Panemalia: Visualising Longitudinal Datasets at the Australian Data Archive

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ADA

Longitudinal datasets

- Respondents answer survey/questionaire
  - Mailout, phone, etc
- Follows the same respondents over time
  - Collection “waves”
- $\Rightarrow$ Very rich form of data
- Excellent scope for advanced and sophisticated visualisation techniques

Panemalia

- Visualisation tool for longitudinal datasets
- Easy to use
  - Integrated with the ADA website
  - Interactively manipulate view of the data
  - Visualisation method presents the data in a simple and direct way

Use cases

- Initial familiarisation (all users)
- Finding information (researchers)
  - Targeted (supporting evidence), or
  - Serendipitous
- Data cleaning (archivists)
  - Problems tend to be visually apparent

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- The challenge:

How to visualise this data?

Mapping data to space

- Graphs map variables *directly* to 2D/3D space

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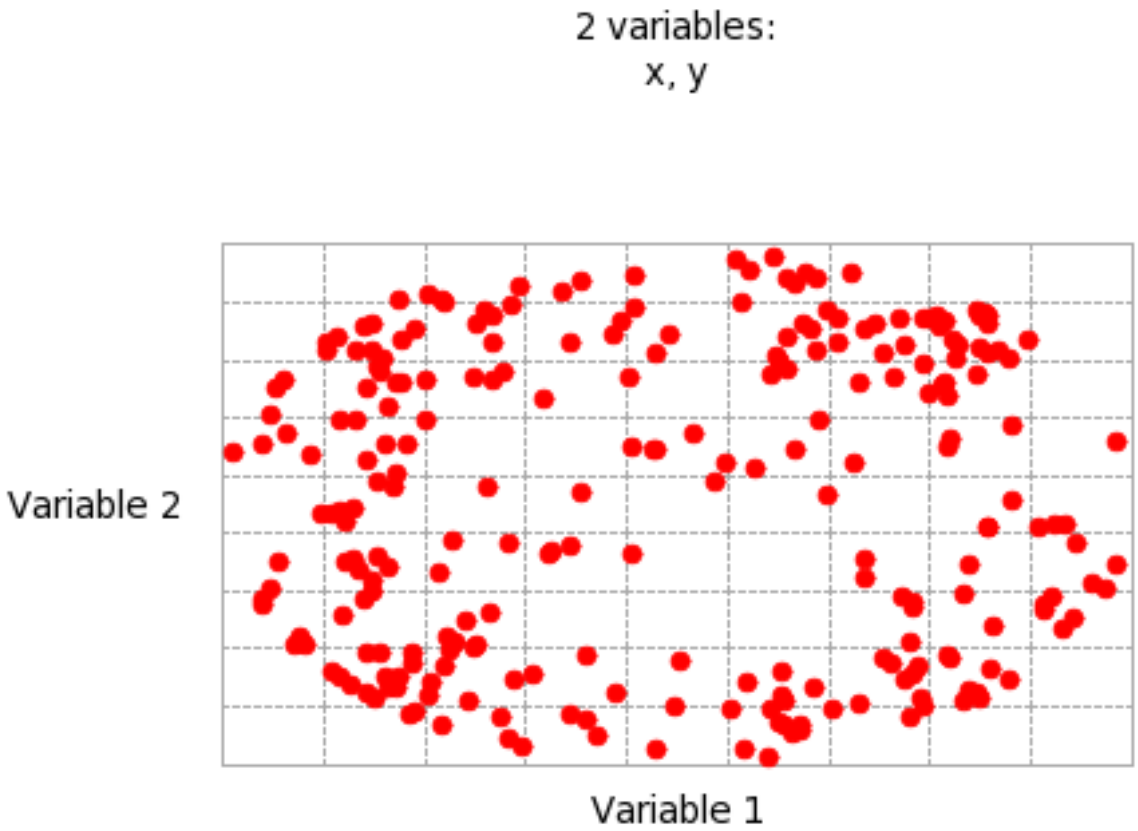

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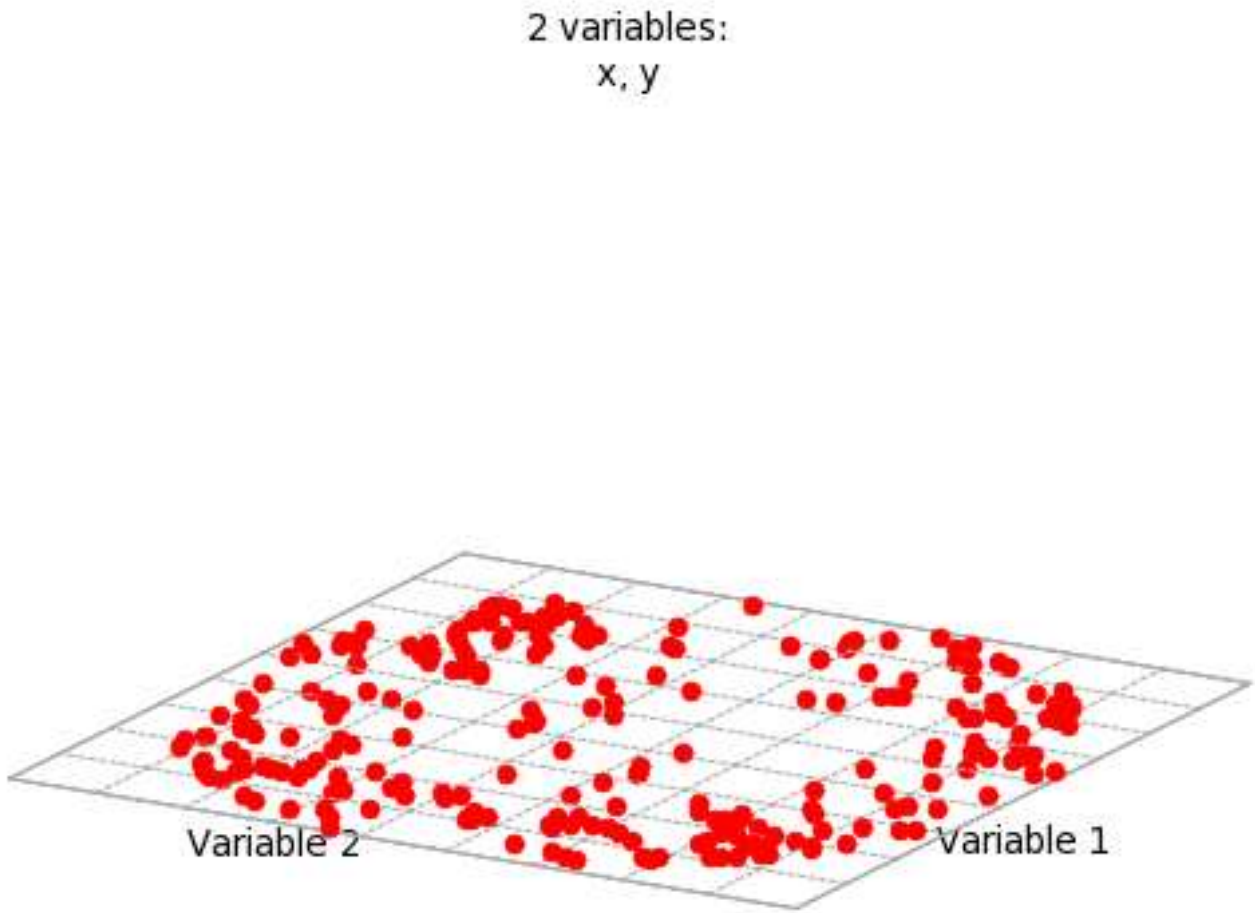

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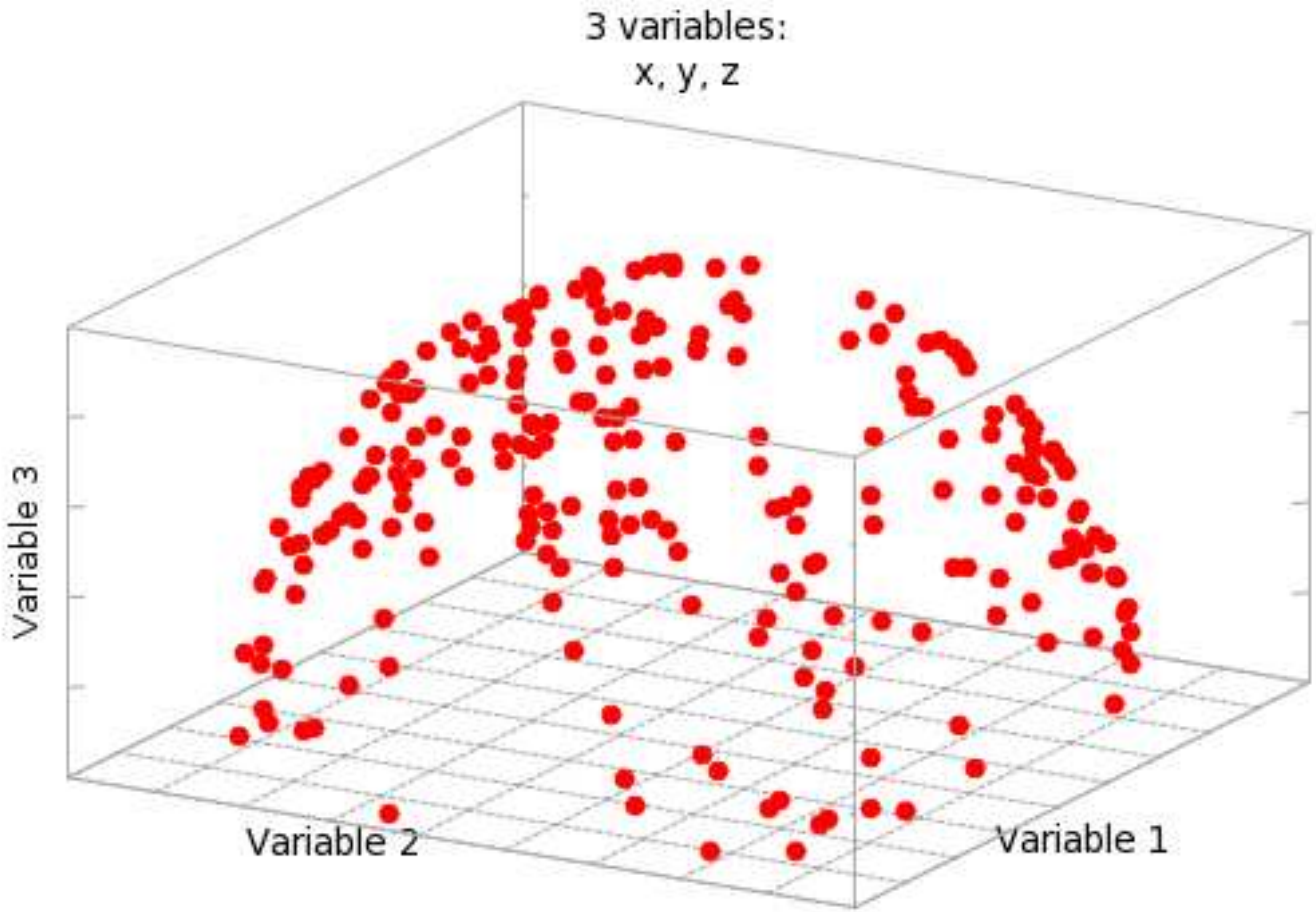

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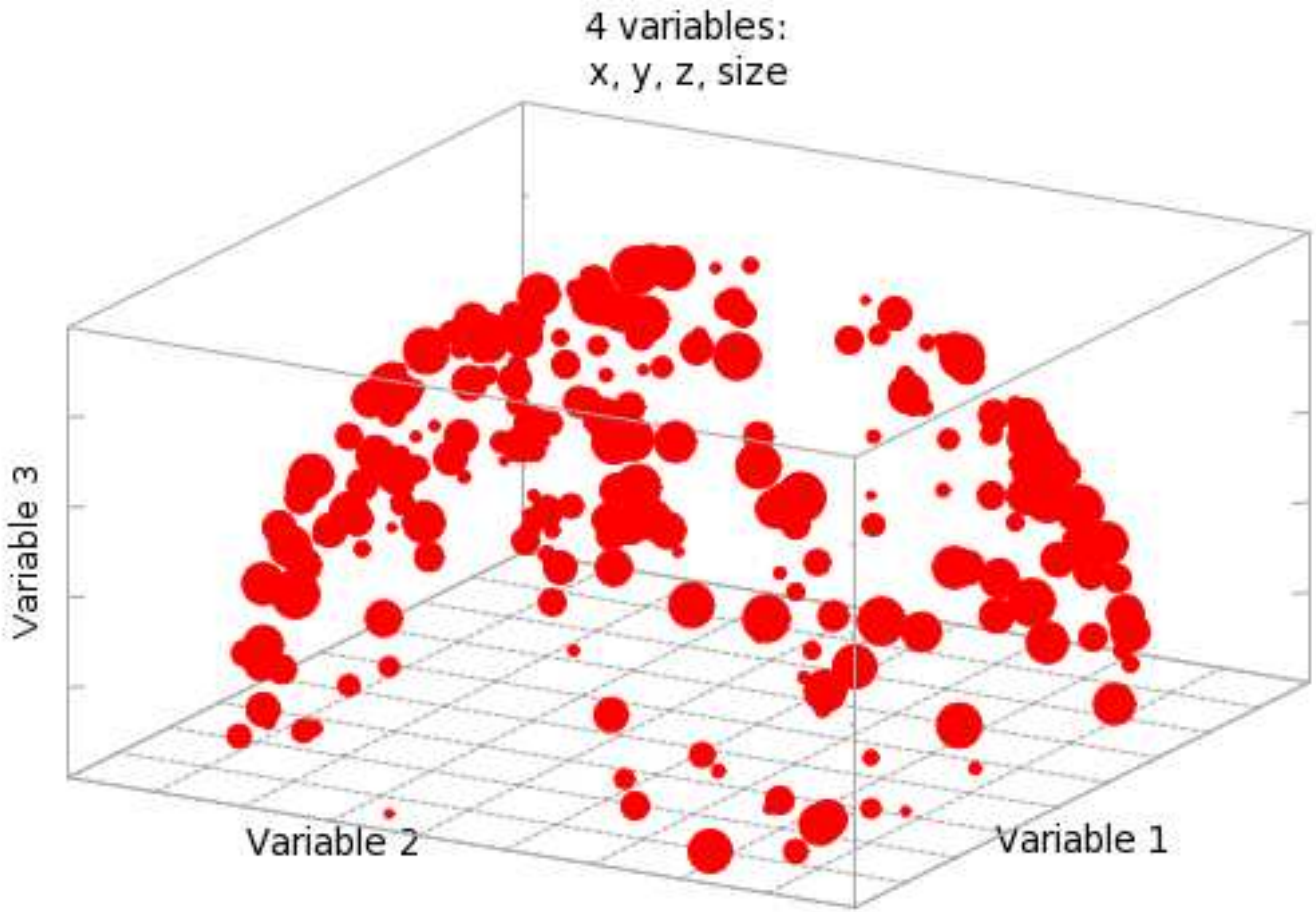

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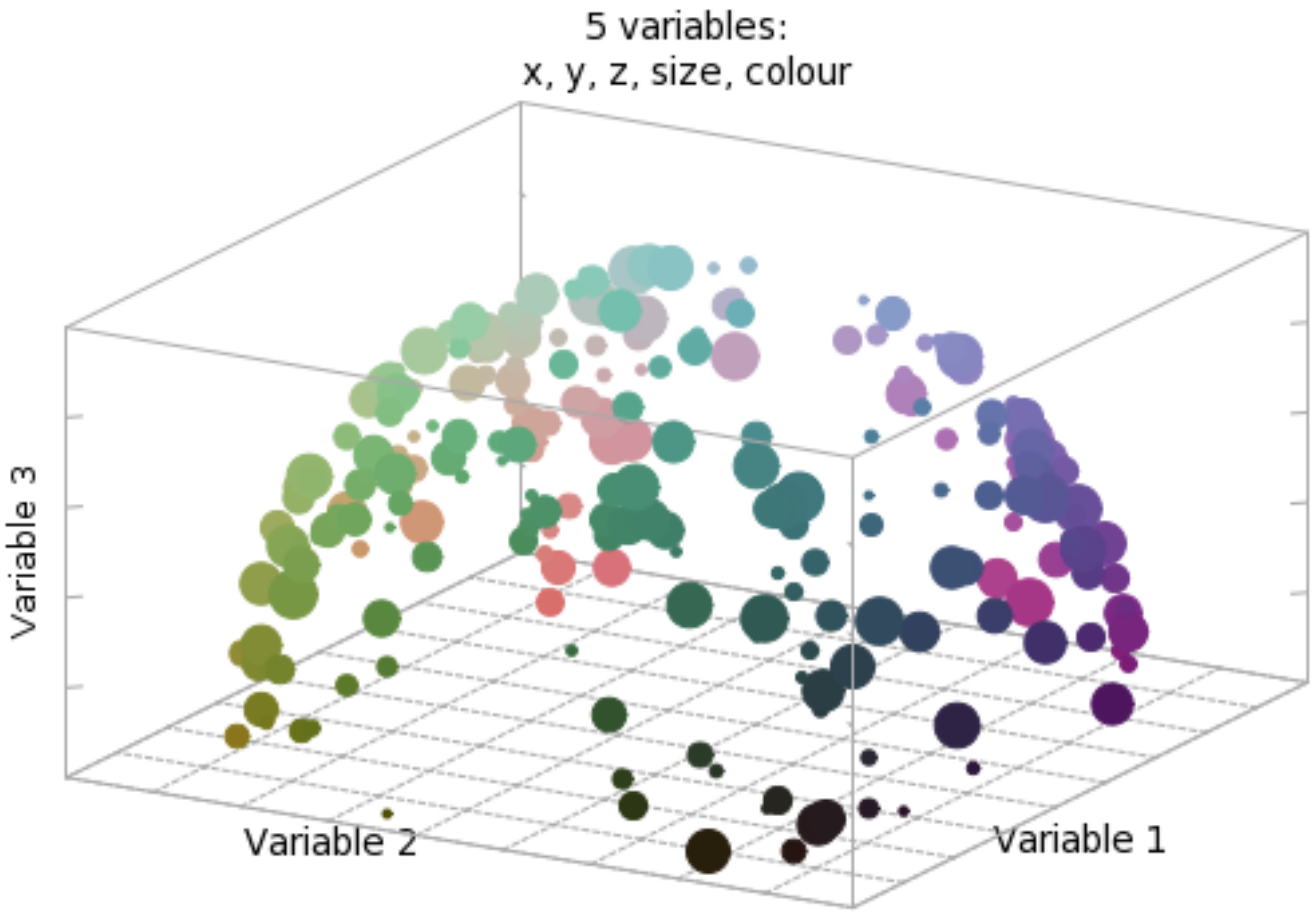

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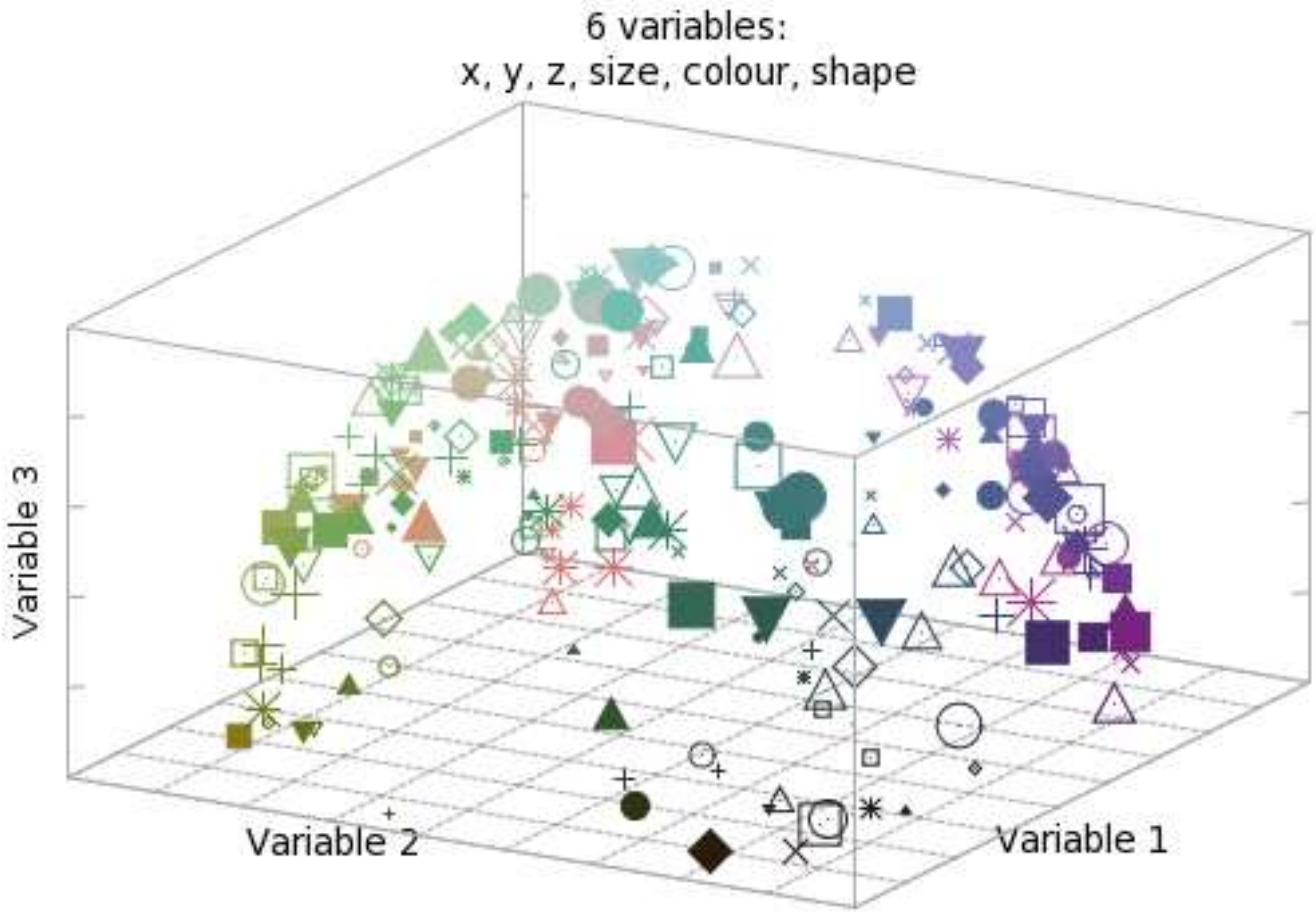

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- Dimensions (axes) are laid out in parallel
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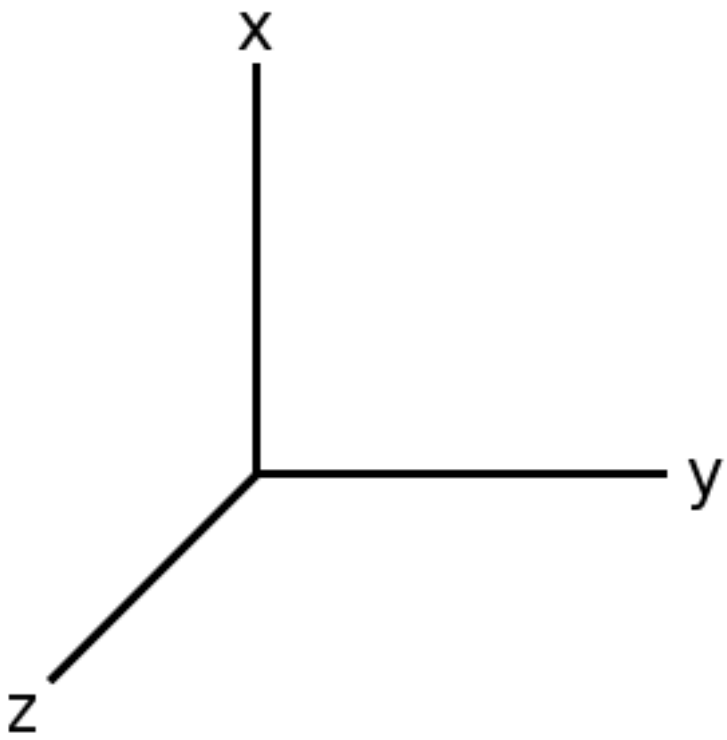

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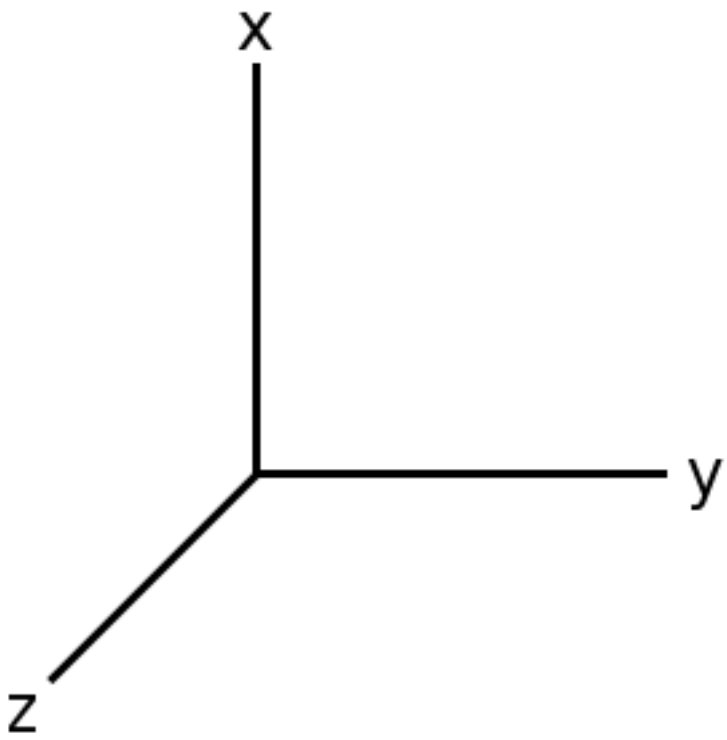

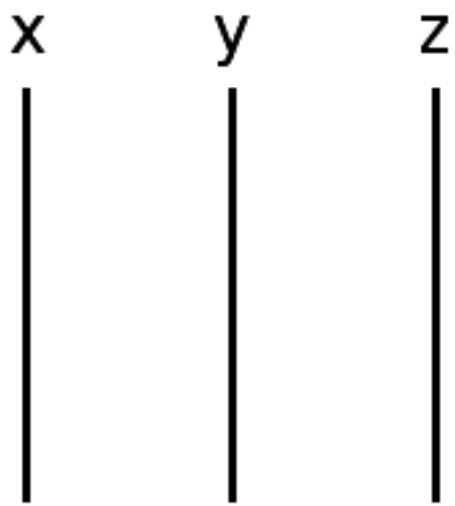

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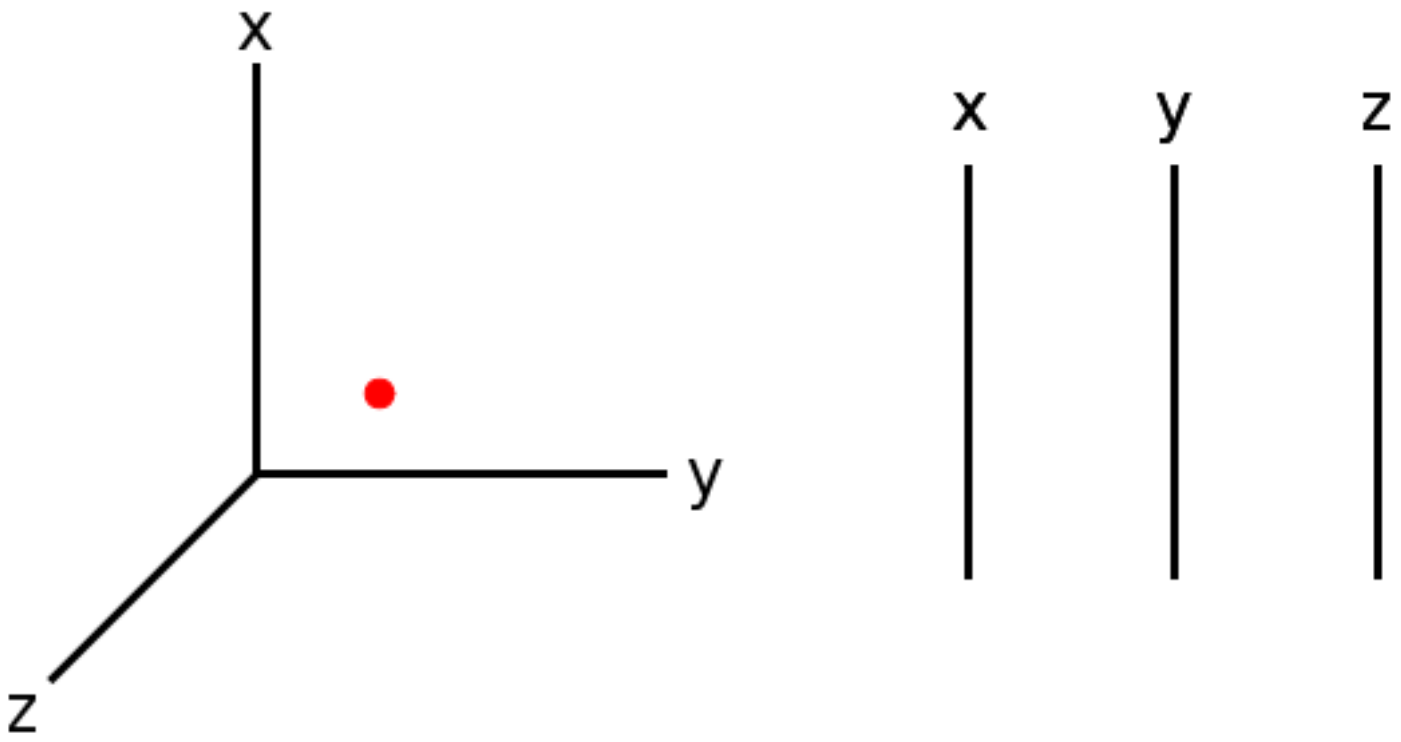

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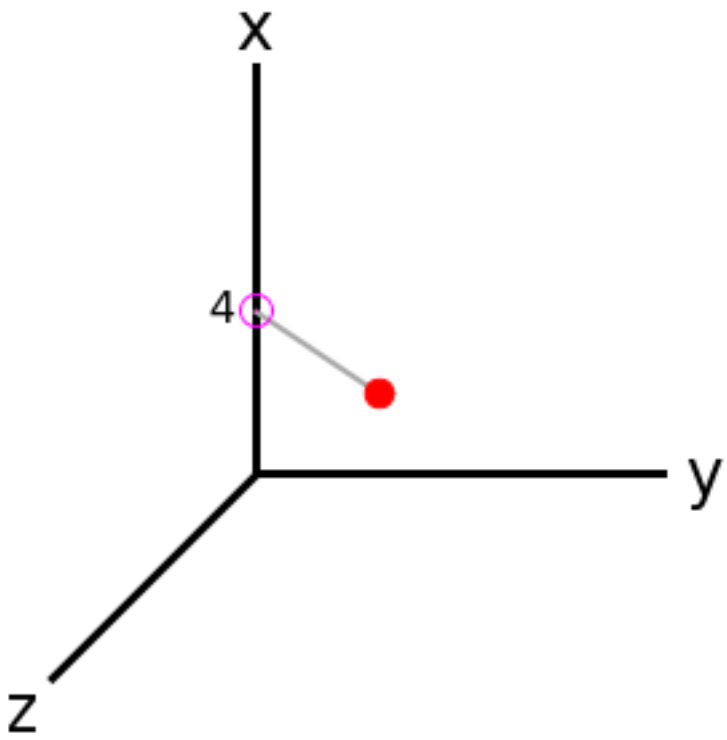

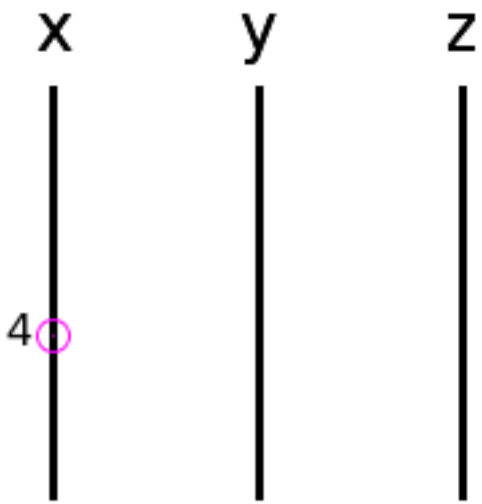

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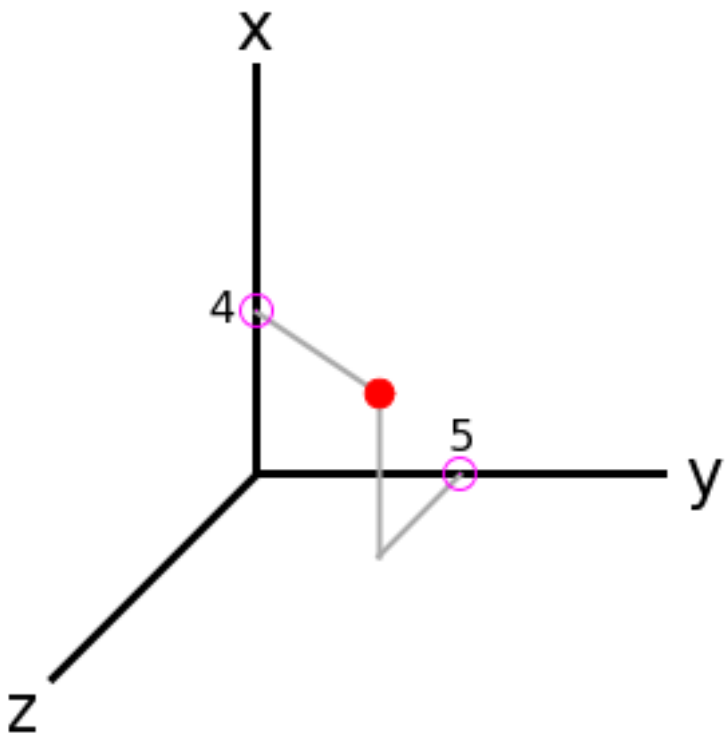

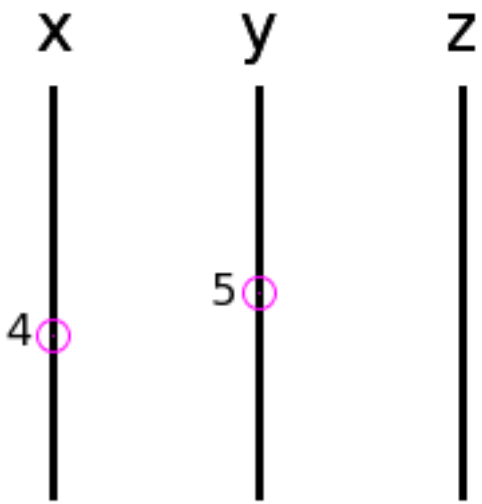

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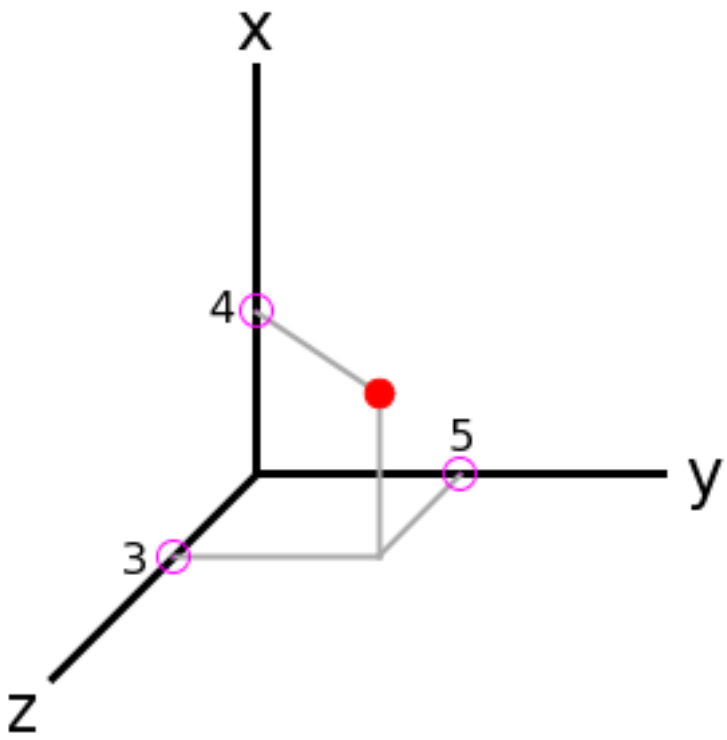

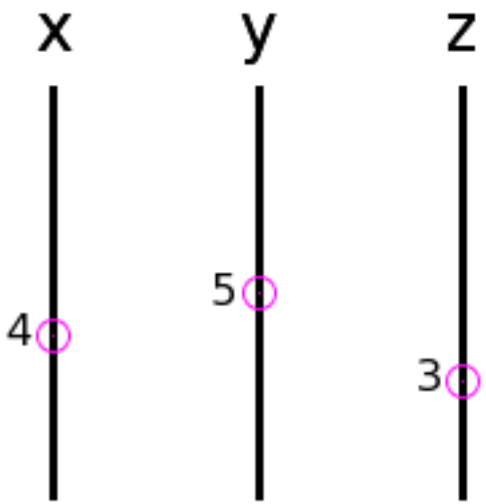

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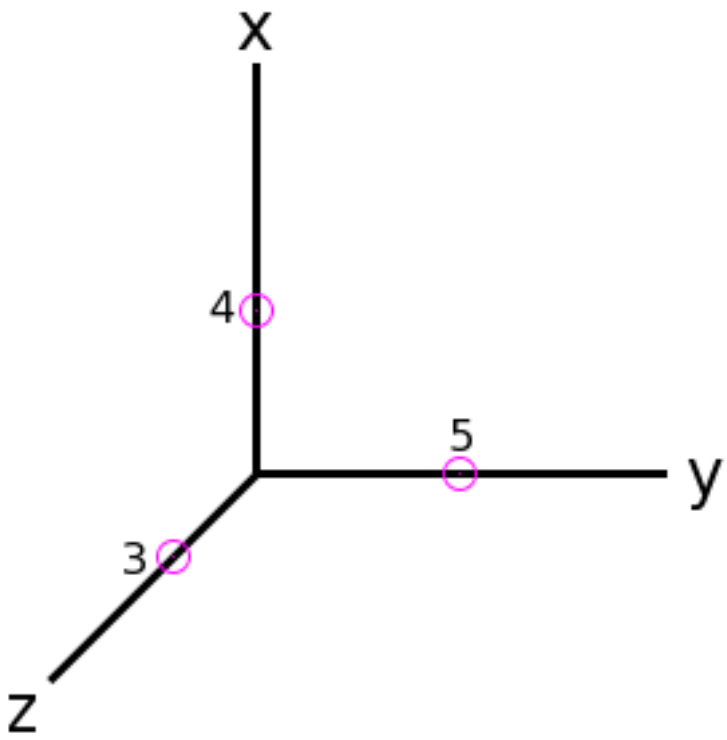

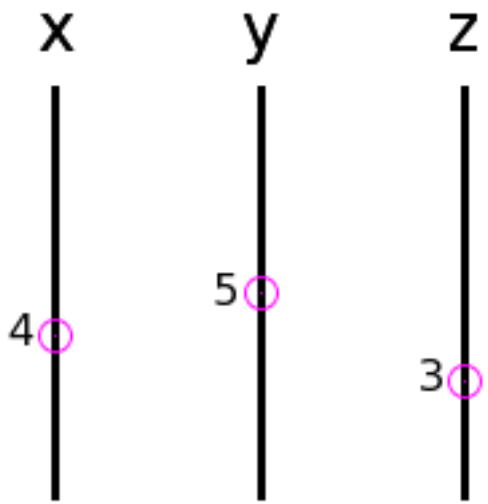

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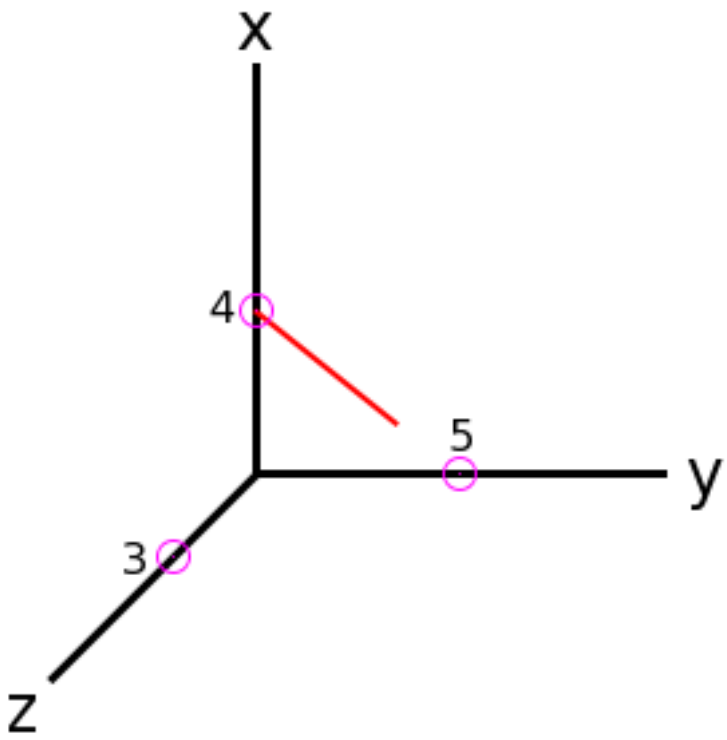

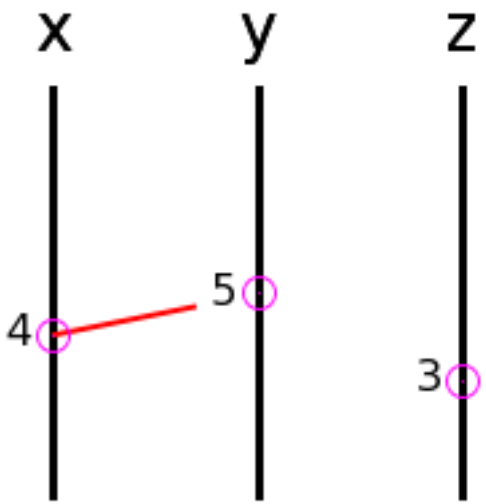

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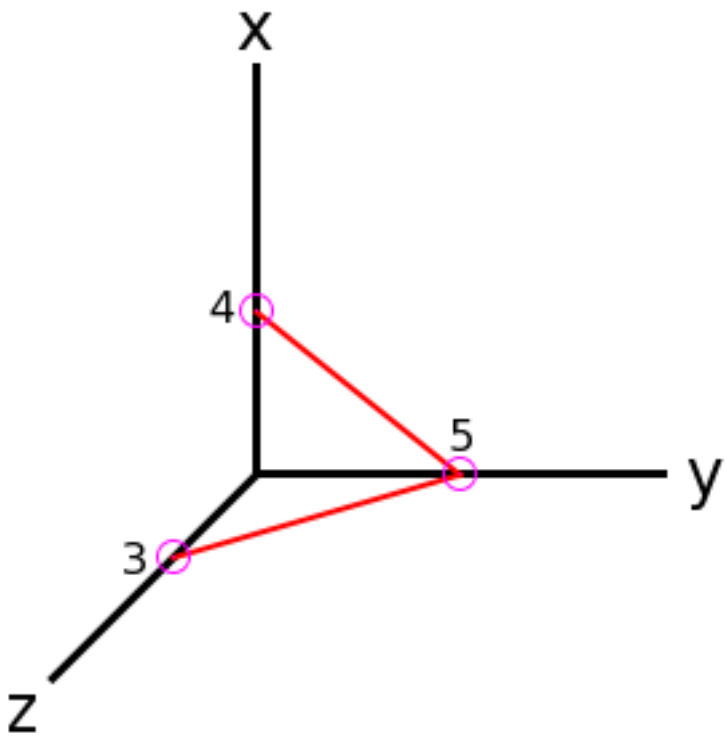

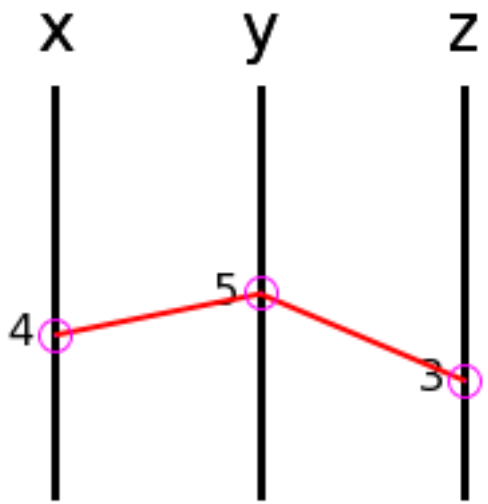

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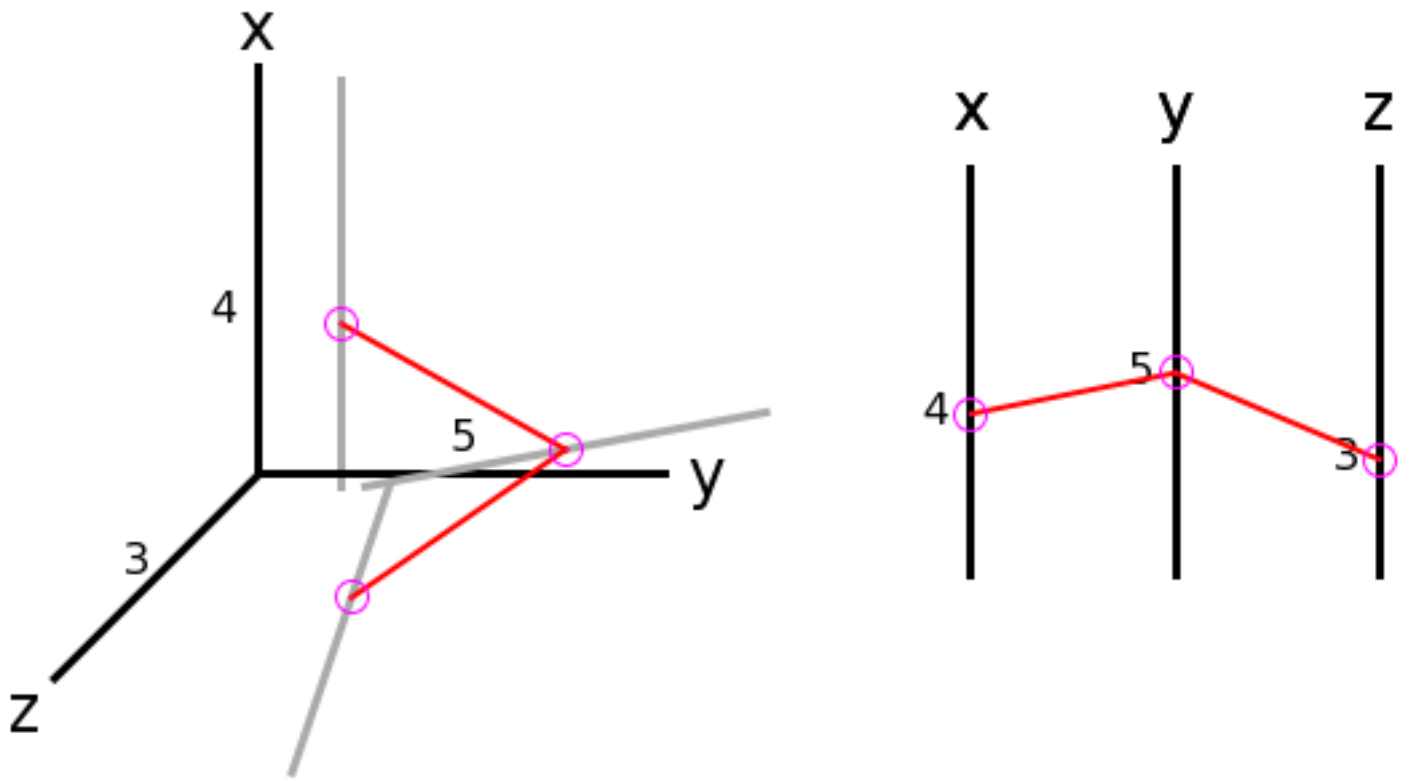

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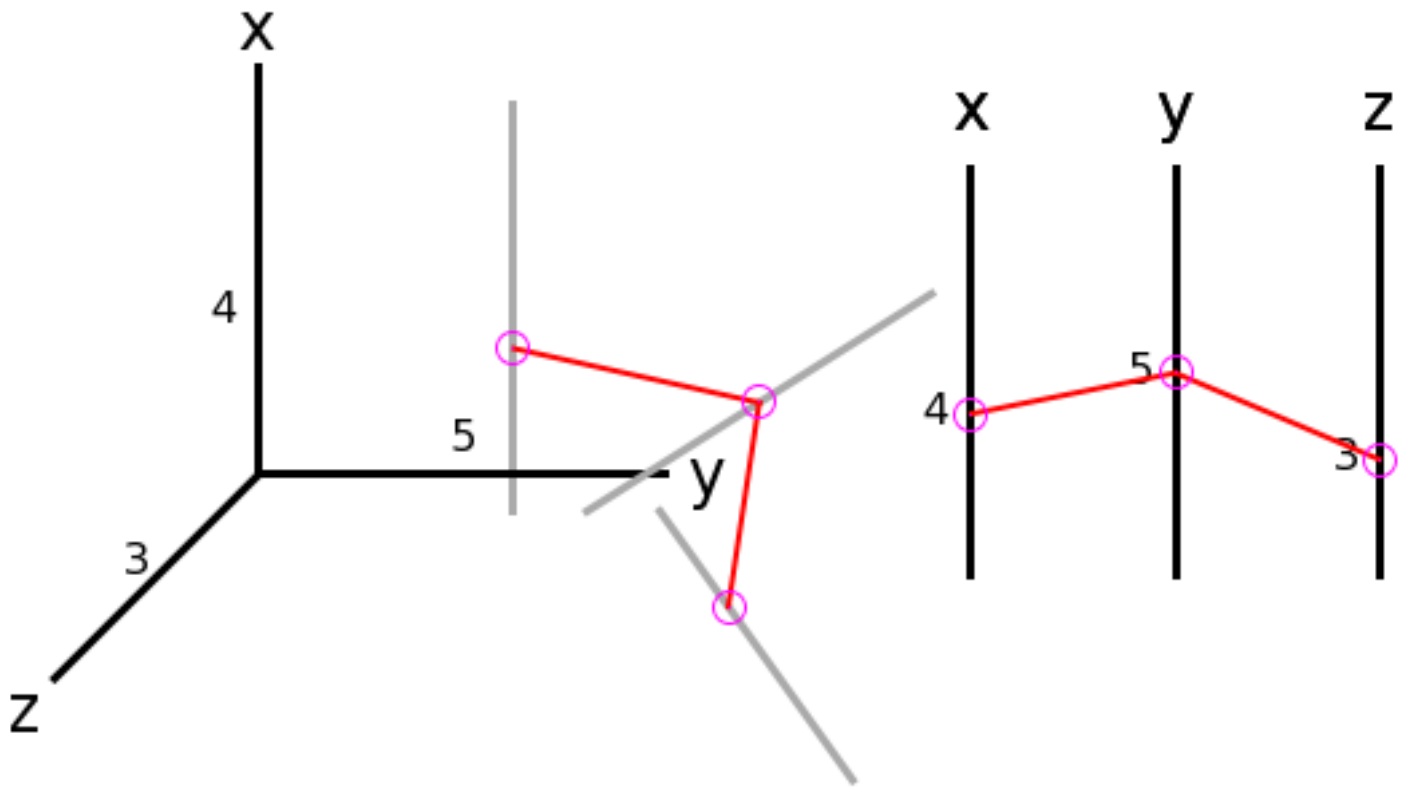

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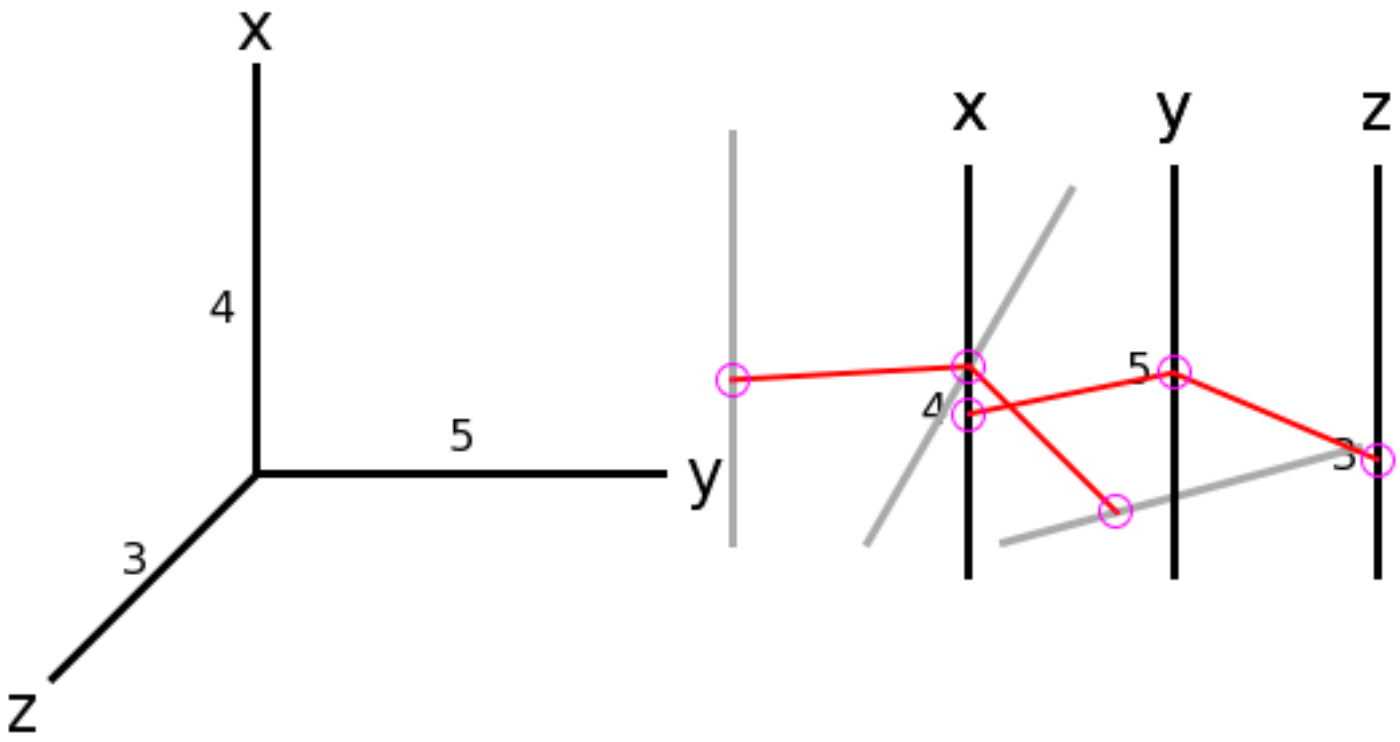

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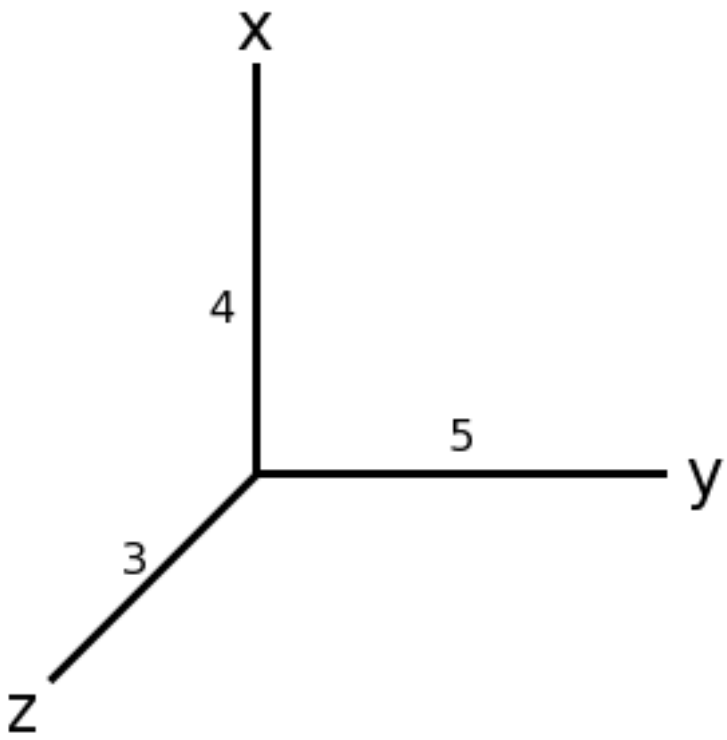

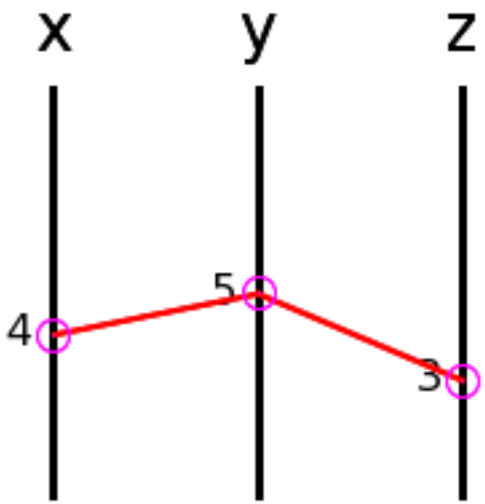

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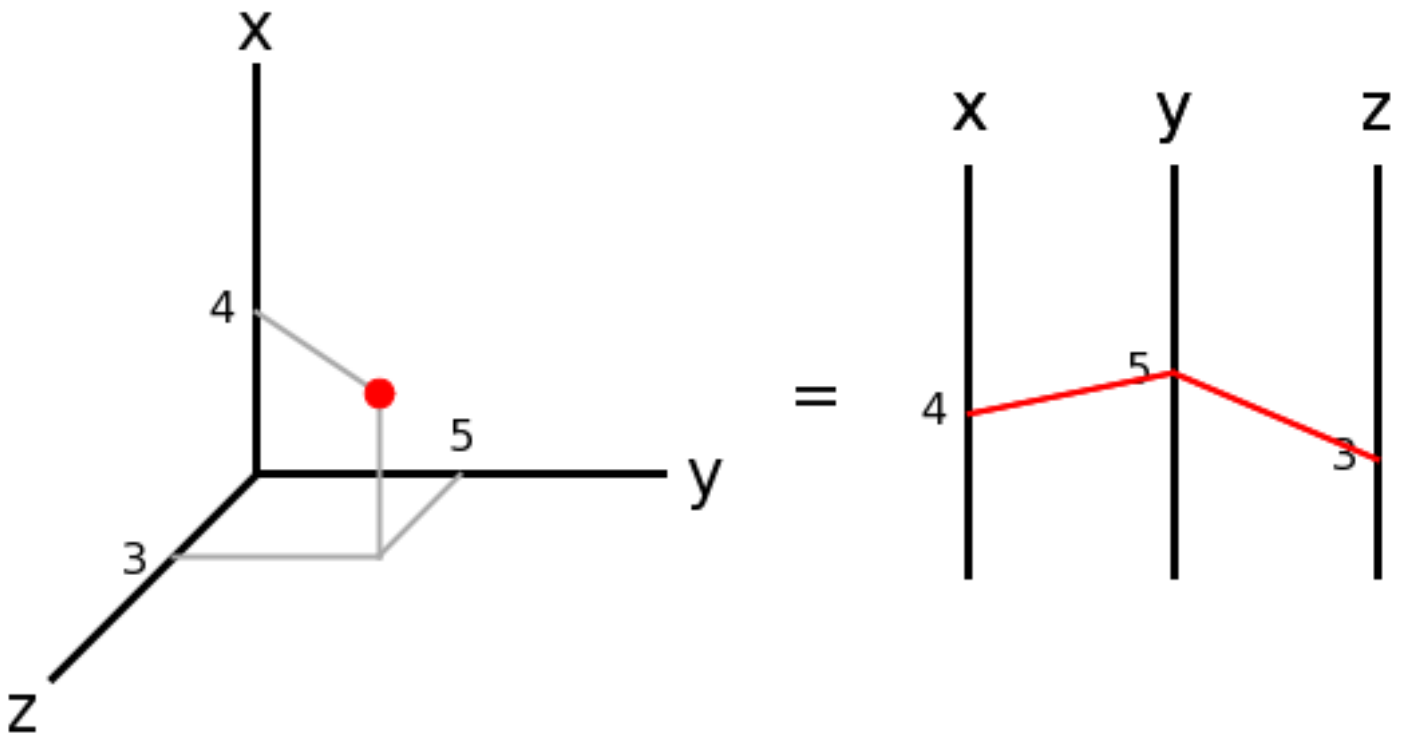

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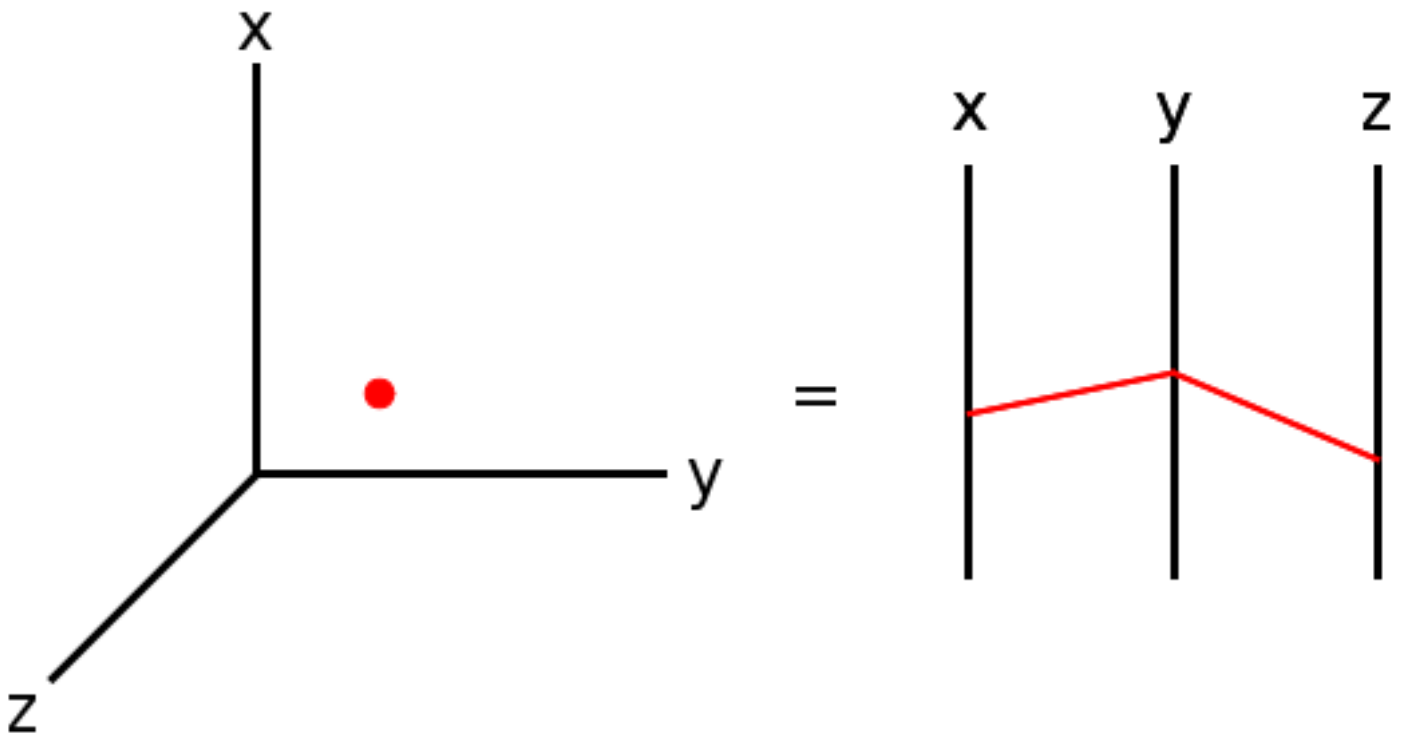

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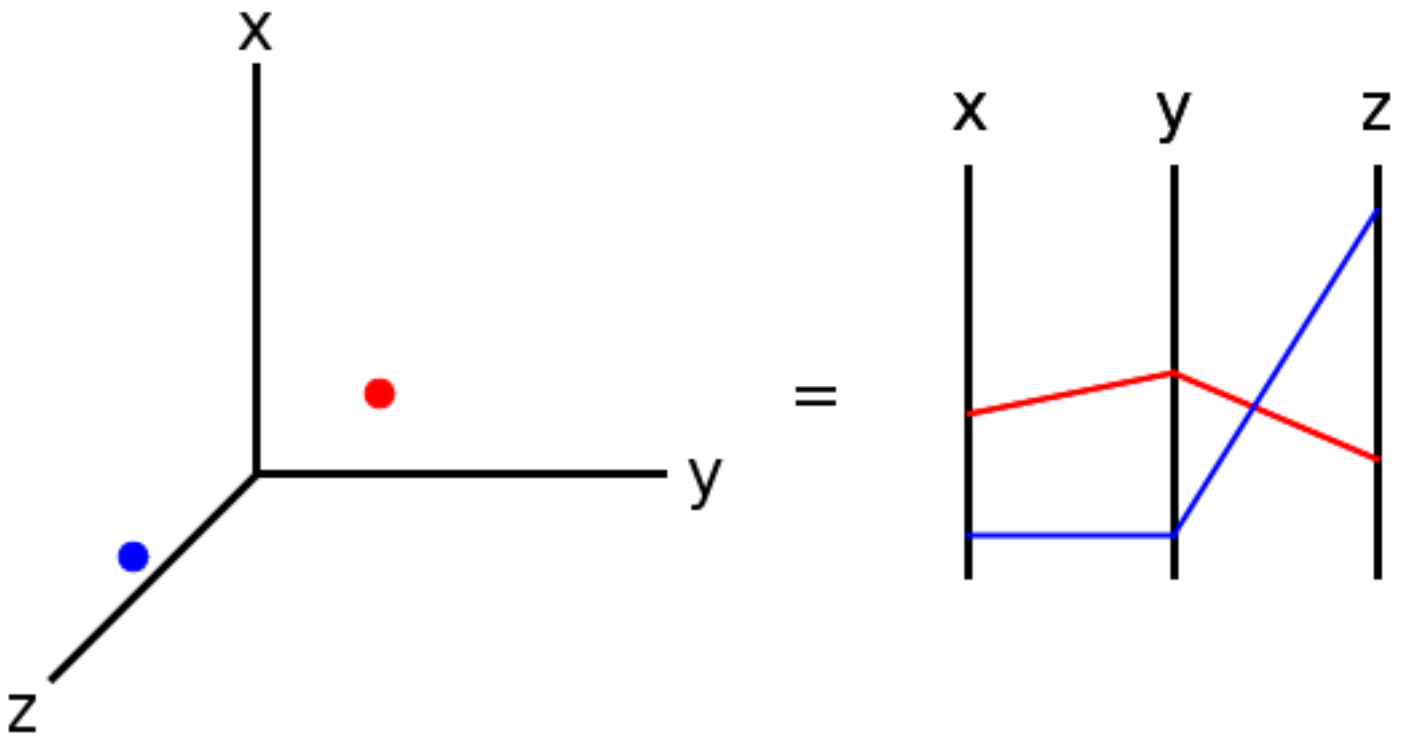

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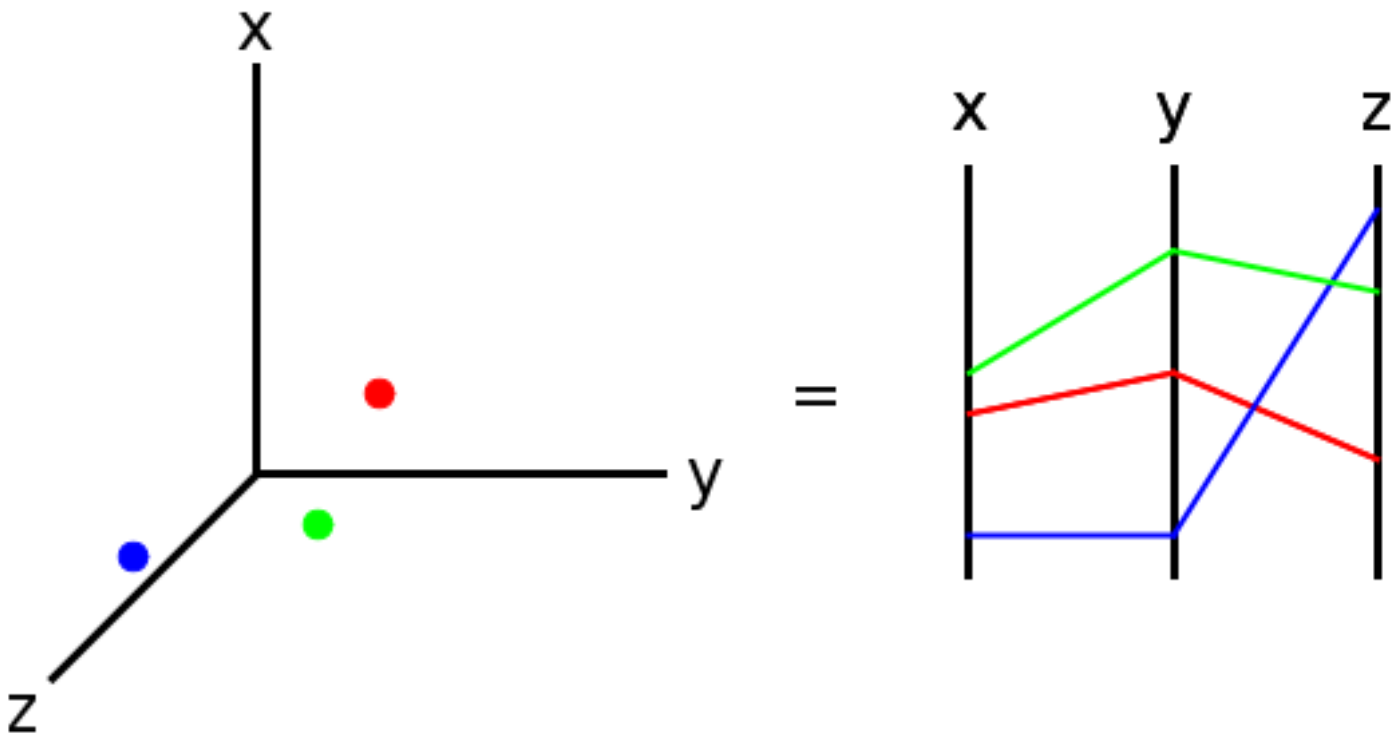

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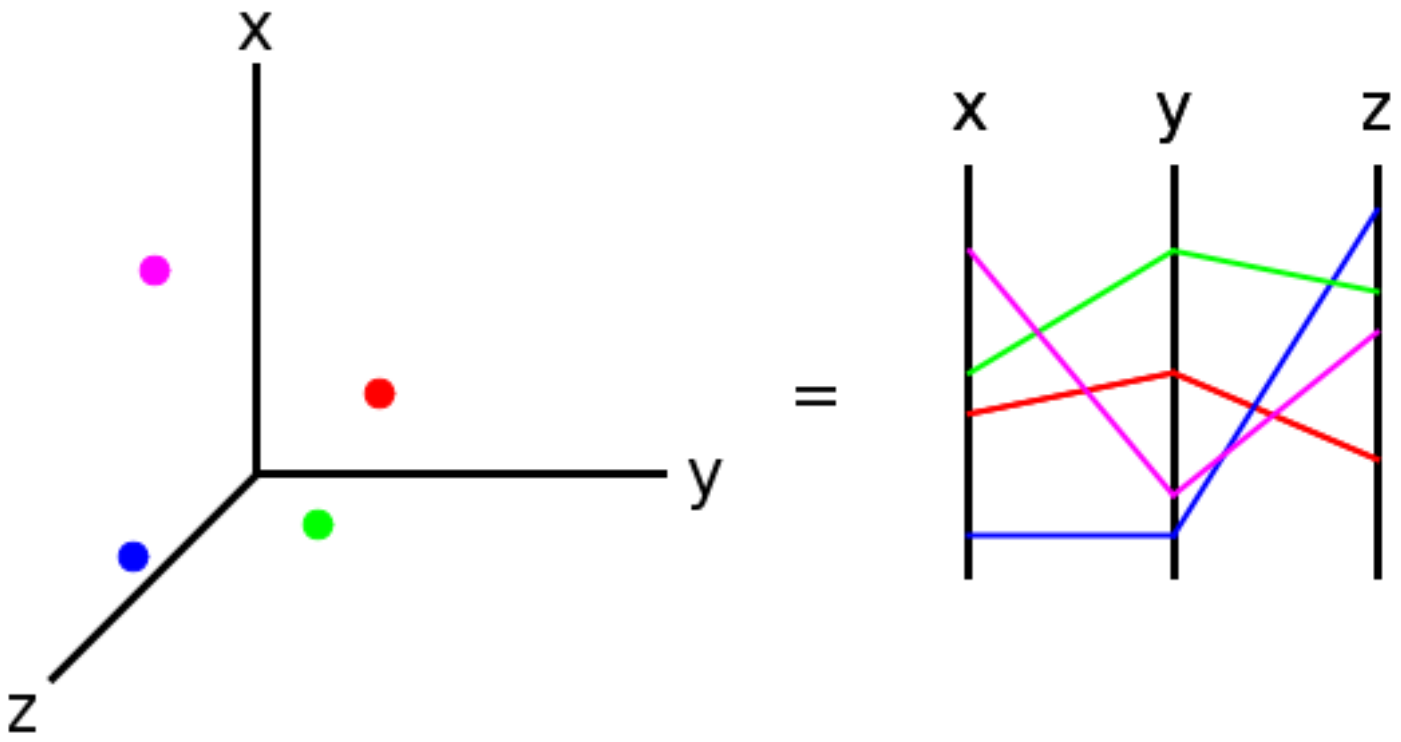
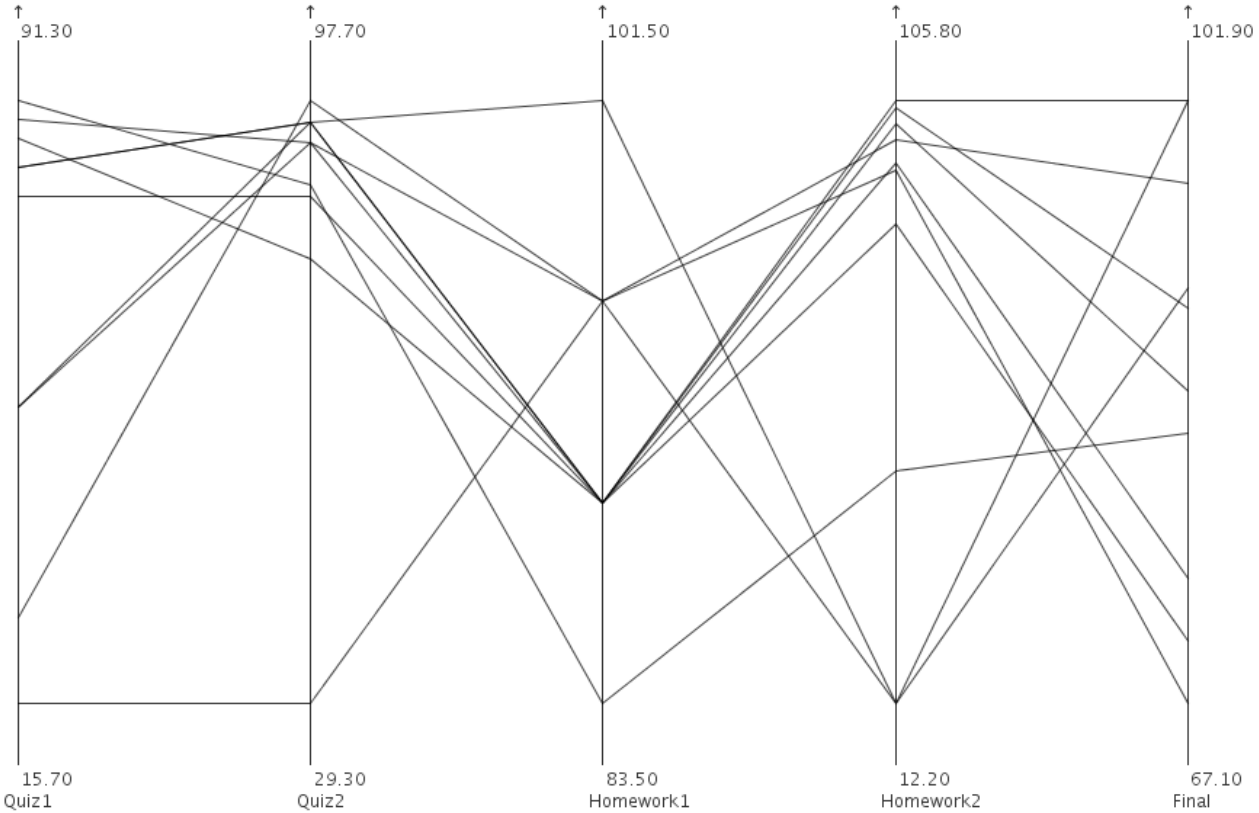


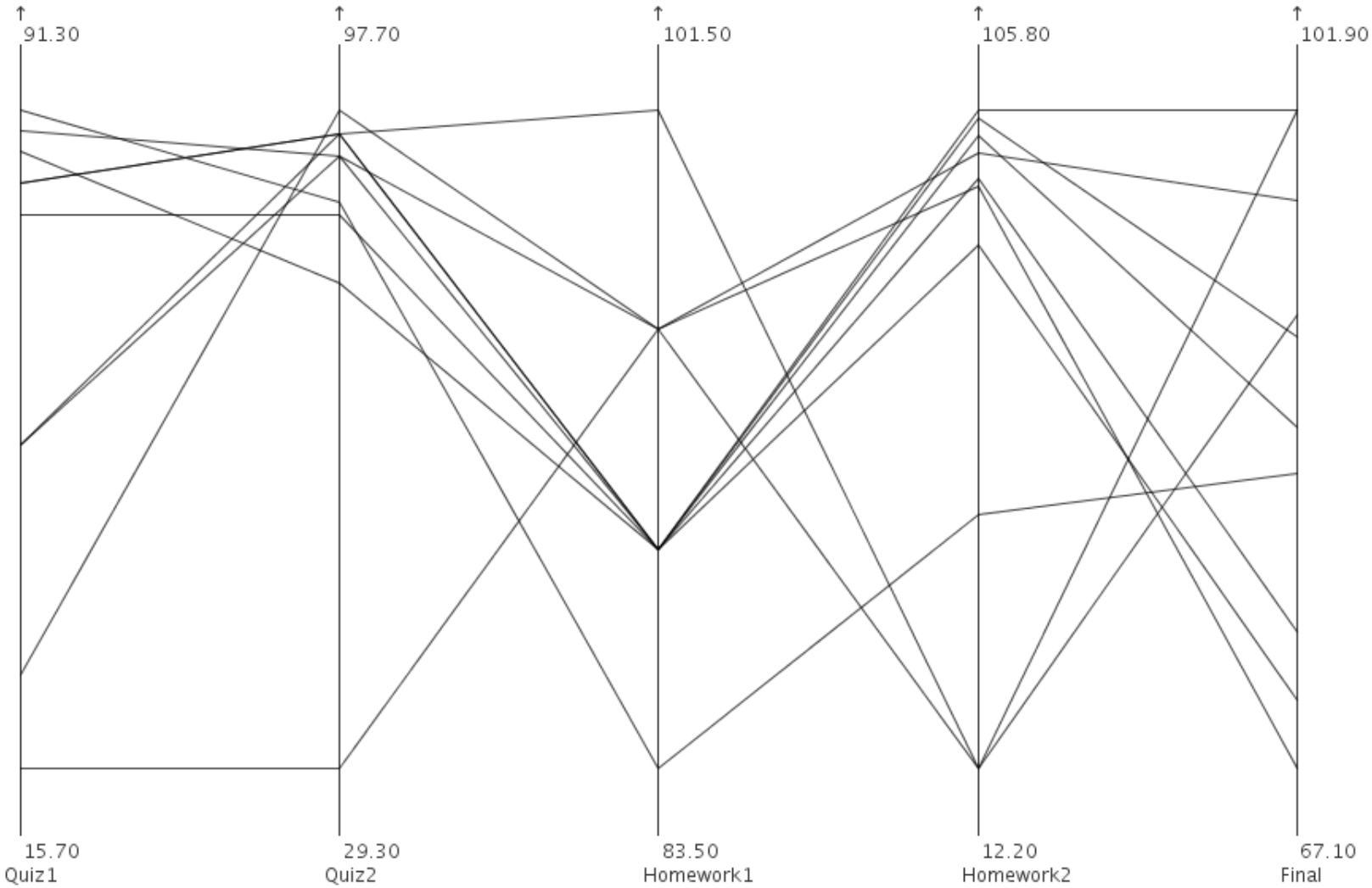
Advantages

- Allows many dimensions
- Straightforward mapping
- Human perceptual system is good at seeing connectedness and patterns



Challenge: Ambiguity

Common values cause ambiguity



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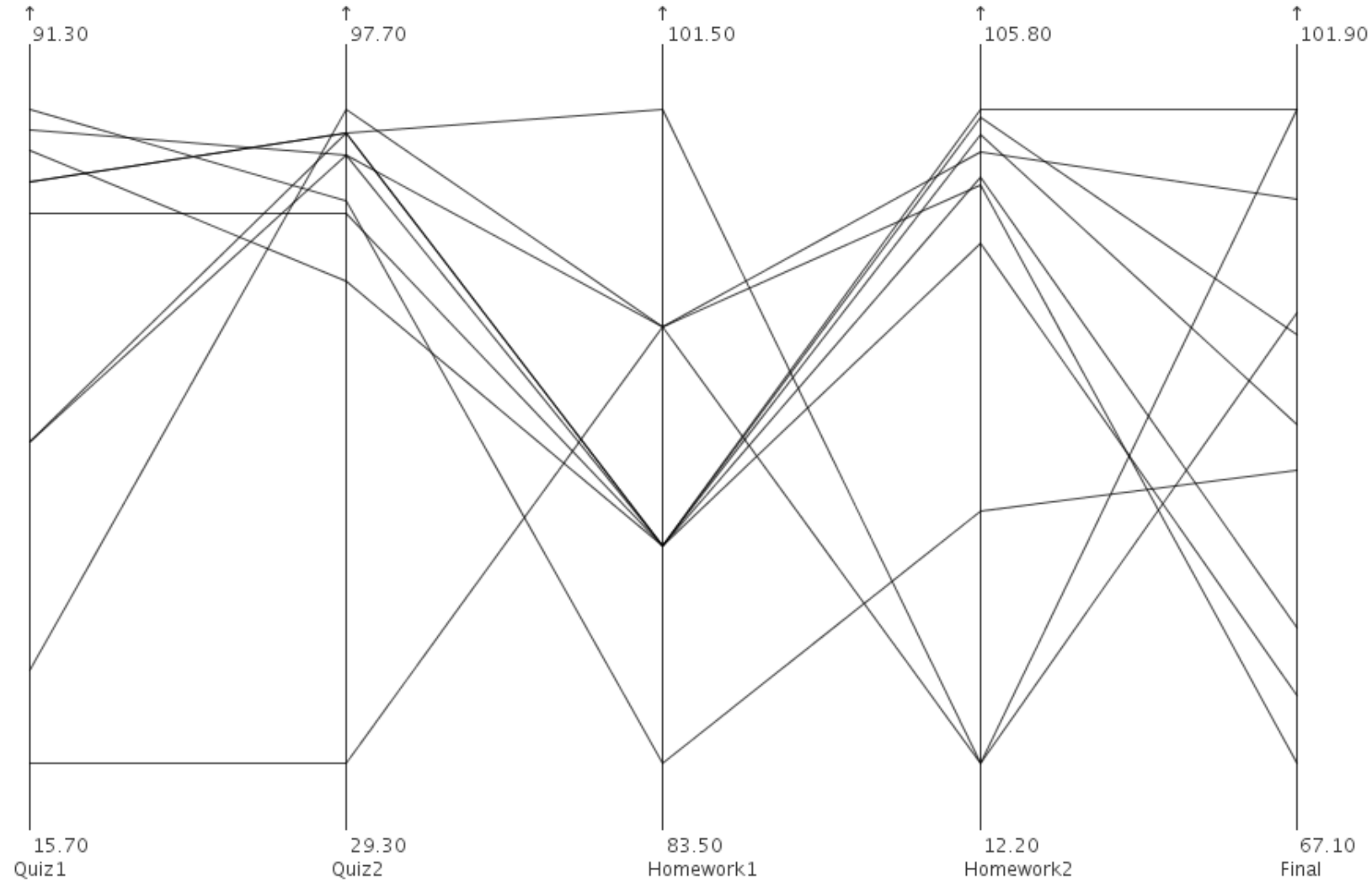

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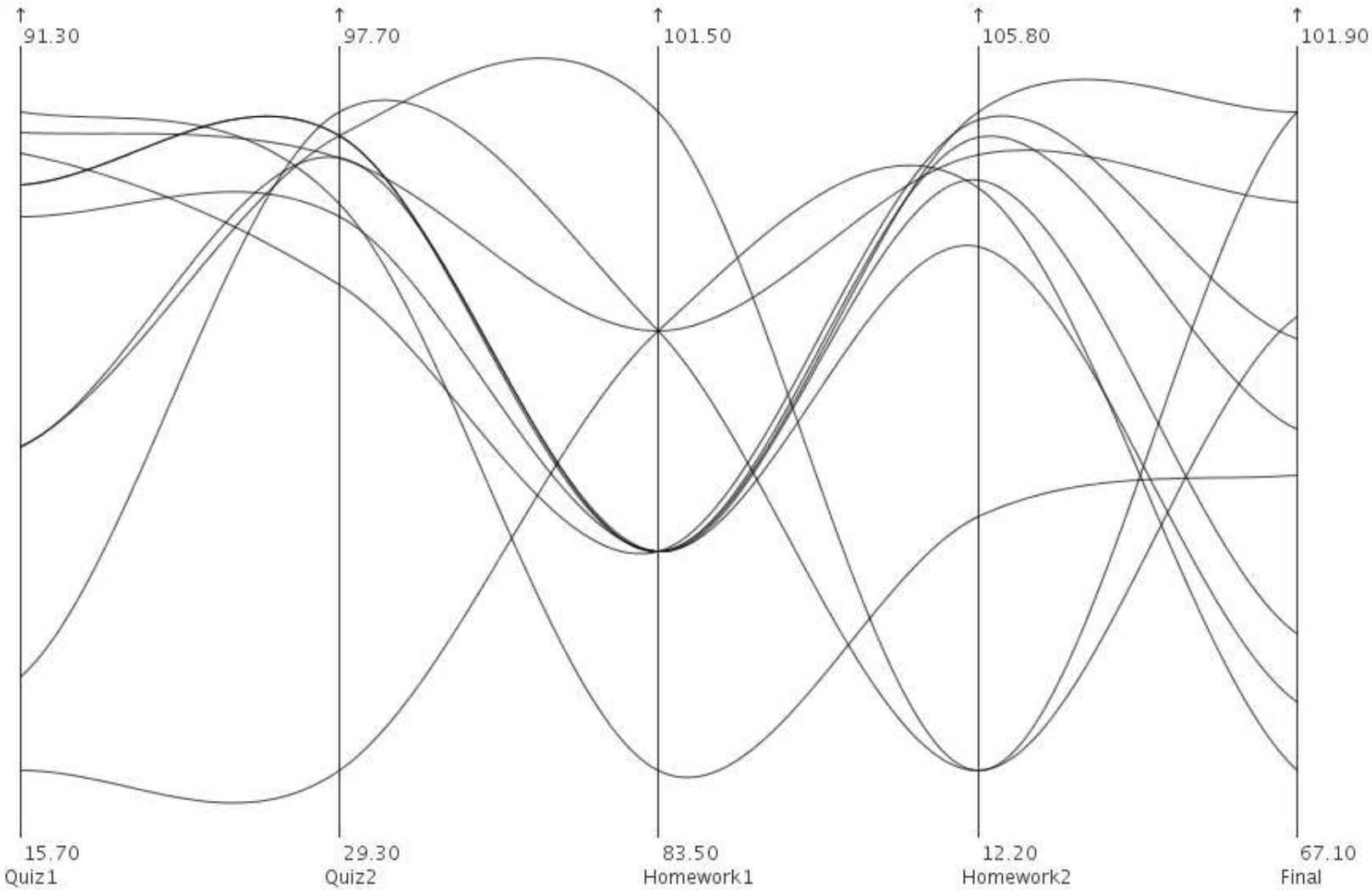

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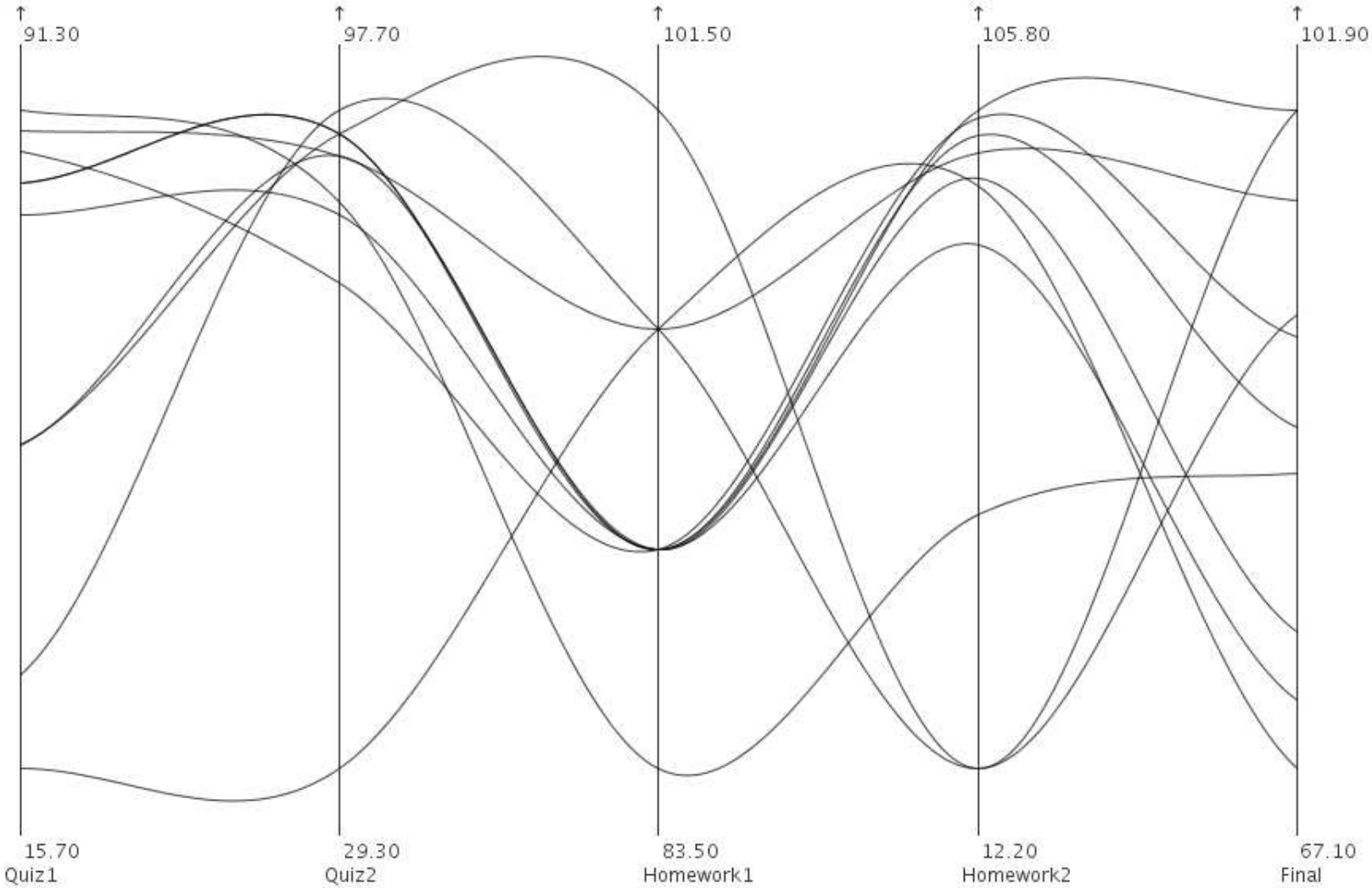
Common values cause ambiguity

Solution: (a) Curves (b) Spreading



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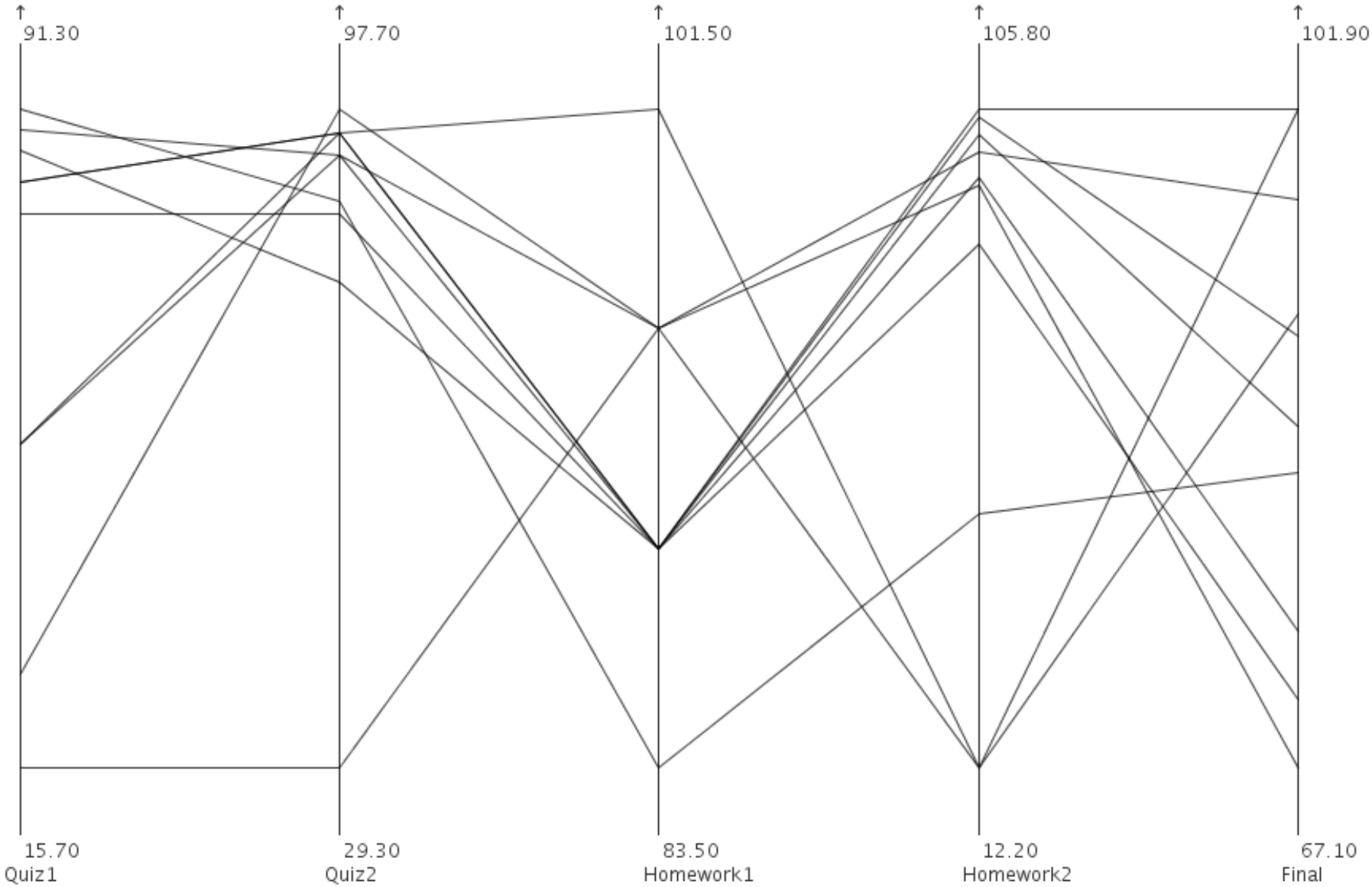

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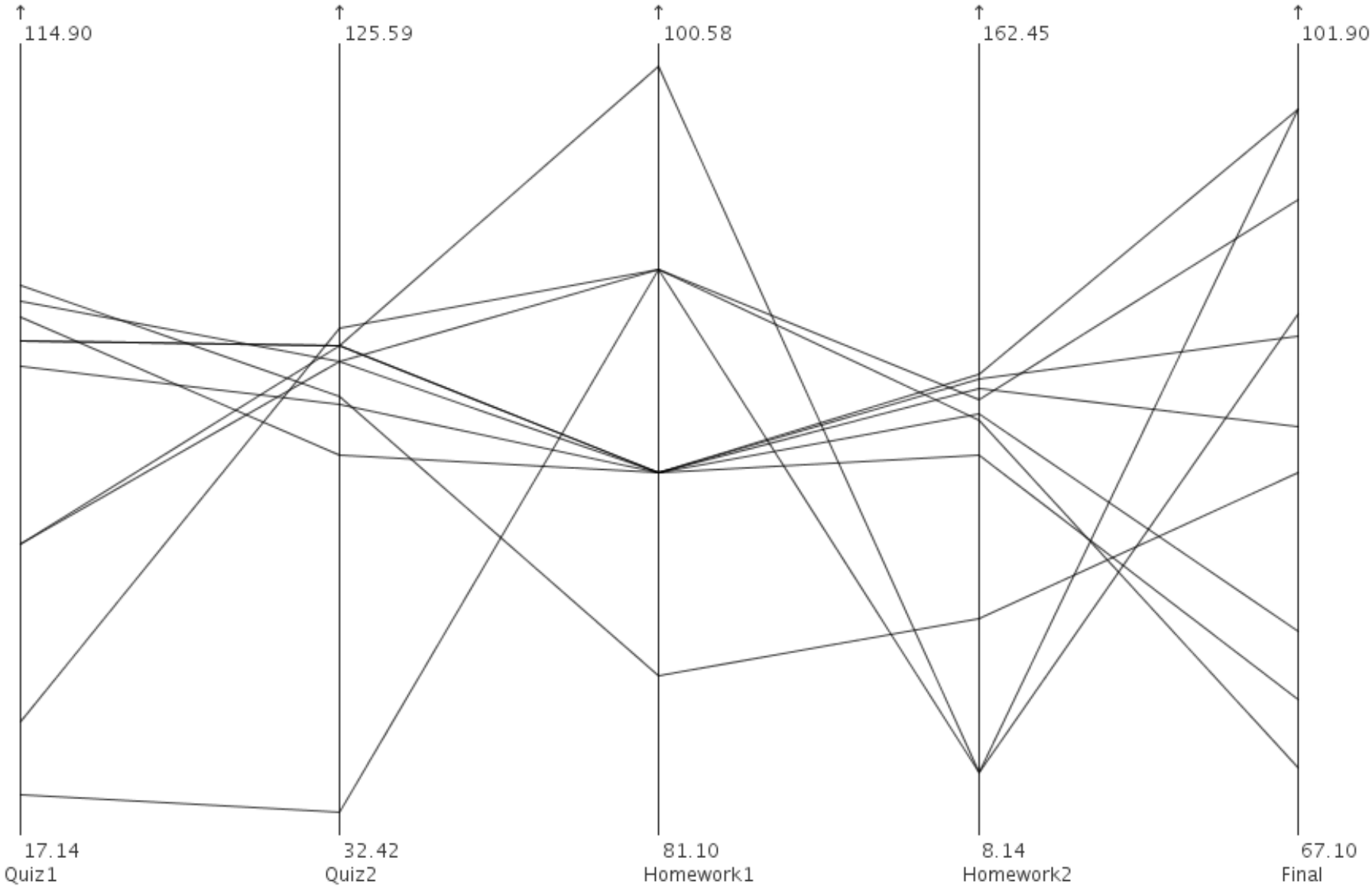

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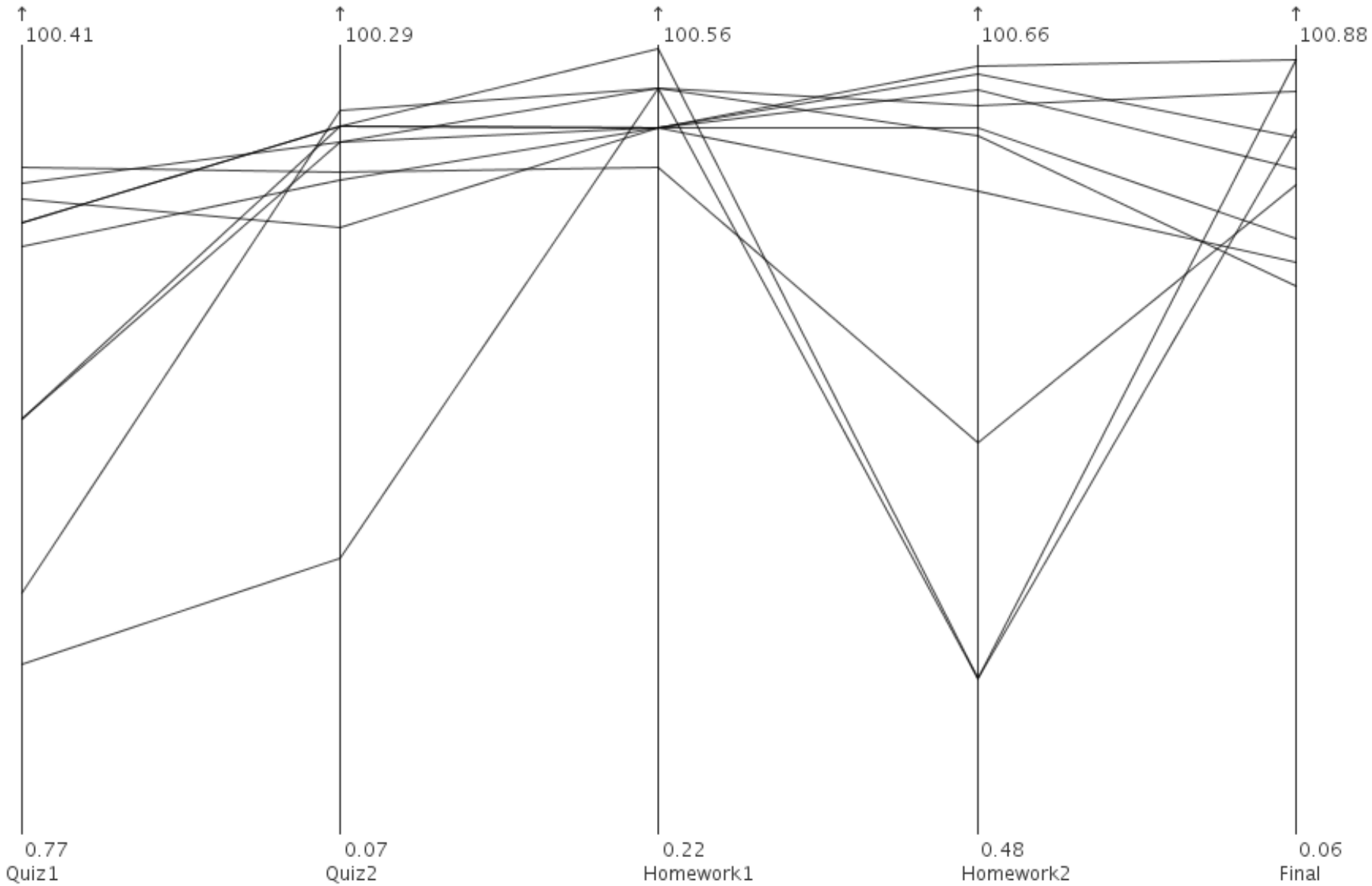

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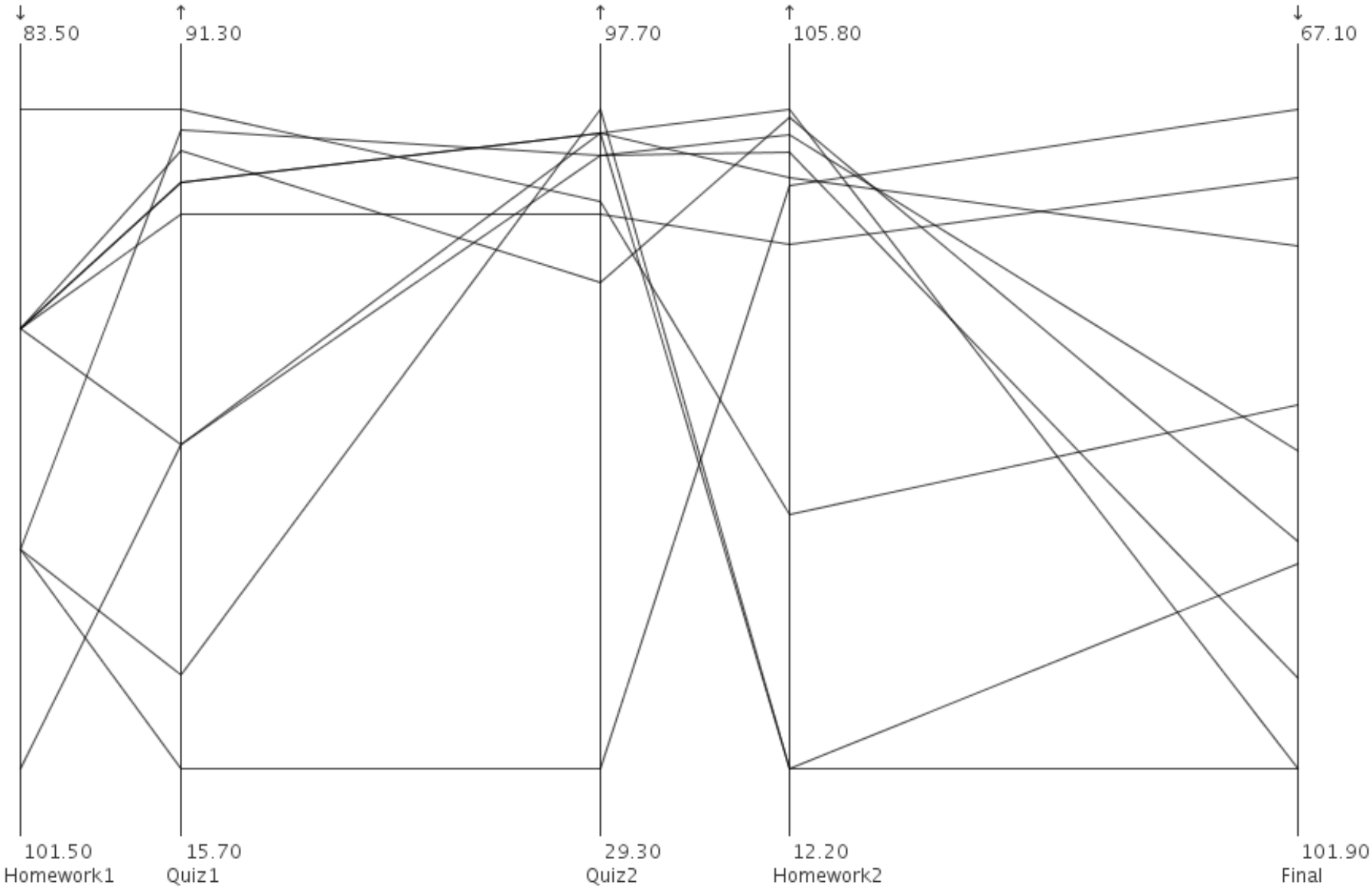

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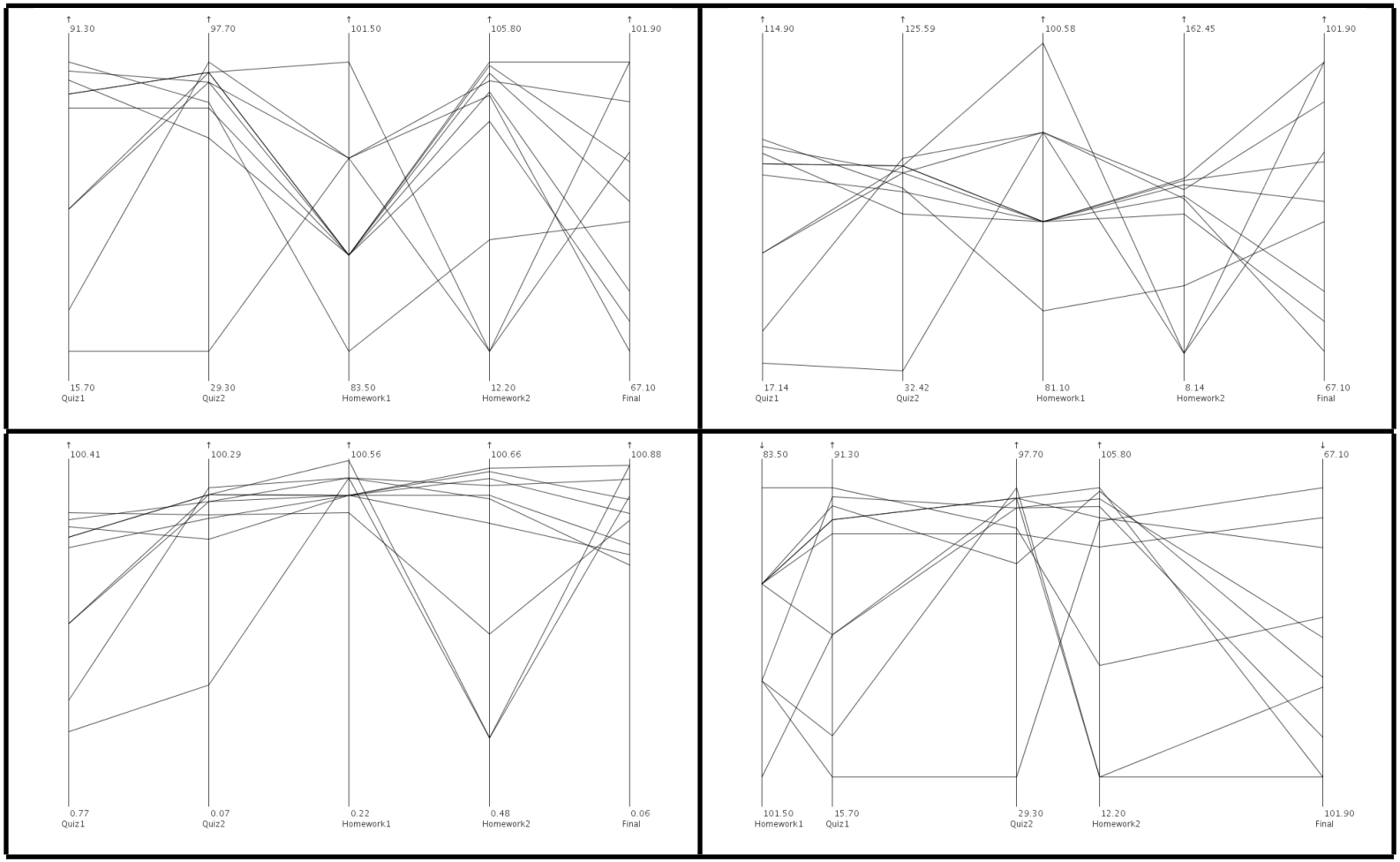

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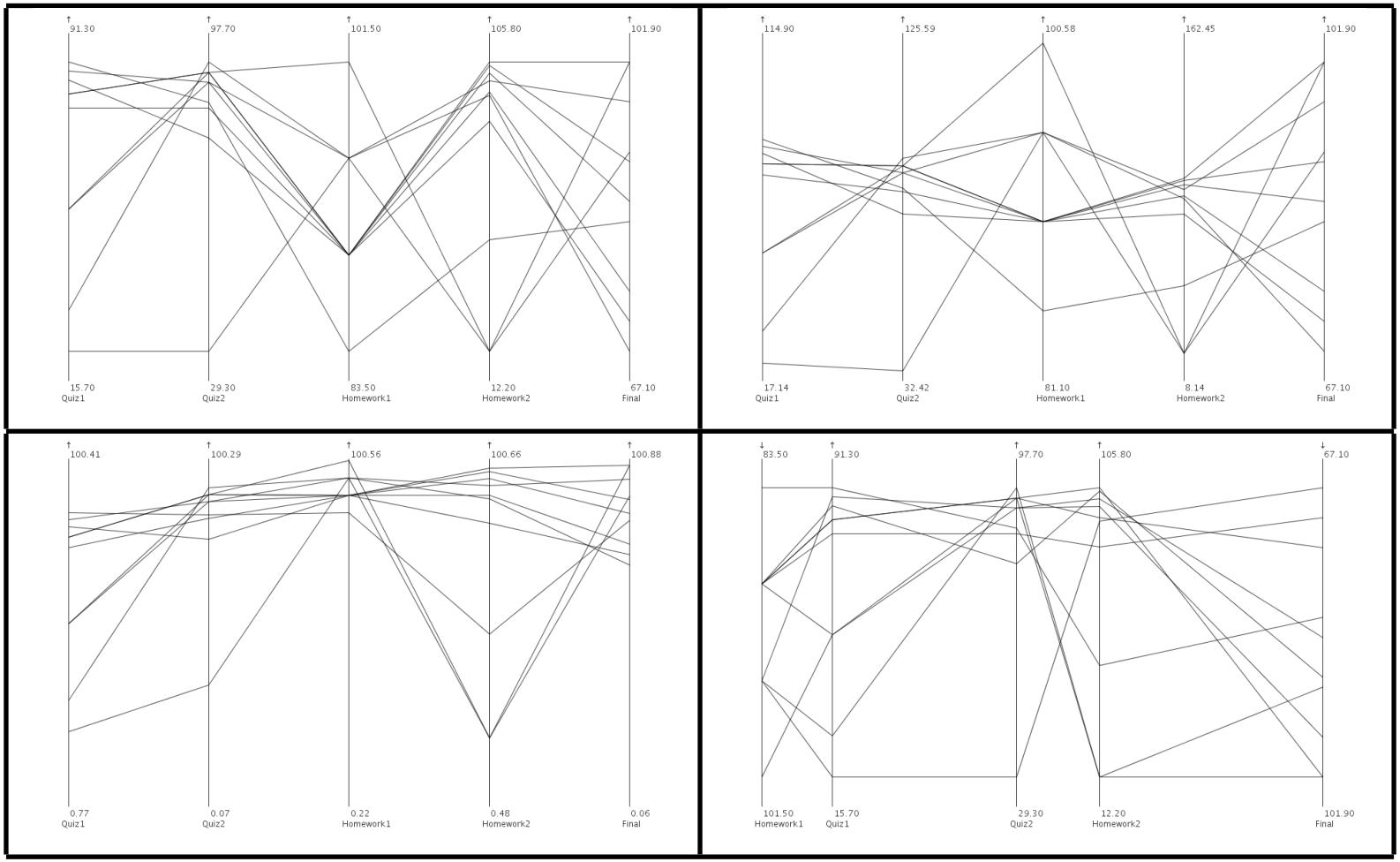
View affected by axis ordering, sign, scaling, translation

Solution: Interactive view manipulation



Pilot implementation

- Based on “parvis” InfoVis research software
- Java application
  - Swing + Java2D canvas
- Issues highlighted:
  - Web integration: possible, but not optimal
  - Data storage: flat text files not scalable
  - Interactivity: poor responsiveness, usability
- Useful to confirm the use cases and benefits of longitudinal visualisation

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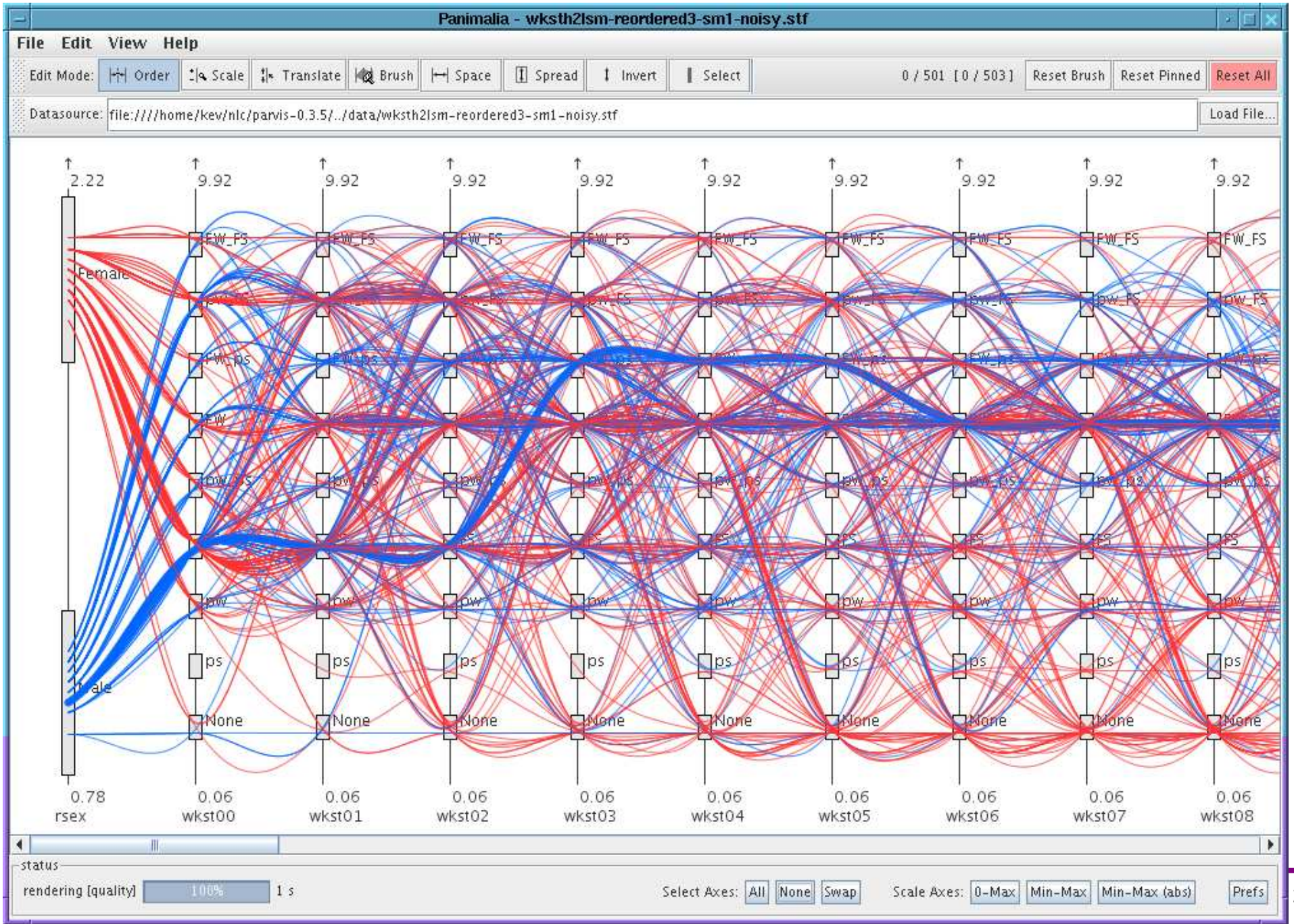

Panemalia technology

- Frontend
  - DHTML (HTML5 + Javascript + CSS)
  - jQuery + jQueryUI
  - raphaelJS (SVG or VML)
  - Requires modern browser
    - (But not Firefox on Linux)
- Backend
  - Ruby on Rails
  - SQLite
  - R
- Queries and results using AJAX + JSON

Demo — NLC

Negotiating the Life Course (NLC)

- 4 waves (unbalanced), 1000–3000 respondents
- Examine aspects relating to labour force participation
  - Work and study history
    - Retrospectively from age 15 (up to age 62)
    - Full-time, part-time, none

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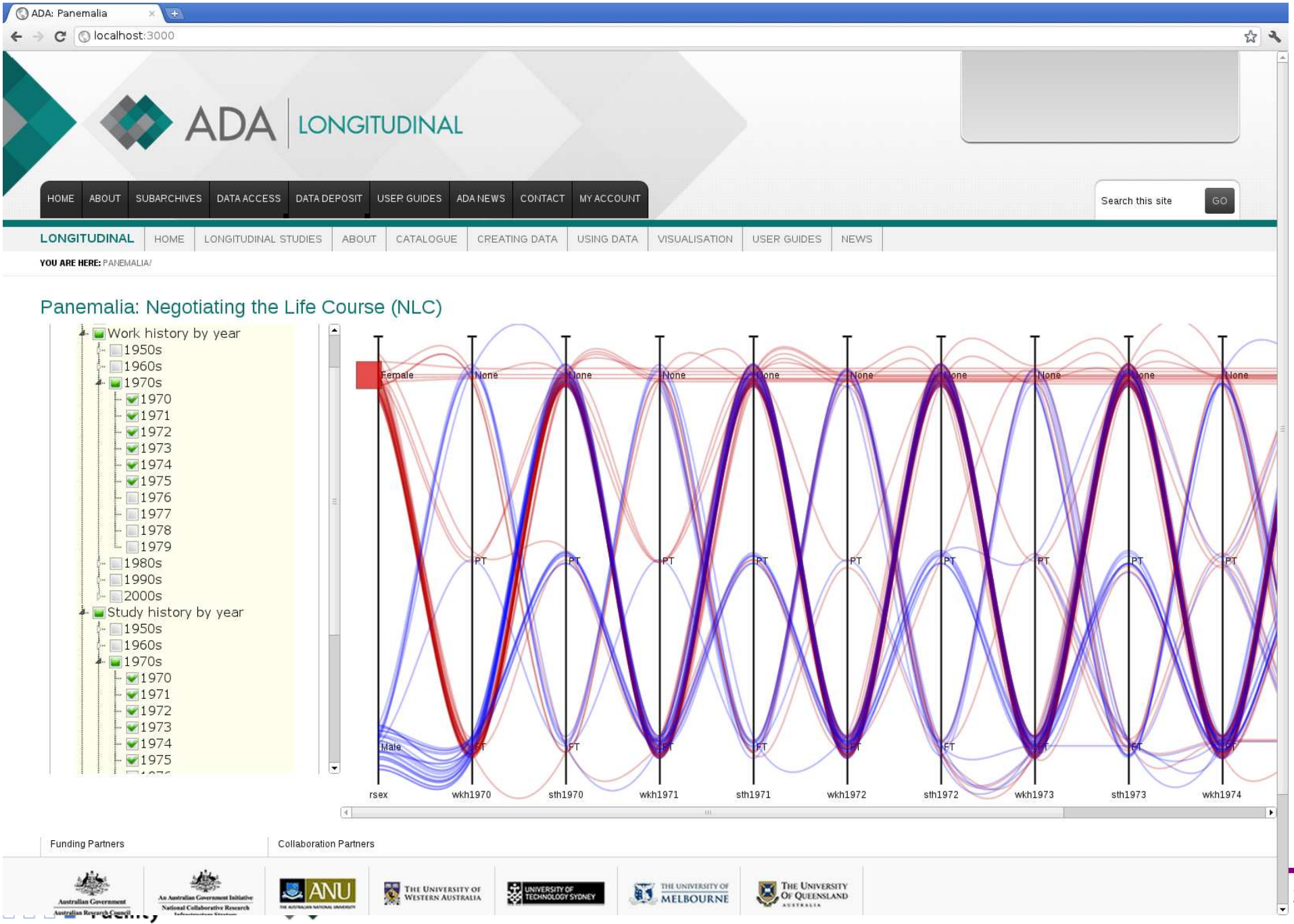
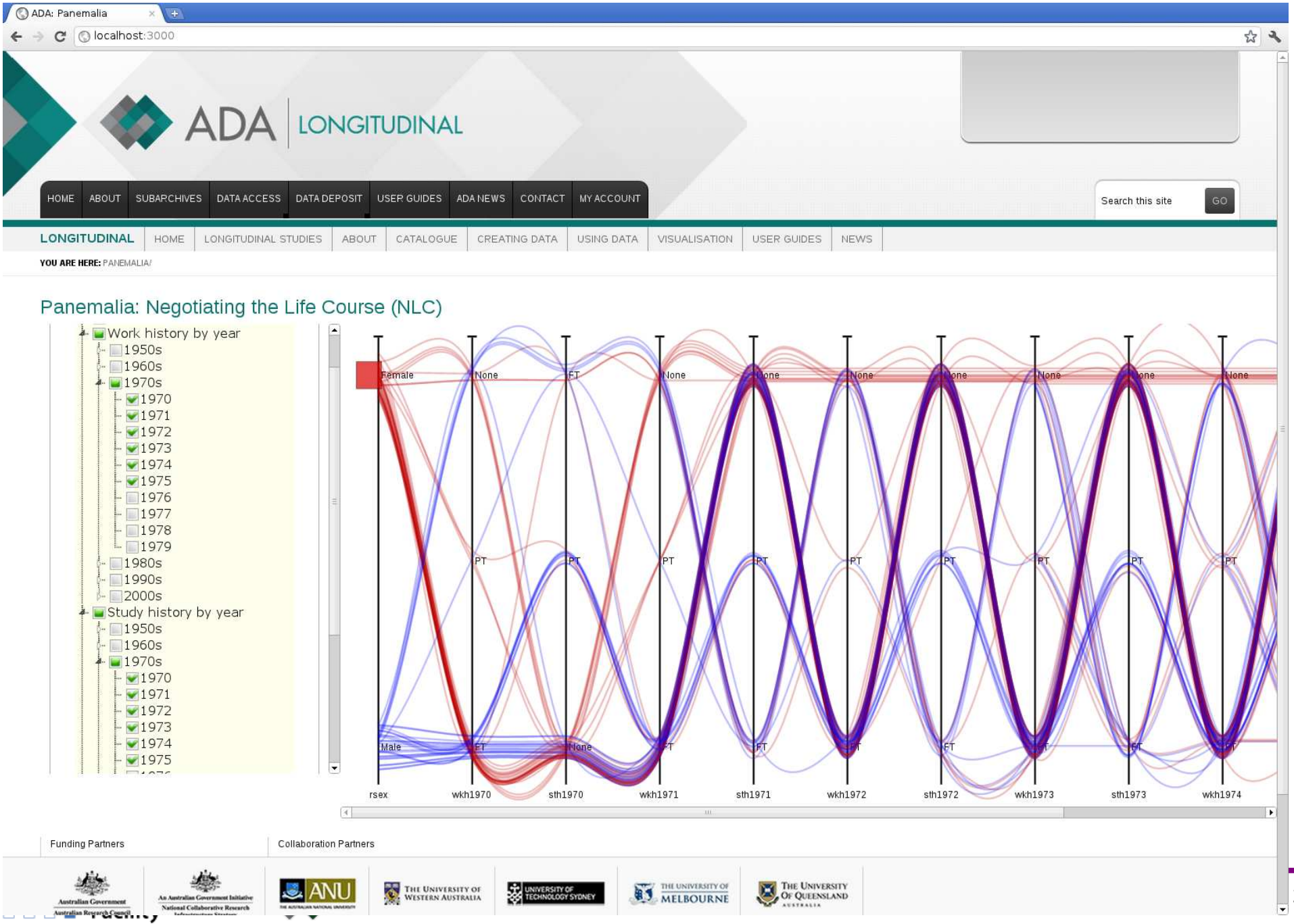


Work/study: interleaved by year



Work/study: interleaved by year

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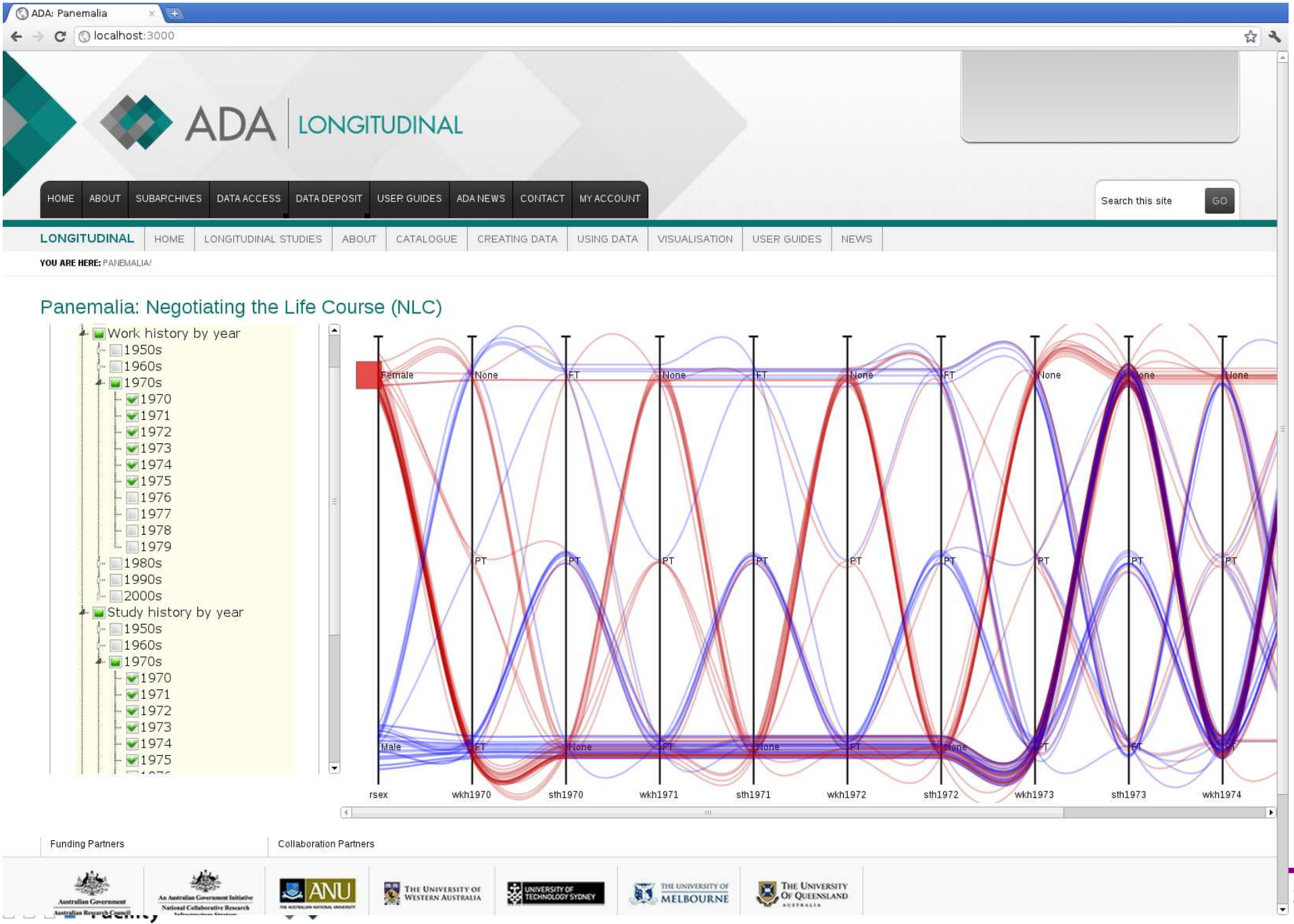
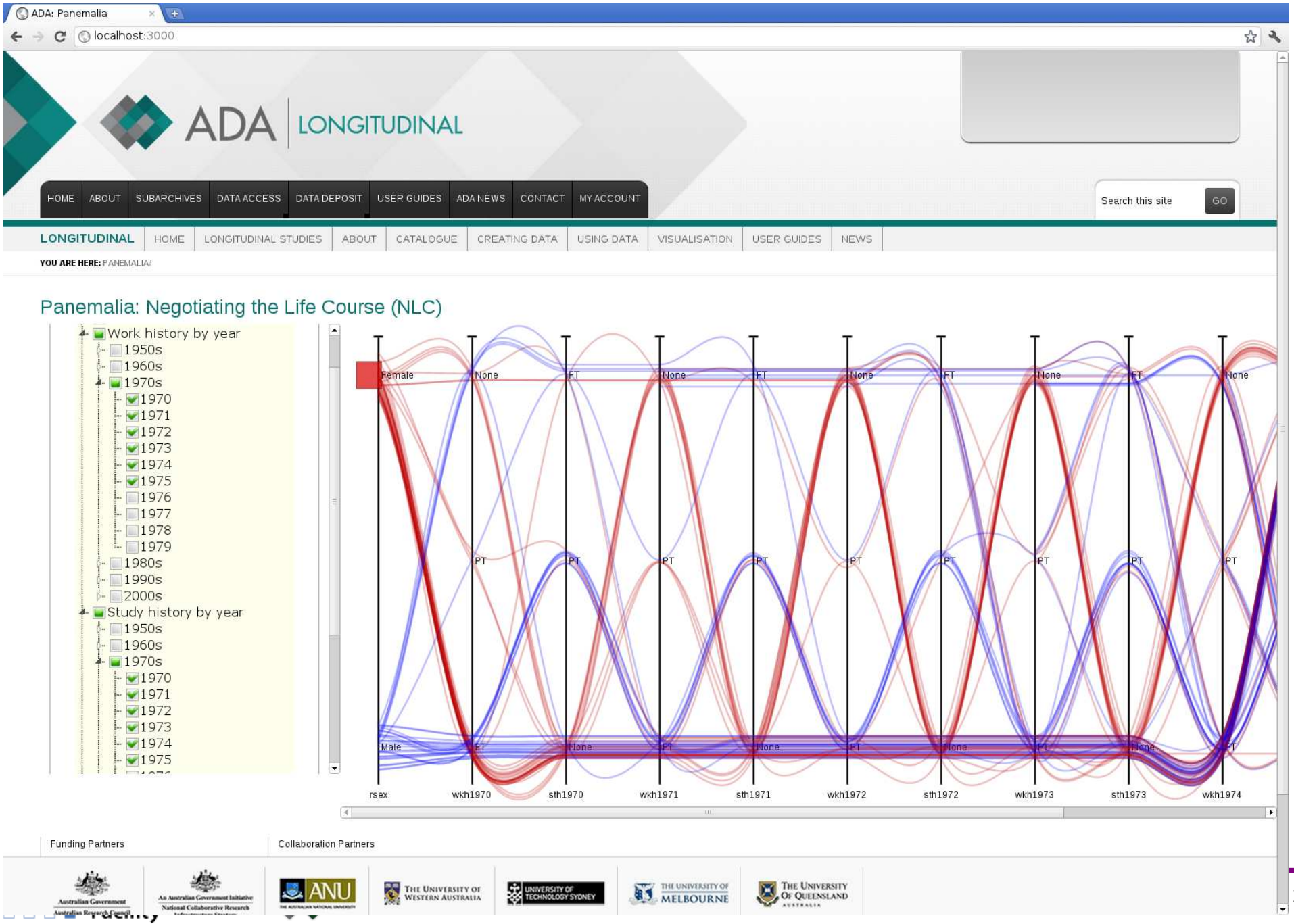


Work/study: interleaved by year



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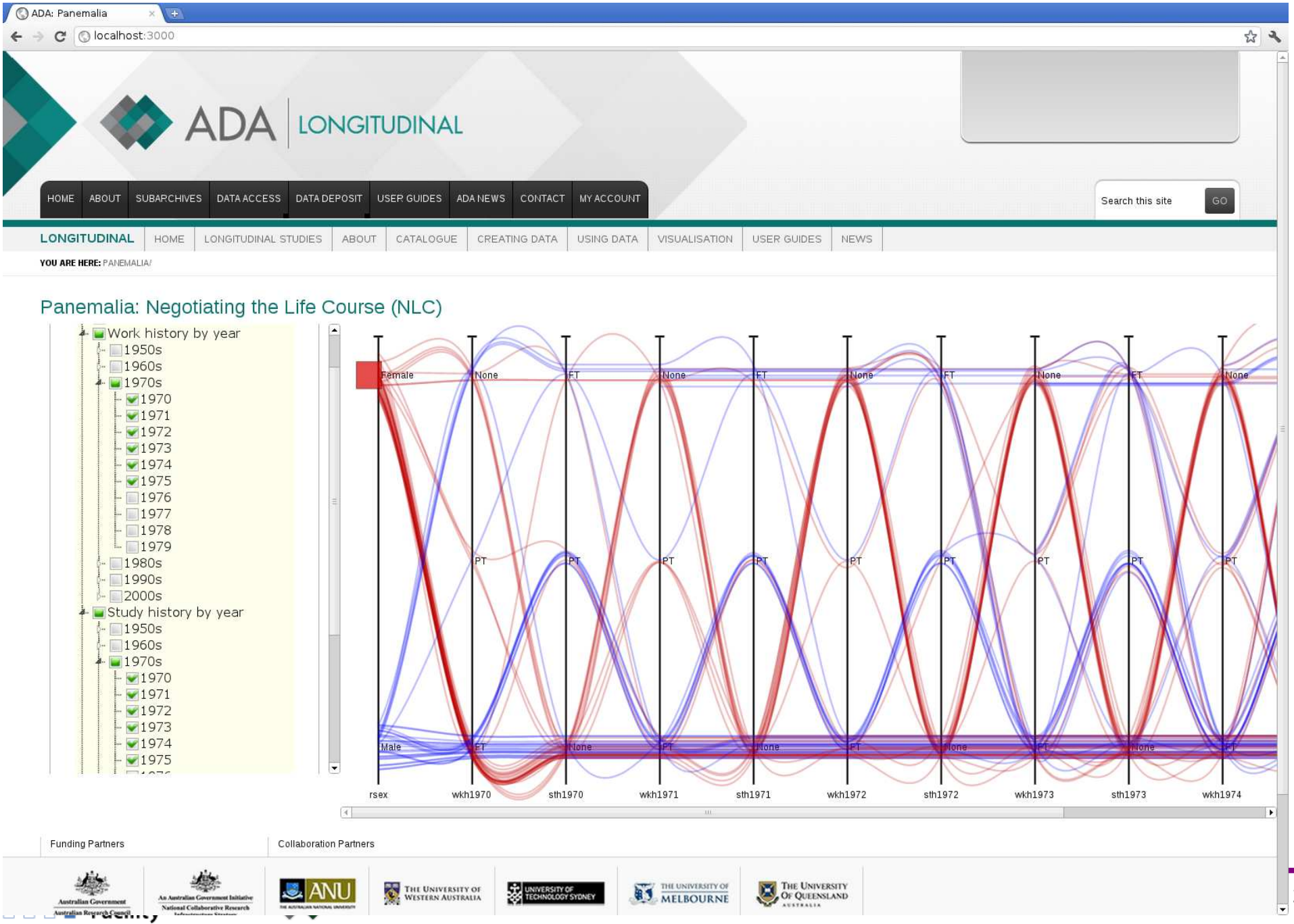
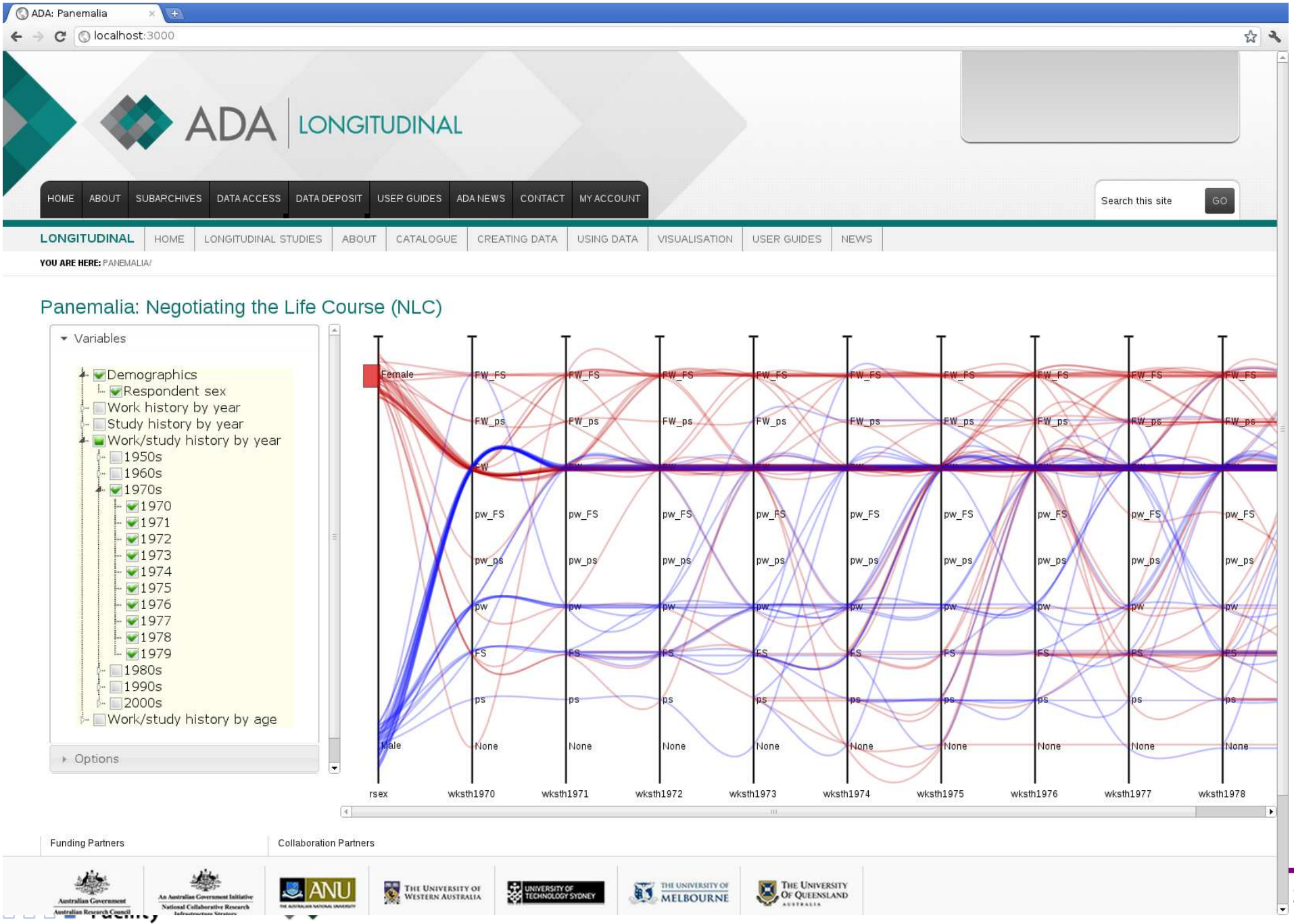


Work/study: combined by year

Work/study: combined by year



Work/study: combined by age

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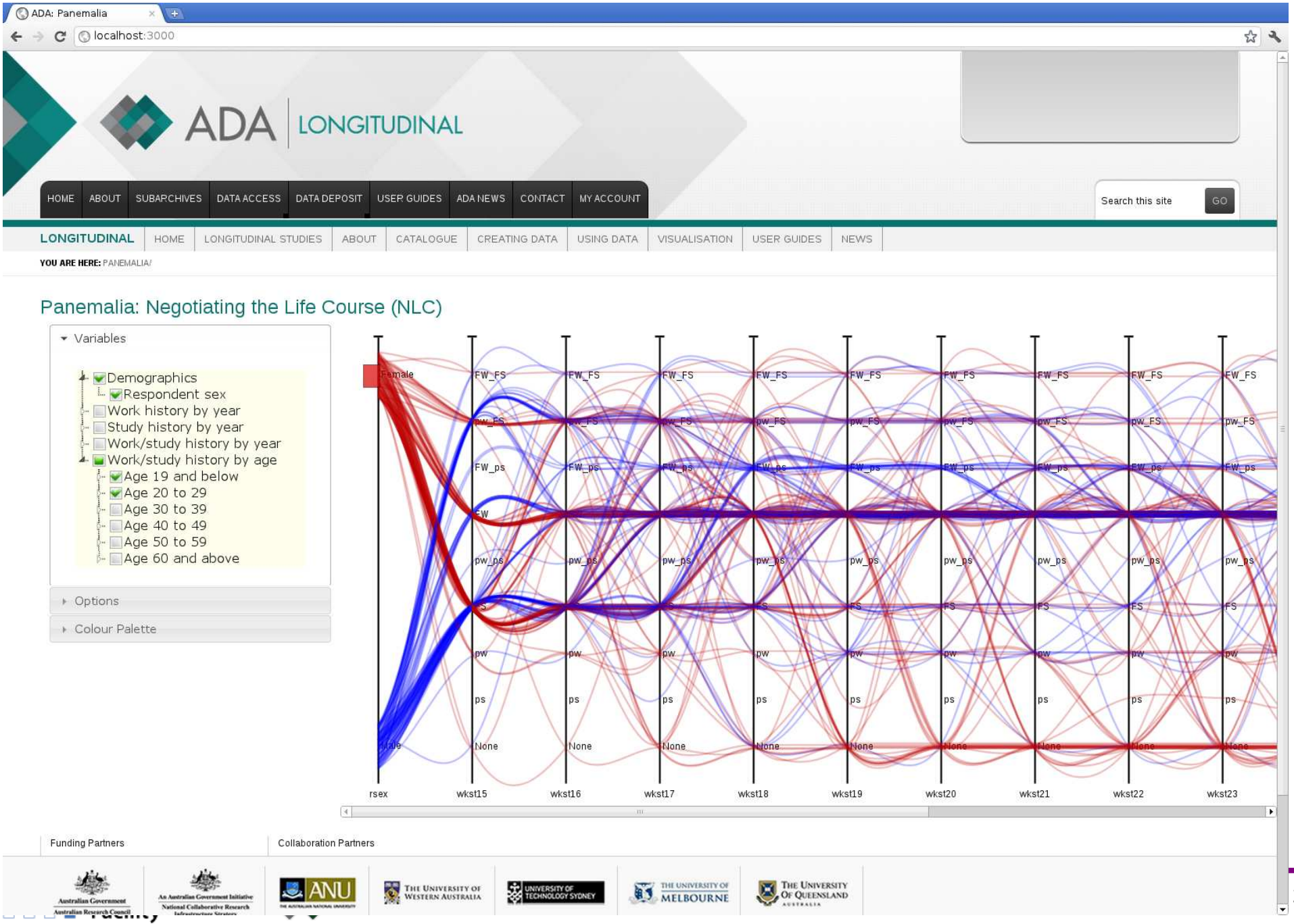
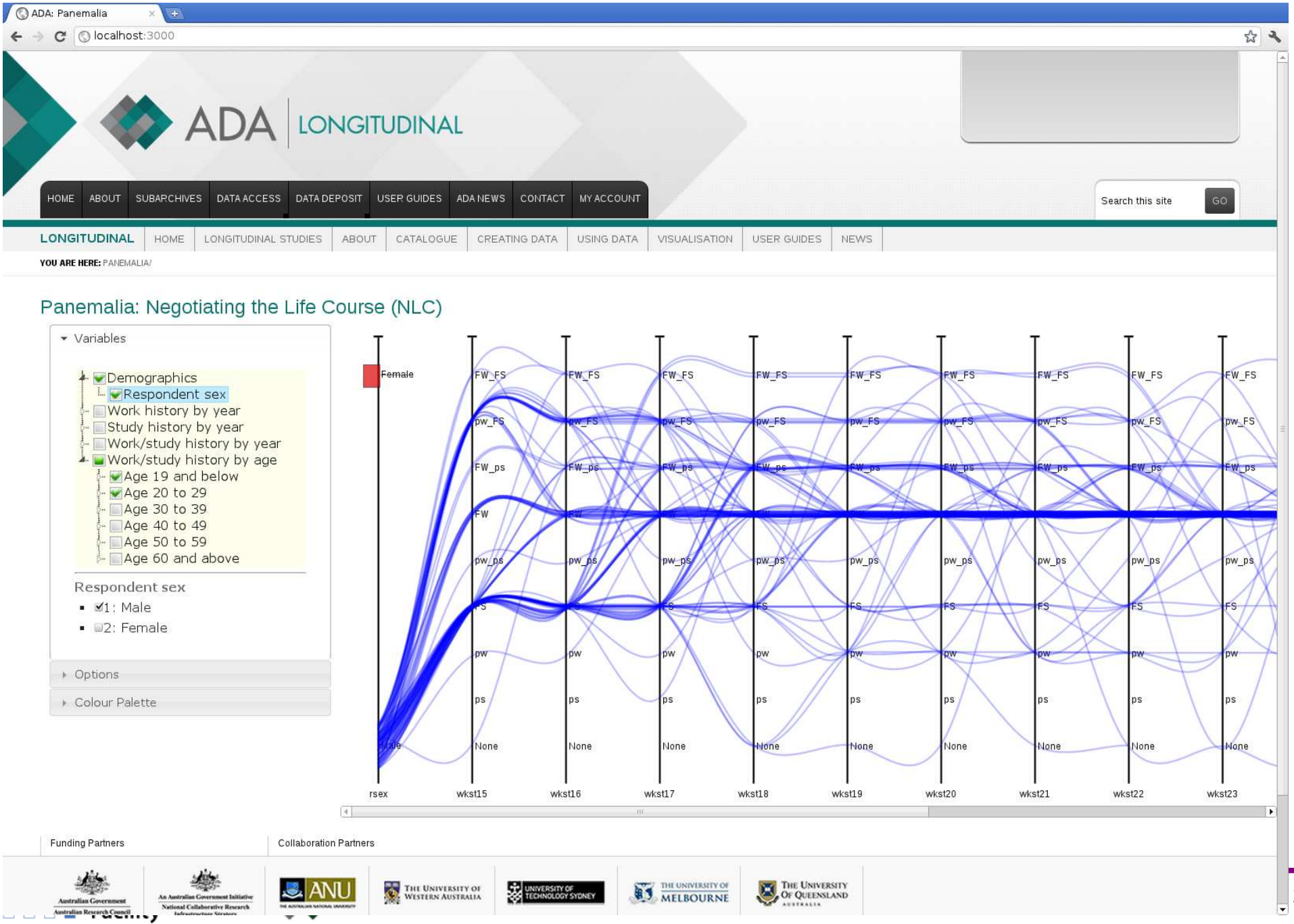
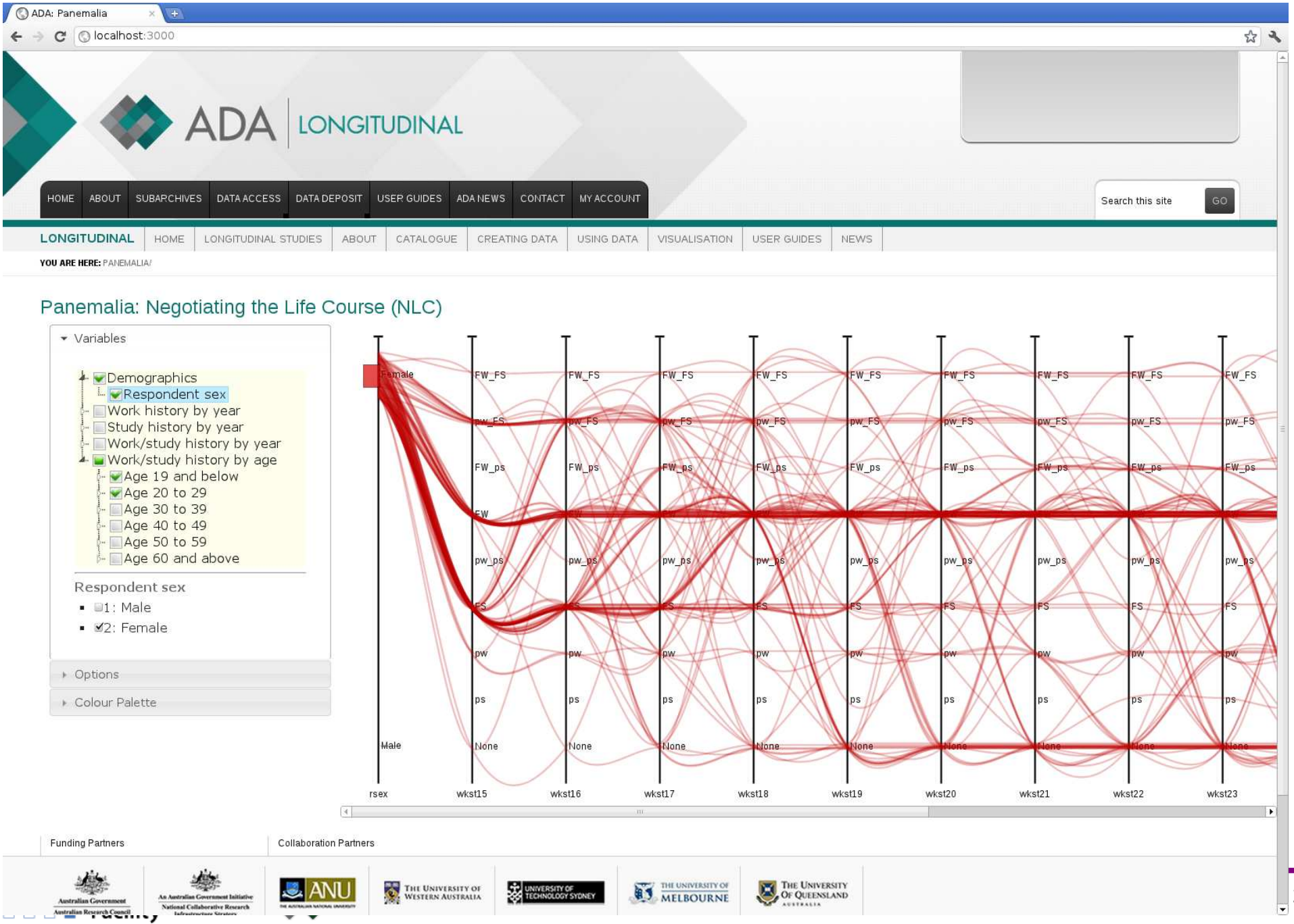


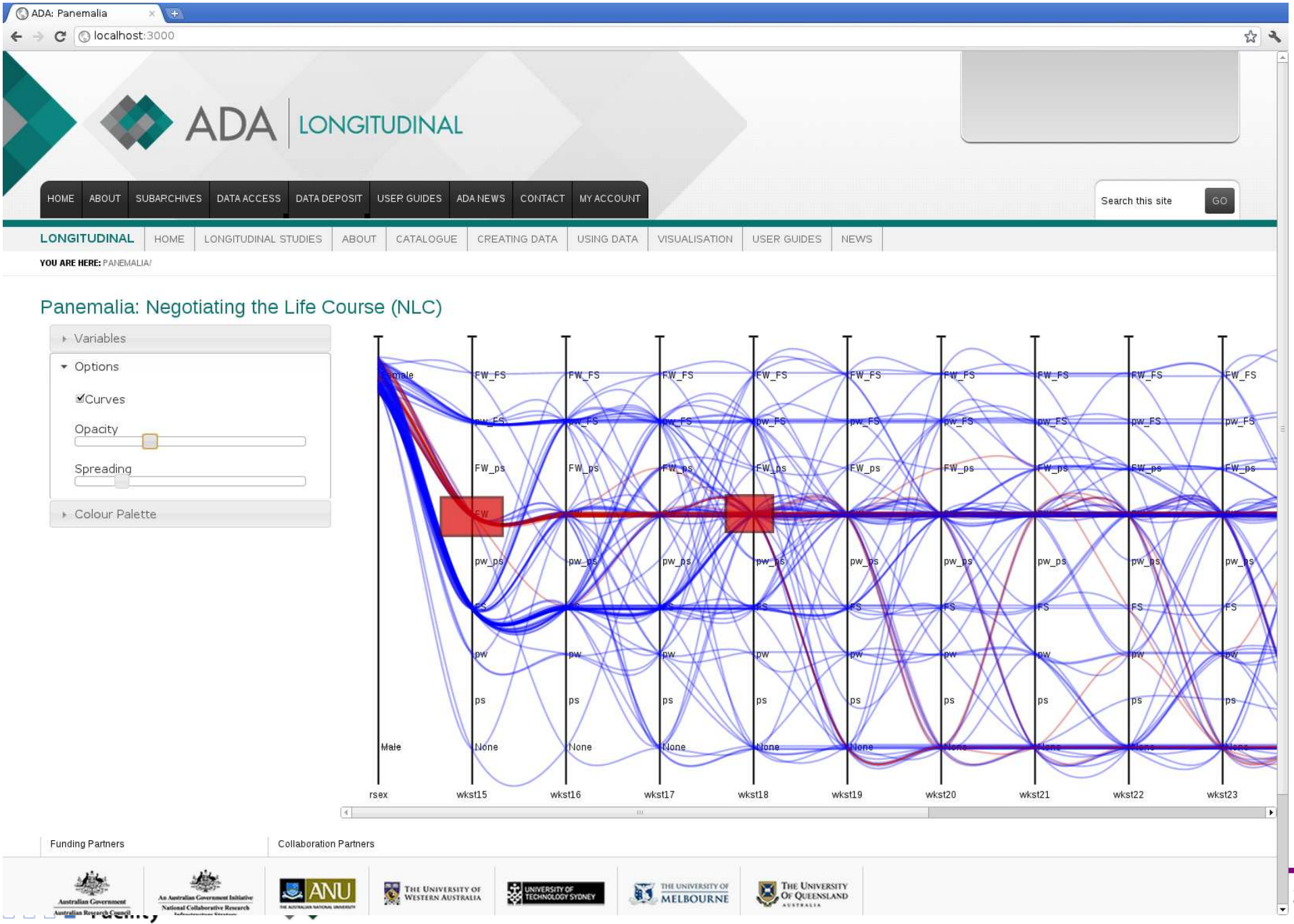
Work/study: combined by age



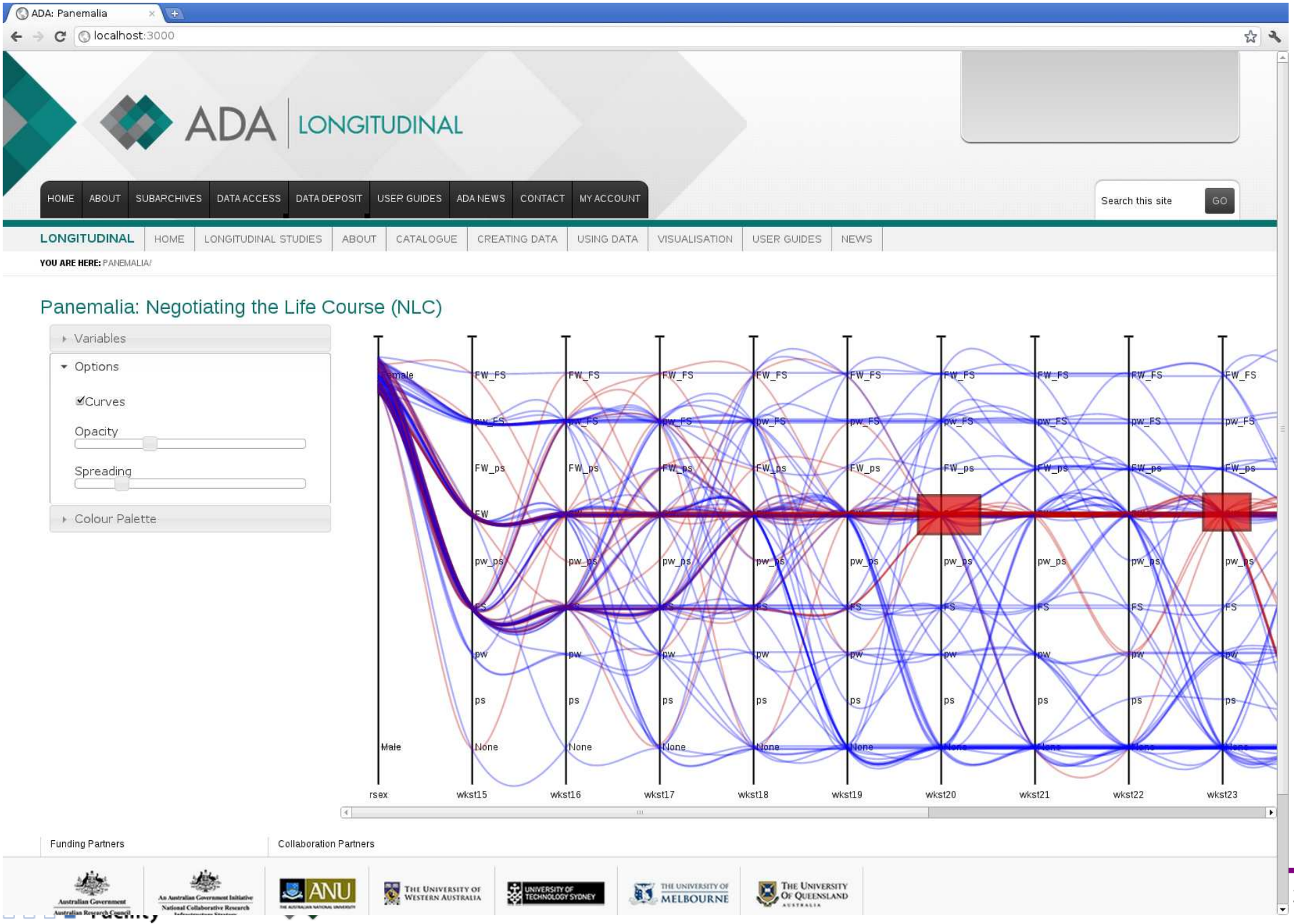
Work/study: combined by age



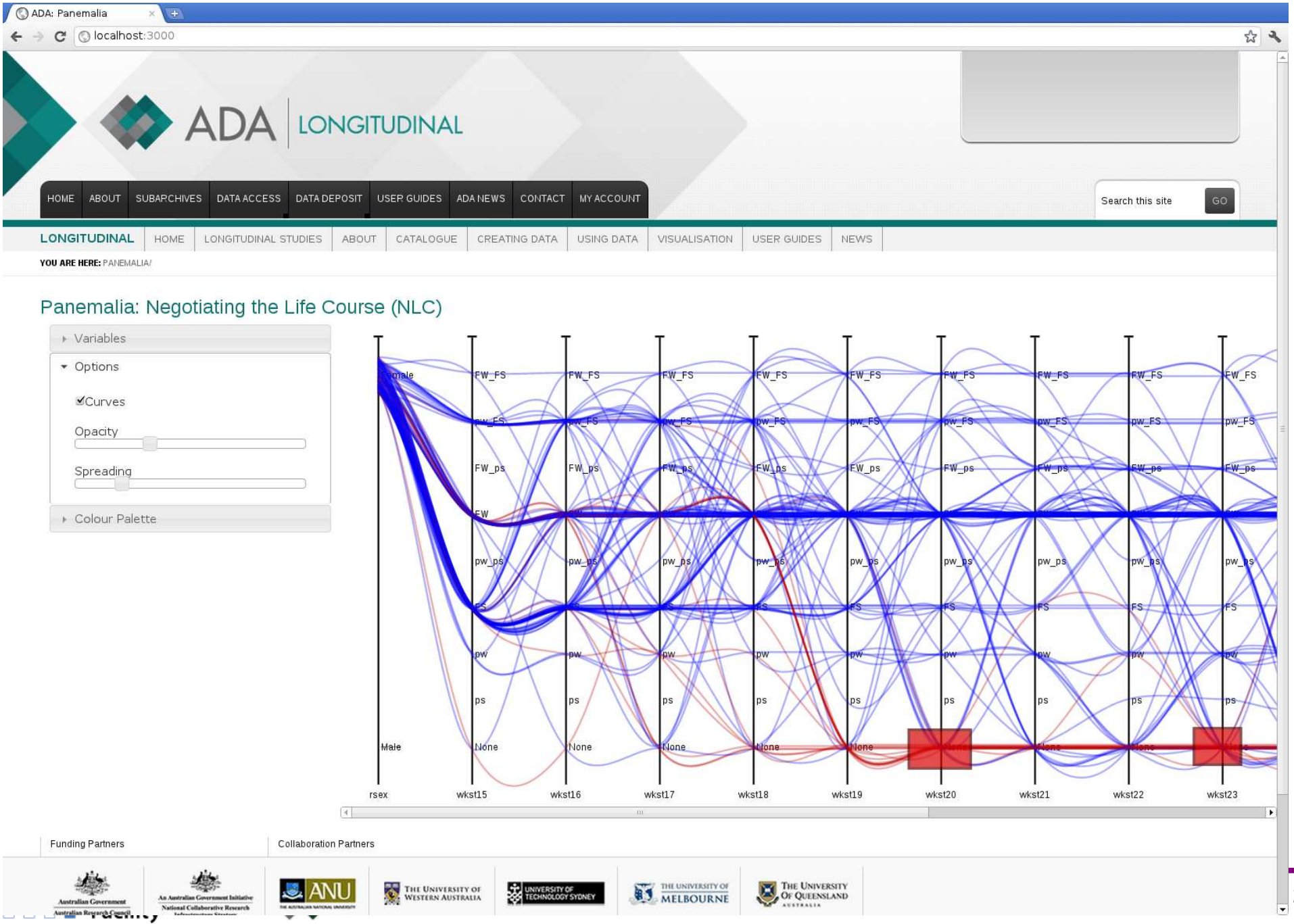
Work/study: combined by age



Work/study: combined by age



Work/study: combined by age



Moving forwards

- Improved interactive performance
  - WebGL
  - Web workers (multithreading)
  - Remote desktop to ADA Virtual Lab VM
- State and session management
  - “How did I get to this view?”
  - “I had a great view 2 minutes ago, now it’s gone.”
  - Sessions spanning many days and locations
- Data cleaning
  - Allow sandboxed raw dataset upload, auto-convert and private visualisation
  - Standalone Panemalia in a desktop VM image

Questions? Comments?