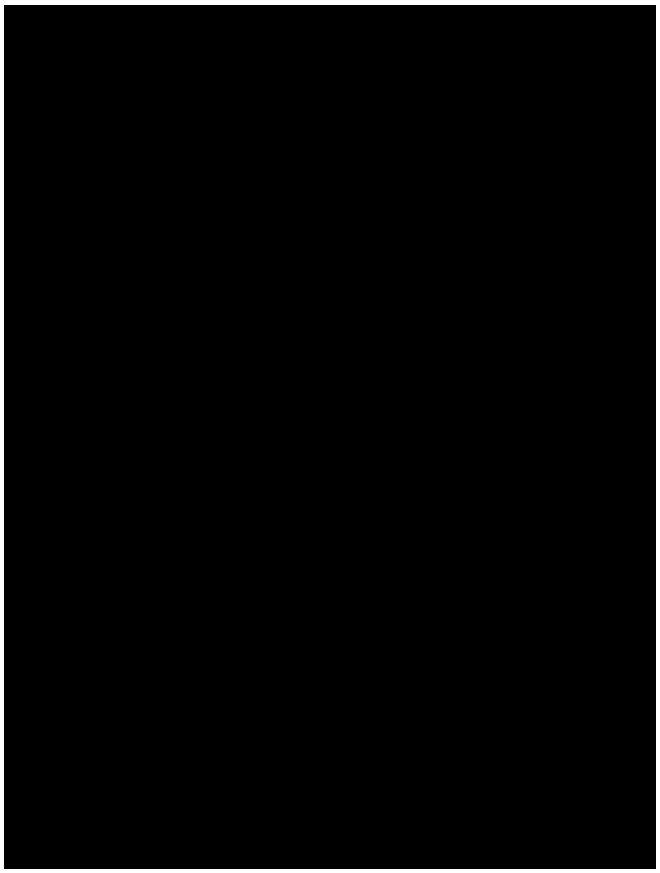
```
# Get dimensions of the original image
h <- dim(img)[1]
w  <- dim(img)[2]
cat("Width:", w, "Height:", h)
```

```
## Width: 861 Height: 1142
```

2. Get drawing!

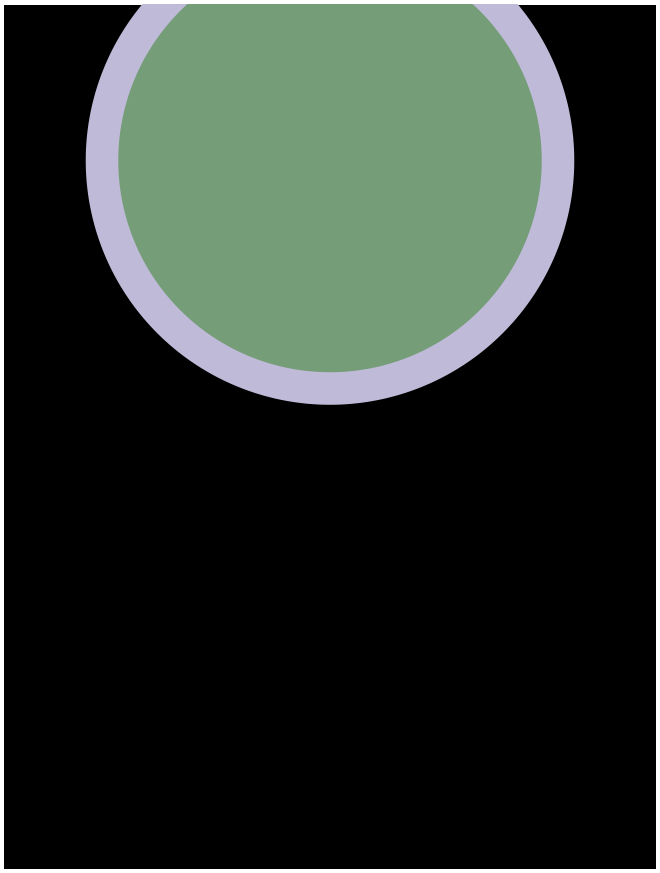
2.1 Background

```
background <- geom_rect(aes(xmin = 0, xmax = w, ymin = 0, ymax = h), fill = "black")

ggplot() +
  background +
  coord_fixed(xlim = c(0, w), ylim = c(0, h), expand = FALSE)
```



2.2 The circles

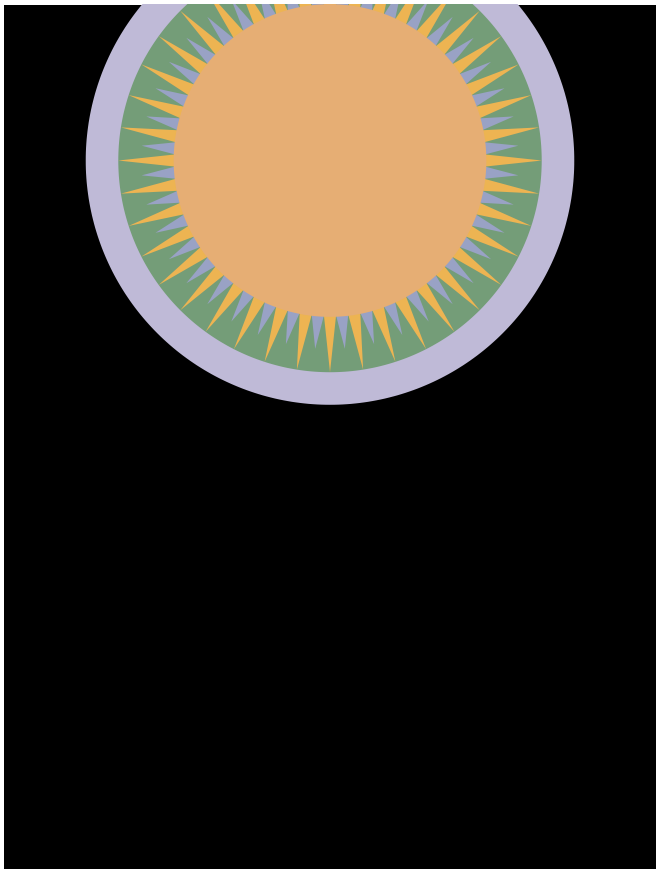
```
cx <- w * 0.5
cy <- h * 0.82

circle1 <- geom_circle(aes(x0 = cx, y0 = cy, r = w * 0.375), fill = "#BFBAD7", color = NA)
circle2 <- geom_circle(aes(x0 = cx, y0 = cy, r = w * 0.325), fill = "#749D78", color = NA)

circles <- list(circle1, circle2)

ggplot() +
  background +
  circles +
  coord_fixed(xlim = c(0, w), ylim = c(0, h), expand = FALSE)
```



2.2 The sun

```
# Single instances of both types of rays
one_gold_ray <- data.frame(
  x = c(0, 30, -30),
  y = c(w * 0.325, 0, 0)
)

one_blue_ray <- data.frame(
  x = c(0, 45, -45),
  y = c( w * 0.29, 0, 0)
)

# Function to rotate them
rotate_shape <- function(shape, angle_deg, cx, cy) {
  angle_rad <- angle_deg * pi / 180
  shape %>%
    mutate(
      x_rot = cos(angle_rad) * x - sin(angle_rad) * y + cx,
      y_rot = sin(angle_rad) * x + cos(angle_rad) * y + cy
    )
}

# Calculate the angle
n_repeats <- 40
```

```r
angle <- 360 / n_repeats

# Perform the rotation
gold_rays <- bind_rows(
  lapply(0:(n_repeats - 1), function(i) {
    rotate_shape(one_gold_ray, i * angle, cx, cy) %>%
      mutate(group = i)
  })
)

blue_rays <- bind_rows(
  lapply(0:(n_repeats - 1), function(i) {
    rotate_shape(one_blue_ray, i * angle + 4.5, cx, cy) %>%
      mutate(group = i)
  })
)

# Get final ray geometry
gold_sun <- geom_polygon(
    data = gold_rays,
    aes(x = x_rot, y = y_rot, group = group),
    fill = "#EDB452",
    color = NA
  )

blue_sun <- geom_polygon(
    data = blue_rays,
    aes(x = x_rot, y = y_rot, group = group),
    fill = "#99A2C5",
    color = NA
  )

# The central sun disk
sun_circle <- geom_circle(aes(x0 = cx, y0 = cy, r = w * 0.24), fill = "#E6AE74", color = NA)

# Assemble the sun
sun <- list(gold_sun, blue_sun, sun_circle)

ggplot() +
  background +
  circles +
  sun +
  coord_fixed(xlim = c(0, w), ylim = c(0, h), expand = FALSE)
```

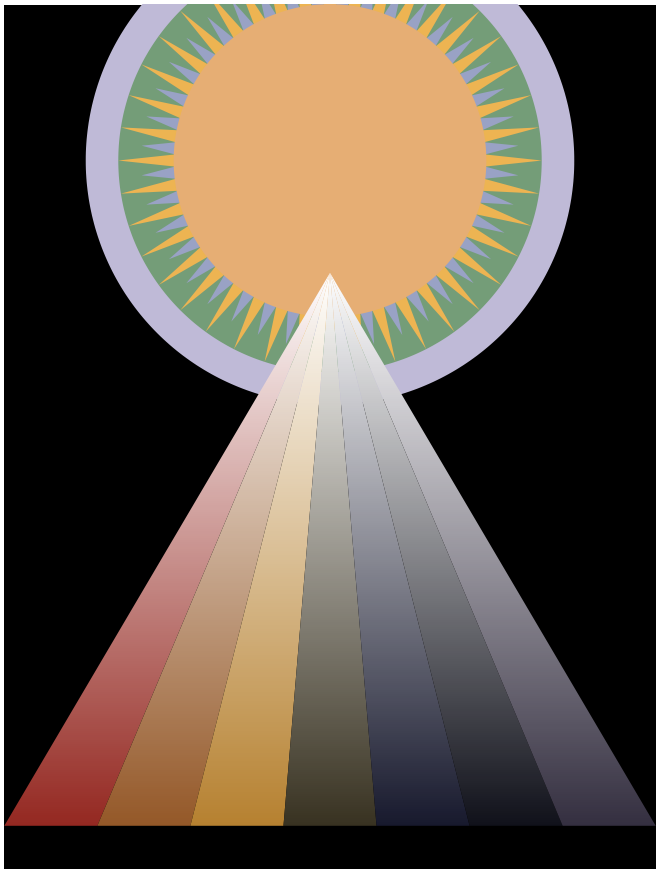


2.3 Main triangles

```
t1 <- data.frame(
  x = c(0, w * 0.5, 1 * w / 7),
  y = c(h * 0.05, h * 0.69, h * 0.05),
  group = 1
)

triangle1 <- geom_polygon_pattern(
    data = t1,
    aes(x = x, y = y, group = group),
    pattern = "gradient",
    pattern_fill = "#942821",
    pattern_fill2 = "white",
    fill = NA,
    color = NA
  )

t2 <- data.frame(
  x = c(1 * w / 7, w * 0.5, 2 * w / 7),
  y = c(h * 0.05, h * 0.69, h * 0.05),
  group = 1
)

triangle2 <- geom_polygon_pattern(
```

```
    data = t2,
    aes(x = x, y = y, group = group),
    pattern = "gradient",
    pattern_fill = "#945828",
    pattern_fill2 = "white",
    fill = NA,
    color = NA
  )

t3 <- data.frame(
  x = c(2 * w / 7, w * 0.5, 3 * w / 7),
  y = c(h * 0.05, h * 0.69, h * 0.05),
  group = 1
)

triangle3 <- geom_polygon_pattern(
    data = t3,
    aes(x = x, y = y, group = group),
    pattern = "gradient",
    pattern_fill = "#B68130",
    pattern_fill2 = "white",
    fill = NA,
    color = NA
  )

t4 <- data.frame(
  x = c(3 * w / 7, w * 0.5, 4 * w / 7),
  y = c(h * 0.05, h * 0.69, h * 0.05),
  group = 1
)

triangle4 <- geom_polygon_pattern(
    data = t4,
    aes(x = x, y = y, group = group),
    pattern = "gradient",
    pattern_fill = "#383221",
    pattern_fill2 = "white",
    fill = NA,
    color = NA
  )

t5 <- data.frame(
  x = c(4 * w / 7, w * 0.5, 5 * w / 7),
  y = c(h * 0.05, h * 0.69, h * 0.05),
  group = 1
)

triangle5 <- geom_polygon_pattern(
    data = t5,
    aes(x = x, y = y, group = group),
    pattern = "gradient",
    pattern_fill = "#17192D",
    pattern_fill2 = "white",
```

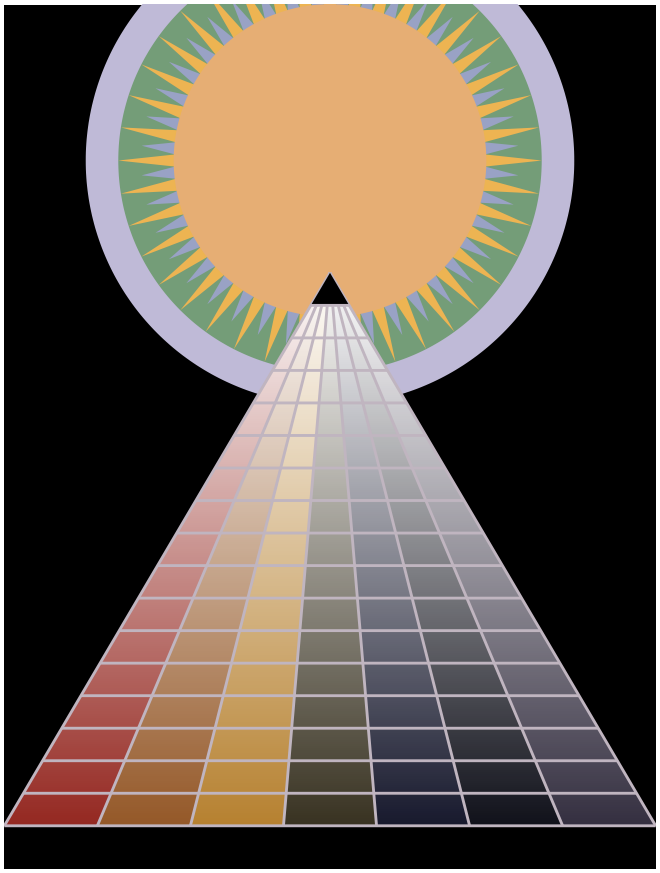
```
    fill = NA,
    color = NA
  )

t6 <- data.frame(
  x = c(5 * w / 7, w * 0.5, 6 * w / 7),
  y = c(h * 0.05, h * 0.69, h * 0.05),
  group = 1
)

triangle6 <- geom_polygon_pattern(
    data = t6,
    aes(x = x, y = y, group = group),
    pattern = "gradient",
    pattern_fill = "#10111A",
    pattern_fill2 = "white",
    fill = NA,
    color = NA
  )

t7 <- data.frame(
  x = c(6 * w / 7, w * 0.5, w),
  y = c(h * 0.05, h * 0.69, h * 0.05),
  group = 1
)

triangle7 <- geom_polygon_pattern(
    data = t7,
    aes(x = x, y = y, group = group),
    pattern = "gradient",
    pattern_fill = "#342F40",
    pattern_fill2 = "white",
    fill = NA,
    color = NA
  )

main_triangles <- list(triangle1, triangle2, triangle3, triangle4, triangle5, triangle6, triangle7)

ggplot() +
  background +
  circles +
  sun +
  main_triangles +
  coord_fixed(xlim = c(0, w), ylim = c(0, h), expand = FALSE)
```



2.4 The black triangle and edges

```
mth <- h * 0.64 # main triangle height
lh <- mth / 17

tb <- data.frame(
  x = c(w * 0.5 - w / 34, w * 0.5, w * 0.5 + w / 34),
  y = c(h * 0.69 - lh, h * 0.69, h * 0.69 - lh),
  group = 1
)

black_triangle <- geom_polygon(data = tb, aes(x = x, y = y), fill = "black")

i <- 0:7

# There are many edges of the same color, so we can loop through them
ve_df <- data.frame(
  x = i * w / 7,
  y = h * 0.05,
  xend = w * 0.5,
  yend = h * 0.69
)

vertical_edges <- geom_segment(
  data = ve_df,
```

```
  aes(x = x, y = y, xend = xend, yend = yend),
  color = "#C0B5C0",
  size = 0.5
)

i <- 1:17

he_df <- data.frame(
  x = w * 0.5 - i * w / 34,
  y = h * 0.69 - i * lh,
  xend = w * 0.5 + i * w / 34,
  yend = h * 0.69 - i * lh
)

horizontal_edges <- geom_segment(
  data = he_df,
  aes(x = x, y = y, xend = xend, yend = yend),
  color = "#C0B5C0",
  size = 0.5
)

ggplot() +
  background +
  circles +
  sun +
  main_triangles +
  vertical_edges +
  black_triangle +
  horizontal_edges +
  coord_fixed(xlim = c(0, w), ylim = c(0, h), expand = FALSE)
```



2.5 Finishing touches

```
eye <- geom_circle(aes(x0 = w * 0.5, y0 = h * 0.69 - lh * 0.6, r = 5), fill = "#E6AE74", color = NA)

# Circles on the left side
cl_list <- list()

for (i in 1:16) {
  cl_list[[i]] <- data.frame(
    x0 = (i - 1) * (w / 34) + 15,
    y0 = h * 0.05 + (i - 1) * lh + 10
  )
}

cl_df <- do.call(rbind, cl_list)

circles_left <- geom_circle(data = cl_df, aes(x0 = x0, y0 = y0, r = 6), fill = NA, color = "#C0B5C0")

# Circles on the right side
cr_list <- list()

for (i in 1:16) {
  cr_list[[i]] <- data.frame(
    x0 = w - ((i - 1) * (w / 34) + 15),
    y0 = h * 0.05 + (i - 1) * lh + 10
```

```
  )
}

cr_df <- do.call(rbind, cr_list)

circles_right <- geom_circle(data = cr_df, aes(x0 = x0, y0 = y0, r = 6), fill = NA, color = "#C0B5C0")

# Ellipses in the central triangle
ellipse_list <- list()

for (i in 1:16) {
  ellipse_list[[i]] <- data.frame(
    x0 = w * 0.5,
    y0 = h * 0.05 + (i - 0.5) * lh,
    a = w * (17 - i + 1) / 17 / 7 / 2 - 1,
    b = lh / 2 - 1
  )
}

ellipse_df <- do.call(rbind, ellipse_list)

ellipses <- geom_ellipse(data = ellipse_df, aes(x0 = x0, y0 = y0, a = a, b = b, angle = 0), fill = NA,


fin <- list(eye, circles_left, circles_right, ellipses)

ggplot() +
  background +
  circles +
  sun +
  main_triangles +
  vertical_edges +
  black_triangle +
  horizontal_edges +
  fin +
  coord_fixed(xlim = c(0, w), ylim = c(0, h), expand = FALSE)
```