This document explains the R code provided, which generates **Swimmer Plots** based on the 1997 biostatistics tutorial by Bull and Spiegelhalter. This script is used to visualize the clinical timeline of patients, specifically focusing on heart surgery (first operation) and survival.

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1. Overview and Data Context

The script visualizes data from 30 patients. Unlike a standard bar chart, this swimmer plot tracks multiple milestones simultaneously:

- **Time Zero:** Can be either "Birth" (Age) or "Presentation" (Entry into the study).
- **Events:** Presentation at the clinic, the first surgical operation, and death (if it occurred).
- **Attributes:** Anatomy of pulmonary arteries (paanat) and whether the patient is still alive.

2. The Data Structure (survdat)

The data frame contains 16 variables. The most critical for the plot are:

- agepres: Age in days when the patient first presented.
- ageop1: Age in days at the first operation.
- agelast: Age in days at death or last follow-up.
- dead: Status (1 = Dead, 0 = Alive/Censored).
- paanat: Size of arteries (0 = Tiny/Absent, 1 = Normal). This determines the starting symbol shape.

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3. The swimmerplot Function Explained

This custom function is the "engine" of the script. It automates the drawing of bars, segments, and symbols.

A. Nonlinear Scaling (scaleX)

The script uses a sophisticated scaling method to ensure that early events (which happen frequently) are not "squashed" by long-term follow-up data.

- **0 to 2 years:** Mapped to the first 50% of the X-axis.
- 2 to 18 years: Mapped to the remaining 50% of the X-axis.

  This allows the viewer to see details in the first 730 days more clearly while still showing the full 18-year history.

B. Event Mapping (convSS)

This helper function calculates the timing of events.

- If .sz = TRUE, it subtracts the "Presentation" time from all other times, effectively making the plot start at "Years after presentation" instead of "Age."

C. Visual Symbols (PCH and LTY)

The plot uses specific codes to differentiate events:

| Symbol | Meaning | Code Mapping |

| :--- | :--- | :--- |

| Diamond (Open) | Presentation (Artery size 0) | PCH[1] |

| Diamond (Filled) | Presentation (Artery size 1) | PCH[2] |

| Circle | First Operation | PCH[3] |

| Cross (+) | Death | PCH[4] |

| Solid Line | Follow-up before operation | LTY[1] |

| Dashed Line | Follow-up after operation | LTY[2] |

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4. Comparison of the Two Figures

The script generates two side-by-side plots to provide different perspectives:

Figure 1: Histories from Birth

- **X-axis:** Chronological age of the patient.
- **Insight:** Shows how old the patients were when they first got sick (presented) and how long they lived from birth.
- **Function call:** swimmerplot(..., .sz=FALSE)

Figure 2: Histories from Presentation

- **X-axis:** Years passed since the patient first entered the study.
- **Insight:** Standardizes all patients to "Time Zero." This is the preferred view for survival analysis to see how treatment (surgery) affects the time until death regardless of the patient's age.
- **Function call:** swimmerplot(..., .sz=TRUE)

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5. Summary of Code Execution

1. **Environment Setup:** windows(16,8) opens a wide window, and par(mfrow=c(1,2)) splits it into two panels.
2. **Drawing Fig 1:** Calls swimmerplot using ages.

3. **Drawing Fig 2:** Calls swimmerplot using relative time.
4. **Legends:** Adds the key for symbols and line types to the right side of the plots.

How to adapt this for your data

If you want to use this for your own study:

1. Ensure your time variables are in **days**.
2. Maintain columns for ID, Start_Time, Intervention_Time, and End_Time.
3. Adjust the .xmem parameter to change the year markers on the X-axis (e.g., 0:5 for a 5-year study).

Would you like me to help you modify this code to accept a different number of events or a specific dataset you have?