Time and Space on a Computer Display: Overview+Detail vs. Focus+Context

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Importance of Representations

- Learning Context: need representations that allow learners to look at what learners want to look at
- Issue: when to use what representations in what ways?
- Background: toward “richer” representations
  - text
  - graphics
  - animation
- Research goal: to develop a theory on the use of animation as a representation for learners
Graphic Representations

- Graphic representations help people grasp the meaning of information more easily and quickly [Tufte 97].
Spatial Visualization

- To keep a view of the whole data available, while pursuing detailed analysis of a part of it

Overview + Detail

Focus + Context

ZENRIN electronic map Z[iː]II

http://www.caida.org/tools/measurement/skitter/
Two Visualization Techniques

- **Focus + Context**
  - to represent a focused part and its context in a single window by enlarging a focal point and distorting the surrounding area
  - appropriate when distortion does not change the semantics; e.g. a hierarchical structure

- **Overview + Detail**
  - to represent an overview and a detailed view in separate windows
  - can maintain the original spatial relationships without any distortion
Animation: Temporal Visualizations

- Faster processor and cheaper memory
  - Movies or animations have started being used on a personal computer.
  - Less and less expensive to deal with temporal multimedia data.

- Appropriate use of animation

- How can we apply the spatial visualization techniques to the temporal visualization?
  - Focus?
  - Context?
  - Detail?
  - Overview?
To represent a detail or to focus on a particular point in:
  - Space: by *enlarging* a point or a region
  - Time: by ???
(1) by slower play

focal region

original
time

focused
time
(2) by slower play with “catch-up”
(3) by fast-forwarding play
(4) by repeating

focal region

original

time

focused

time
(5) by pausing
(6) by incrementally changing play speed

![Diagram showing the concept of focal point and its shift from original to focused over time. The diagram illustrates the progression of time with shaded boxes representing the focal point.](image)
(7) by enlarging some frames

focal region

original

focused

time

time
(8) by highlighting color of some frames
(9) by distorting a part of a frame
Representing Overview / Context in Time

- **Spatial representation**
  - Overview (+detail): representing the whole as an original representation in a separate window
  - Context (+focus): representing the whole by distortion in the same window with the focused.

- **Temporal presentation**
  - Overview: in separate windows
  - Context: in the same window by super-impose
Overview-(1): by representing the whole frames in separate windows
Overview-(2):
by representing preceding/succeeding frames in separate window
Context: by showing superimposed frames into a single frame

![Diagram showing superimposed frames over time]

- Original frames
- Focused frames

Time axis
Context: by showing superimposed frames into a single frame (cont’d)

- needs frames that have semantics that would not be changed by superimposing images
  - with a common basic reference
    - The man’s feet
    - The two axes
Conclusion

- Representations for learners that allow them to look at what and how they want to look at
- Seems possible to apply the concepts (Focus+Context, Overview+Detail) of spatial representations to temporal representations
- More control for users to deal with temporal multimedia data
  - universal design
  - technologies for the challenged