

Chapitre 2 : Une obsession philosophique? Le cas de la philosophie de la biologie

Jacob Hamel-Mottiez

2025-04-28

Annexe technique pour le chapitre 2.

Table of contents

1	Gayon Results	3
1.1	Data	3
2	Pradeu's Results (Philosophy of Biology)	13
3	Pradeu's Results (Biology)	16
4	Compare Biology and Philosophy of biology	19
5	How Does these themes evolves through time?	23

```
ggplot_theme_colors <- function(bgcolor, fgcolor) {  
  theme_minimal(base_size = 11) %+ %  
  theme(  
    panel.border = element_blank(),  
    #panel.grid.major.y = element_line(colour = fgcolor),  
    panel.grid.minor.y = element_line(colour = fgcolor),  
    #panel.grid.major.x = element_line(colour = fgcolor),  
    panel.grid.minor.x = element_line(colour = fgcolor),  
    text = element_text(colour = fgcolor),  
    axis.text = element_text(colour = fgcolor),  
    rect = element_rect(colour = bgcolor, fill = bgcolor),  
    plot.background = element_rect(fill = bgcolor, colour = NA),  
    #axis.line = element_line(colour = fgcolor),  
  )  
}
```

```

    axis.ticks = element_line(colour = fgcolor),
    strip.text = element_text(colour = fgcolor)
  )
}

ggplot_theme_brand <- function(brand_yaml) {
  brand <- yaml::yaml.load_file(brand_yaml)
  ggplot_theme_colors(brand$color$background, brand$color$foreground)
}

united_theme_gg<- ggplot_theme_brand('C:/Users/jacob/OneDrive - Université Laval/quarto-light-d
slate_theme_gg <- ggplot_theme_brand('C:/Users/jacob/OneDrive - Université Laval/quarto-light-d

#| echo: false
#| warning: false

gt_theme_colors <- function(bg, fg)
  (function(table)
    table |>
    tab_options(
      table.background.color=bg,
      table.font.color=fg,
    )
  )

gt_theme_brand <- function(brand_yaml) {
  brand <- yaml::yaml.load_file(brand_yaml)
  gt_theme_colors(brand$color$background, brand$color$foreground)
}

united_theme_gt <- gt_theme_brand('C:/Users/jacob/OneDrive - Université Laval/quarto-light-d
slate_theme_gt <- gt_theme_brand('C:/Users/jacob/OneDrive - Université Laval/quarto-light-d

interactivity <- function(data) {
  opt_interactive(data,
    use_search = TRUE,
    use_filters = FALSE,
    use_resizers = TRUE,
    use_highlight = TRUE,
    use_compact_mode = FALSE,
    use_text_wrapping = TRUE,
    use_page_size_select = FALSE,

```

```

page_size_default = 10,
page_size_values = c(10, 25, 50, 100),
pagination_type = c("numbers", "jump", "simple"),
height = "auto"
)
}

```

1 Gayon Results

1.1 Data

```

tbl_1 <- tribble(
  ~Year, ~Studies_Biological_Theories, ~Philosophical_Questions, ~Historical_Articles, ~Total,
  1986, 5, 11, 3, 19,
  1987, 22, 3, 2, 28,
  1988, 10, 20, 2, 32,
  1989, 23, 8, 2, 33,
  1990, 8, 10, 3, 21,
  1991, 7, 10, 5, 22,
  1992, 13, 7, 2, 22,
  1993, 8, 9, 4, 20,
  1994, 9, 8, 2, 19,
  1995, 10, 9, 1, 20,
  1996, 9, 9, 2, 20,
  1997, 9, 9, 0, 18,
  1998, 11, 7, 6, 24,
  1999, 14, 6, 6, 25,
  2000, 10, 7, 4, 26,
  2001, 13, 7, 6, 26,
  2002, 17, 6, 3, 26
)

long_tbl_1 <- tbl_1 %>%
  pivot_longer(cols = -Year, # Pivot all columns except 'Year'
               names_to = "Category",
               values_to = "Count")

```

```

tbl_2 <- tribble(
  ~Year, ~Evolution, ~Taxonomy, ~Species, ~Ecology, ~Genetics, ~Other,
  1986, 3, 0, 0, 1, 0, 1,
  1987, 8, 0, 13, 0, 0, 1,
  1988, 3, 0, 6, 0, 0, 1,
  1989, 17, 0, 4, 1, 0, 1,
  1990, 3, 0, 1, 0, 0, 1,
  1991, 4, 0, 0, 0, 1, 1,
  1992, 7, 1, 0, 2, 1, 2,
  1993, 1, 0, 0, 2, 0, 1,
  1994, 0, 0, 0, 0, 0, 2,
  1995, 0, 0, 0, 0, 0, 1,
  1996, 6, 1, 2, 1, 0, 1,
  1997, 5, 0, 0, 1, 0, 2,
  1998, 3, 0, 0, 1, 1, 2,
  1999, 3, 0, 1, 0, 0, 1,
  2000, 7, 0, 0, 2, 1, 1,
  2001, 3, 0, 0, 0, 0, 2,
  2002, 9, 0, 2, 0, 1, 4
)

tbl_2 <- tbl_2 |> rowwise() %>%
  mutate(Total_Papers = sum(c_across(-Year), na.rm = TRUE)) %>%
  ungroup()

long_tbl_2 <- tbl_2 %>%
  pivot_longer(cols = -Year, # Pivot all columns except 'Year'
               names_to = "Category",
               values_to = "Count")

tbl_3 <- tribble(
  ~Year, ~Evolutionary_Epistemology, ~Ethics_Biology, ~Nature_Culture, ~Function_Design, ~Re
  1986, 2, 7, 1, 1, 0, 0,
  1987, 19, 1, 0, 0, 1, 0,
  1988, 1, 3, 2, 0, 0, 1,
  1989, 17, 0, 2, 1, 0, 0,
  1990, 3, 0, 1, 1, 0, 0,
  1991, 0, 2, 1, 0, 1, 0,
  1992, 2, 3, 3, 1, 0, 1,
  1993, 3, 3, 0, 1, 1, 0,
  1994, 2, 3, 1, 0, 0, 0,

```

```

1995, 2, 3, 0, 0, 1, 0,
1996, 5, 1, 0, 3, 1, 2,
1997, 1, 5, 0, 1, 0, 0,
1998, 2, 2, 0, 0, 2, 1,
1999, 0, 3, 0, 2, 1, 1,
2000, 2, 1, 0, 2, 2, 1,
2001, 1, 0, 0, 2, 1, 3,
2002, 0, 0, 0, 1, 2, 3
)

```

```

tbl_3 <- tbl_3 |> rowwise() %>%
  mutate(Total_Papers = sum(c_across(-Year), na.rm = TRUE)) %>%
  ungroup()

```

```

long_tbl_3 <- tbl_3 %>%
  pivot_longer(cols = -Year, # Pivot all columns except 'Year'
               names_to = "Category",
               values_to = "Count")

```

```

label_plot1<- long_tbl_1 |> select(Category, Year, Count) |> filter(Category != "Total_Papers")

```

```

p3 <- ggplot(long_tbl_3 |> filter(Category != "Total_Papers"), aes(x=Year, y = Count, group = Category)) +
  #geom_point()+
  geom_smooth(se = FALSE, span = 1, aes(fill = Category), alpha = 0.2) +
  #facet_grid(~Category)
theme(legend.key.size = unit(1, 'cm'),
      legend.text = element_text(size=20))

```

```

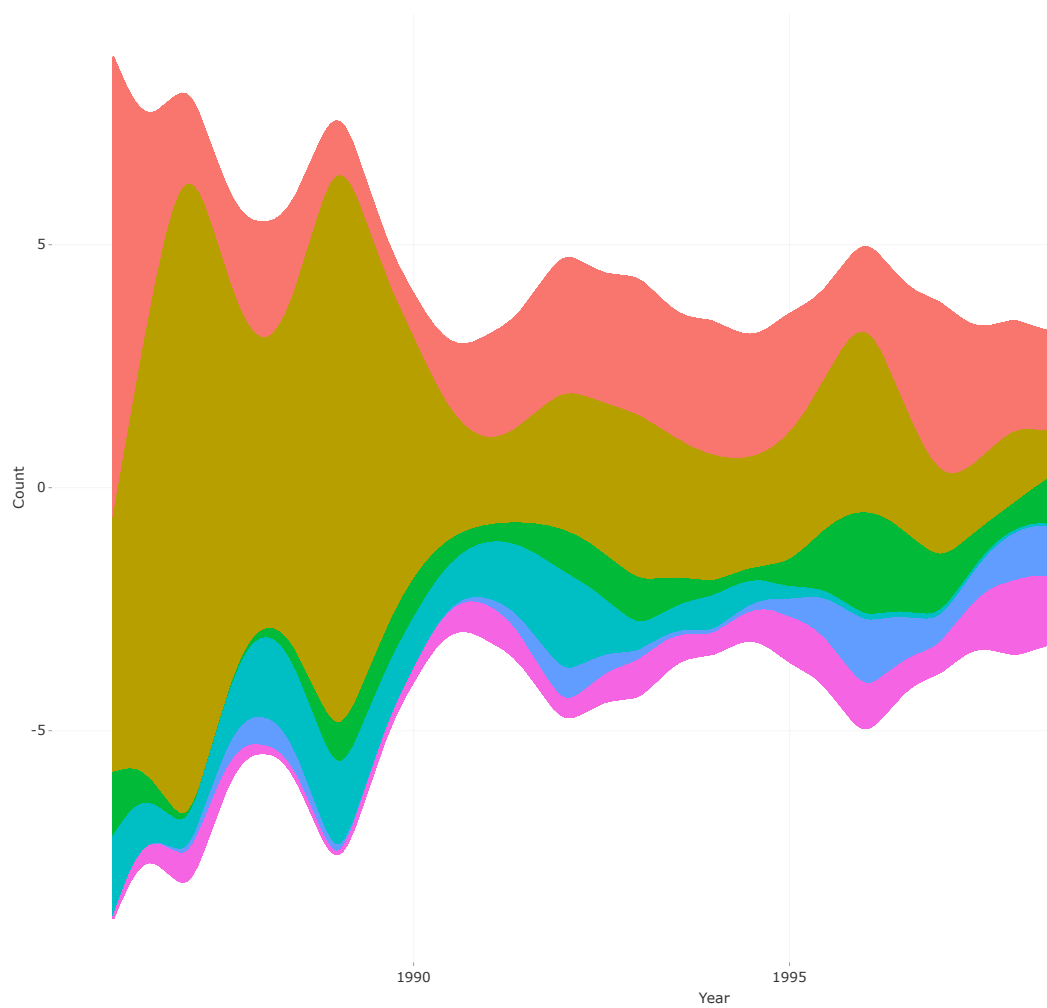
p <- ggplot(long_tbl_3 |> filter(Category != "Total_Papers"), aes(x=Year, y = Count, group = Category)) +
  geom_stream()

```

```

ggplotly(p + united_theme_gg) |> united_theme()

```

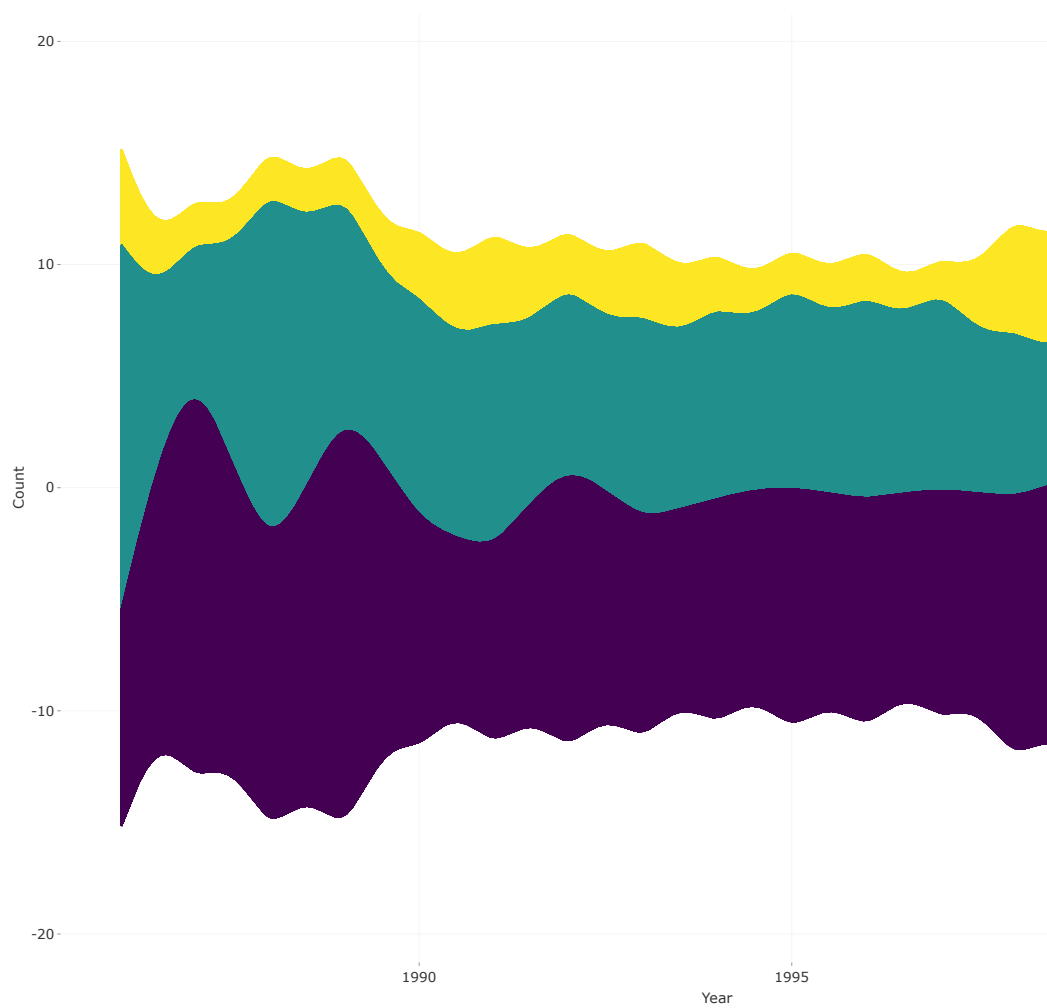


```

p <- ggplot(long_tbl_1 |> filter(Category != "Total_Papers"), aes(x=Year, y = Count, group =
  geom_stream() +
  scale_fill_viridis(discrete = TRUE, option = "D", direction = -1) +
  scale_color_viridis(discrete = TRUE, option = "D", direction = -1) +
  theme(
    legend.position = "top",
    legend.title=element_blank(),
    axis.text.y = element_blank(), # Remove y-axis ticks
    axis.ticks.y = element_blank(), # Remove y-axis tick marks
    axis.title.y = element_blank() # Remove y-axis title
  )

ggplotly(p + united_theme_gg) |> united_theme()

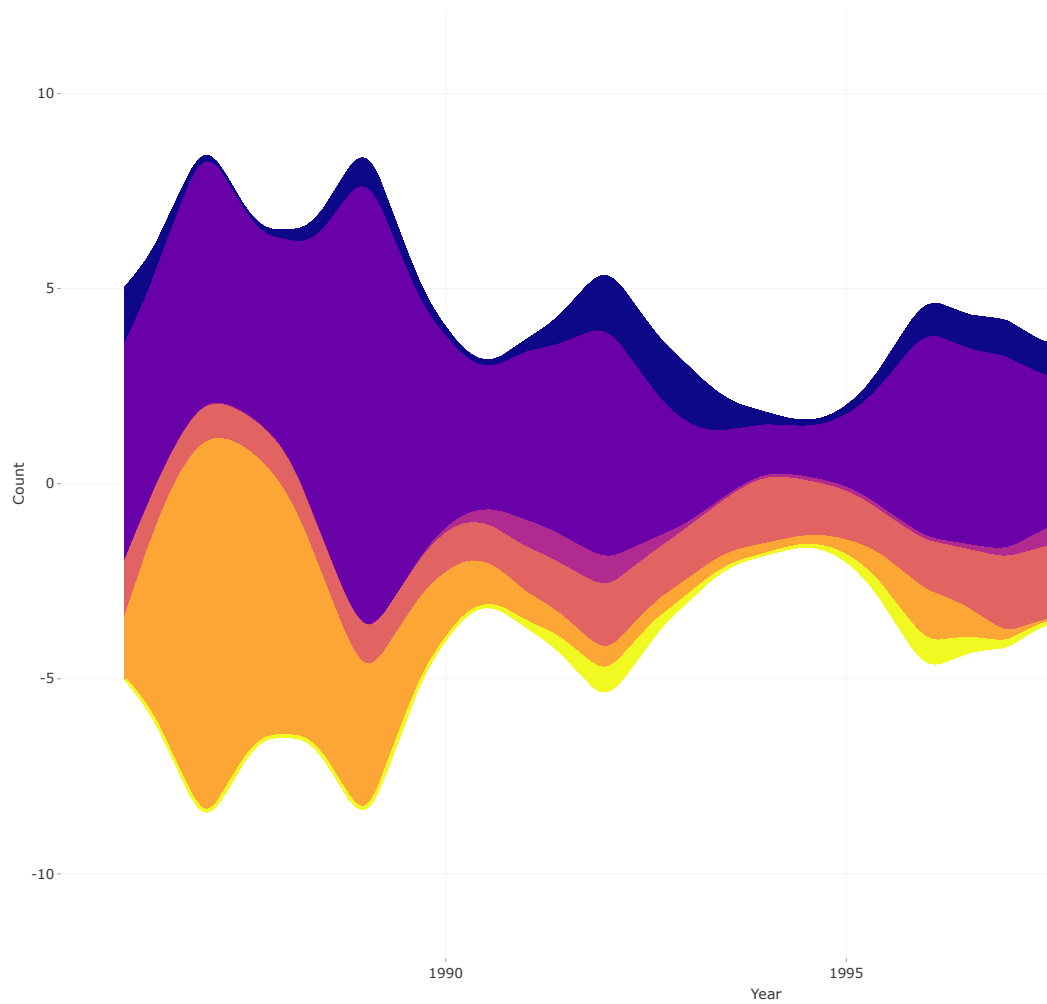
```




```

p <- ggplot(long_tbl_2 |> filter(Category != "Total_Papers"), aes(x=Year, y = Count, group =
  geom_stream() +
  scale_fill_viridis(discrete = TRUE, option = "C") +
  scale_color_viridis(discrete = TRUE, option = "C")+
  theme(legend.key.size = unit(1, 'cm'),
    legend.text = element_text(size=20),
    axis.title.x =element_text(size=20),
    axis.text.x = element_text(size = 20),
    legend.position = "top",
    legend.title=element_blank(),
    axis.text.y = element_blank(), # Remove y-axis ticks
    axis.ticks.y = element_blank(), # Remove y-axis tick marks
    axis.title.y = element_blank() # Remove y-axis title
  )
ggplotly(p + united_theme_gg) |> united_theme()

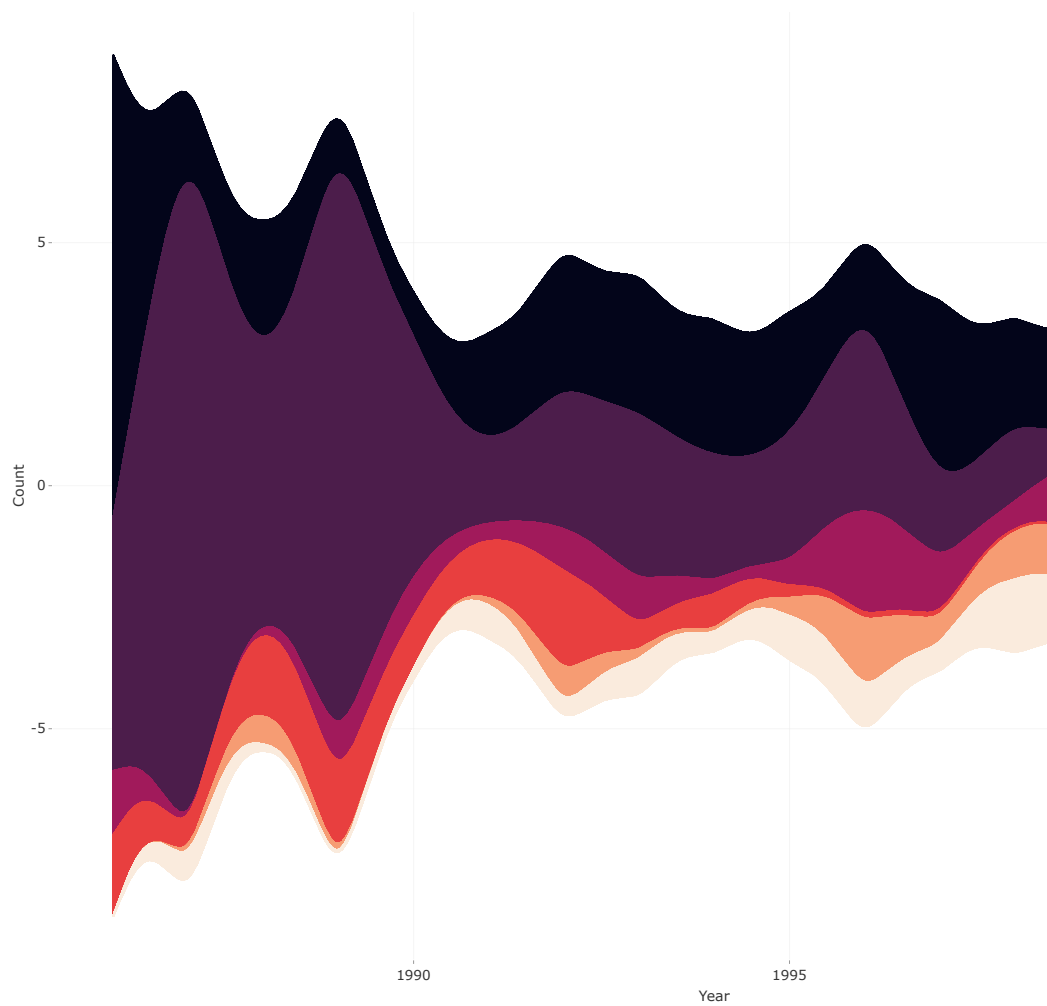
```



```

p <- ggplot(long_tbl_3 |> filter(Category != "Total_Papers"), aes(x=Year, y = Count, group =
  geom_stream() +
  scale_fill_viridis(discrete = TRUE, option = "F") +
  scale_color_viridis(discrete = TRUE, option = "F")+
  theme(legend.key.size = unit(1, 'cm'),
    legend.text = element_text(size=20),
    axis.title.x =element_text(size=20),
    axis.text.x = element_text(size = 20),
    legend.position = "top",
    legend.title=element_blank(),
    axis.text.y = element_blank(), # Remove y-axis ticks
    axis.ticks.y = element_blank(), # Remove y-axis tick marks
    axis.title.y = element_blank() # Remove y-axis title
  )
ggplotly(p + united_theme_gg) |> united_theme()

```



2 Pradeu's Results (Philosophy of Biology)

```
# Names of the disciplines
disciplines_BP_2003_2015 <- tibble(
  discipline = c(
    "Agricultural Sciences",
    "Anthropology",
    "Applied Biological Sciences",
    "Biophysics & Computational Biology",
    "Cell Biology",
    "Environmental Sciences",
    "Immunology & Inflammation",
    "Microbiology",
    "Pharmacology",
    "Physiology",
    "Plant Biology",
    "Population Biology",
    "Sustainability Science",
    "Systems Biology",
    "Evolution",
    "Developmental Biology",
    "Biochemistry",
    "Psychological and Cognitive Sciences",
    "Neuroscience",
    "Medical Sciences",
    "Genetics",
    "Ecology"
  ),
  percentage = c(0, 0, 0, 0, 0, 0, 0, 3, 0, 0, 0, 0, 0, 0, 0, 62, 4, 2, 14, 3, 2, 5, 3),
  journal = "B&P"
)

disciplines_BP_1986_2002 <- tibble(
  discipline = c(
    "Evolution",
    "Others",
    "Reflections on Biology in general",
    "Evolutionary Ethics",
    "Evolutionary Epistemology",
    "Genetics",
    "Ecology",
```

```

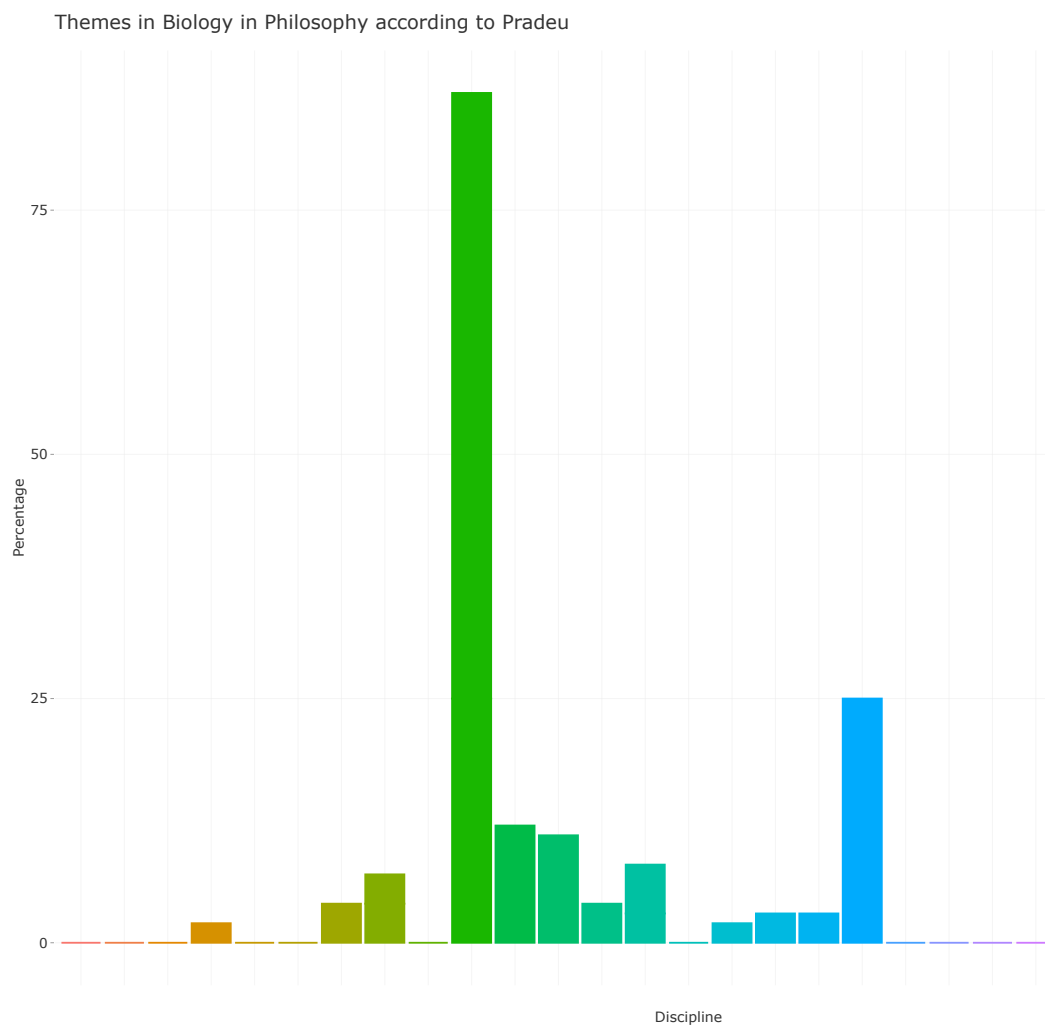
    "Species",
    "Taxonomy",
    "Function, Teleology, Design"
  ),
  percentage = c(25, 25, 6, 11, 12, 3, 4, 9, 3, 4),
  journal = "B&P"
)

# Combine into a data frame (optional)
BP_tb <- rbind(disciplines_BP_1986_2002, disciplines_BP_2003_2015)

# ggplot
p1 <- ggplot(data = BP_tb, mapping = aes(x=discipline, y = percentage, color = discipline, fill = discipline)) +
  geom_bar(stat = "identity") +
  theme(
    legend.position="bottom",
    legend.box = "horizontal",
    legend.title = element_blank(),
    axis.text.x=element_blank(),
    axis.ticks.x=element_blank()
  ) +
  labs(title = "Themes in Biology in Philosophy according to Pradeu", x = "Discipline", y = "Percentage")

ggplotly(p1 + united_theme_gg) |> united_theme() |>
  layout(xaxis = list(showticklabels=F, ticks = ""))

```



3 Pradeu's Results (Biology)

```
# PNAS -----
# Names of the disciplines
disciplines_PNAS <- tibble(
  discipline = c(
    "Population Biology",
    "Plant Biology",
    "Physiology",
    "Pharmacology",
    "Neuroscience",
    "Microbiology",
    "Medical Sciences",
    "Immunology & Inflammation",
    "Genetics",
    "Biochemistry",
    "Biophysics & Computational Biology",
    "Cell Biology",
    "Ecology",
    "Evolution",
    "Developmental Biology",
    "Environmental Sciences",
    "Applied Biological Sciences",
    "Anthropology",
    "Agricultural Sciences",
    "Systems Biology",
    "Psychological and Cognitive Sciences",
    "Sustainability Science"
  ),
  percentage = c(0, 4, 2, 1, 12, 7, 10, 7, 5, 12, 9, 8, 3, 5, 3, 2, 2, 2, 1, 1, 3, 1)
)

# Combine into a data frame (optional)
PNAS_tb <- disciplines_PNAS |> mutate(journal = "PNAS")

plot <- ggplot(data = PNAS_tb, mapping = aes(x=discipline, y = percentage, color = discipline)) +
  geom_bar(stat = "identity") +
  theme(
    legend.position="bottom",
    legend.box = "horizontal",
```

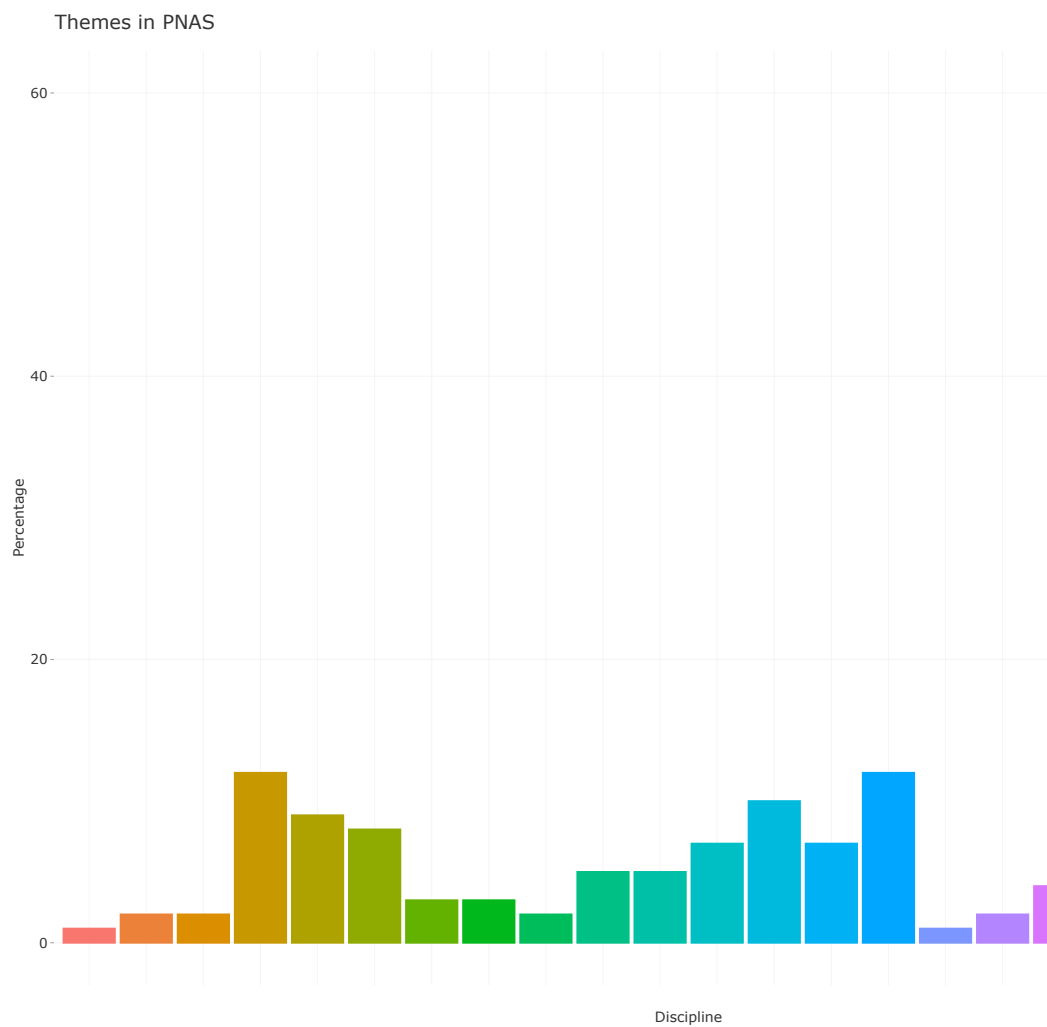


```

legend.title = element_blank(),
axis.text.x=element_blank(),
axis.ticks.x=element_blank(),
) + labs(title = "Themes in PNAS", x = "Discipline", y = "Percentage") +
ylim(c(0,60))

ggplotly(plot + united_theme_gg) |> united_theme() |>
  layout(showlegend = T, xaxis = list(showticklabels=F, ticks = ""), xaxis2 = list(showtickl

```

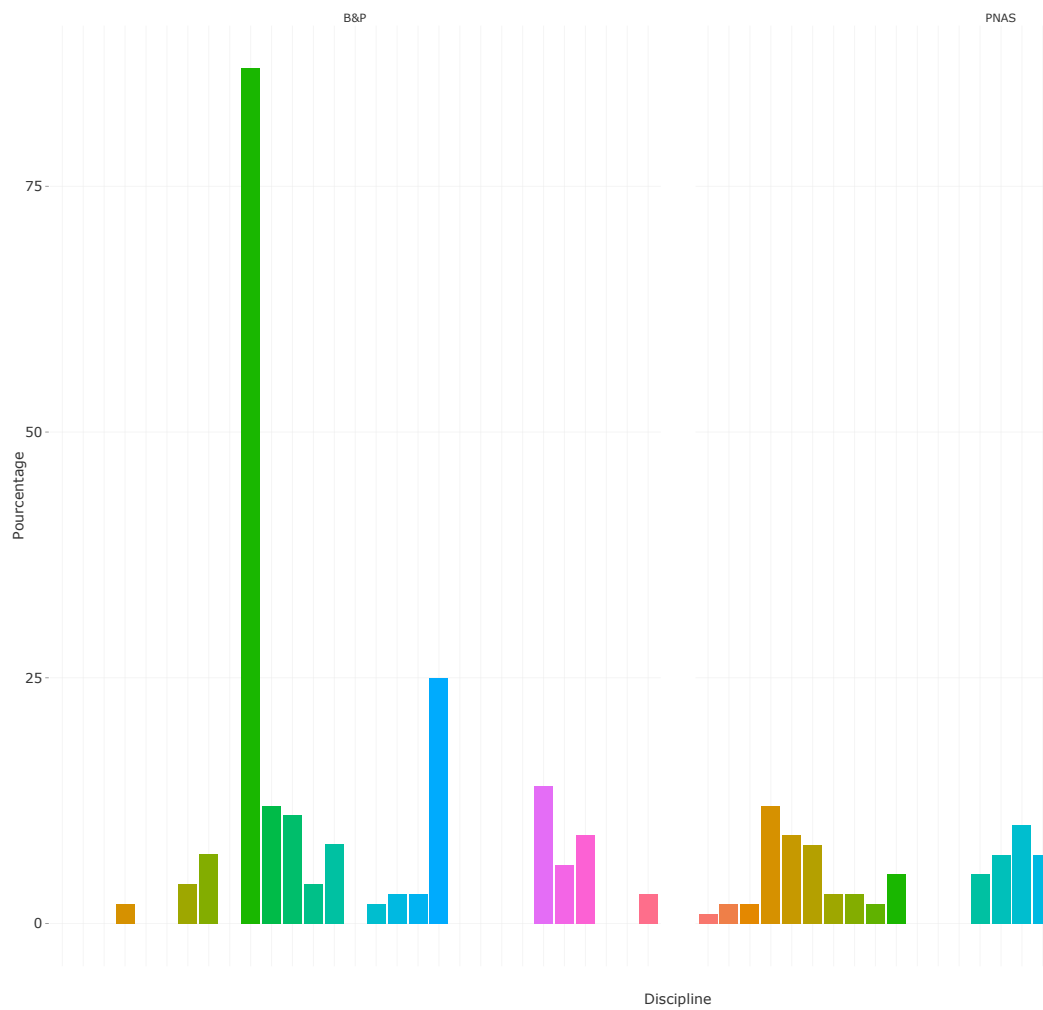


4 Compare Biology and Philosophy of biology

```
# Merged data.table
merged_tb <- rbind(PNAS_tb, BP_tb)

plot <- ggplot(data = merged_tb, mapping = aes(x = discipline, y = percentage, fill = discipline)) +
  geom_bar(stat = "identity") +
  labs(x = "Discipline", y = "Pourcentage") +
  facet_grid(~journal)

ggplotly(plot + united_theme_gg) |> united_theme() |>
  layout(showlegend = T, xaxis = list(showticklabels=F, ticks = ""), xaxis2 = list(showticklabels=F, ticks = ""))
```

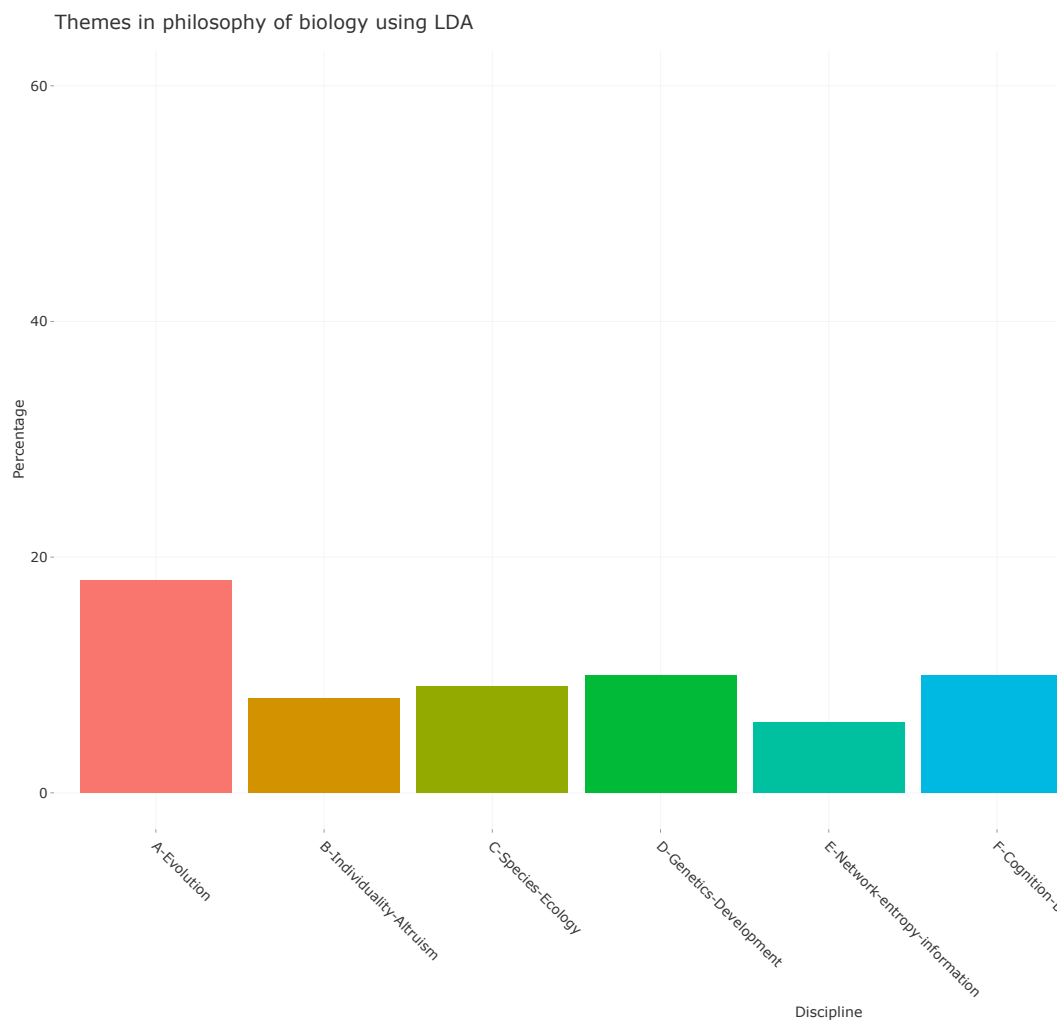


Malaterre Results

```
# Malaterre et al. (2020) vs Pradeu (2017) -----
TM_dt <- data.table(
  Discipline = c("A-Evolution",
                 "B-Individuality-Altruism",
                 "C-Species-Ecology",
                 "D-Genetics-Development",
                 "E-Network-entropy-information",
                 "F-Cognition-behavior",
                 "G-Socio-normative issues",
                 "H-General philosophy of science",
                 "I-Others"),
  Percentage = c(18, 8, 9, 10, 6, 10, 9, 22, 8),
  Data = c("TM")
)

plot <- ggplot(data = TM_dt, mapping = aes(x = Discipline, y = Percentage, fill = Discipline)) +
  geom_bar(stat = "identity") +
  ylim(c(0,60)) +
  labs(title = "Themes in philosophy of biology using LDA")

ggplotly(plot + united_theme_gg) |> united_theme() |> layout(showlegend = F, xaxis = list(ti
```



5 How Does these themes evolves through time?

to do