

Better Perception of 3D-Spatial Relations by Viewport Variations

Markus Jobst

Visual 2008, Salerno

Introduction

2

- Cartography = communication of geospatial info
- Intention: best signature and graphical coding (according to transmitting media)
- Toolbox: increased by multimedia, interactivity, 3D, AR, ...
- Supporting of human sensual system
- Following: concentrates on virtual 3D city models and how we can enhance perception in virtual 3D environments on digital displays



Content

3

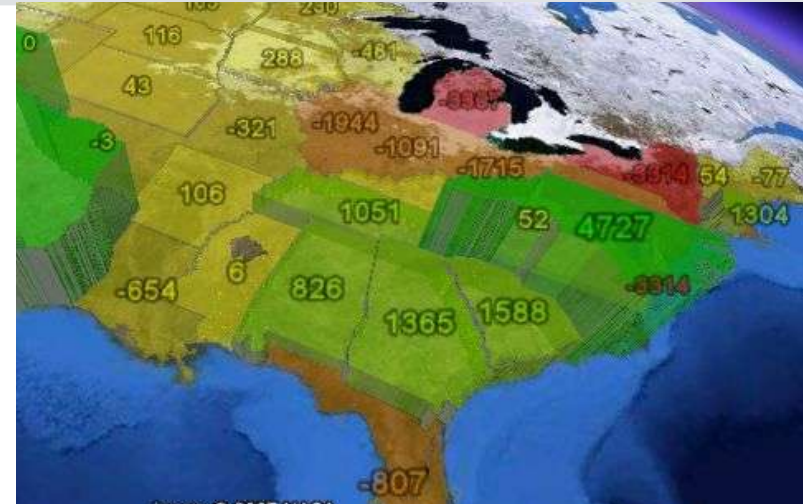
- Some aspects for the need of 3D in cartography
- The use of spatial relations
- Characteristics of digital displays
- Perspectives on digital displays (and their specific problems for a clear perception)
- Possible variations of the viewplane
- Exemplary realization of viewport variations
- Conclusions



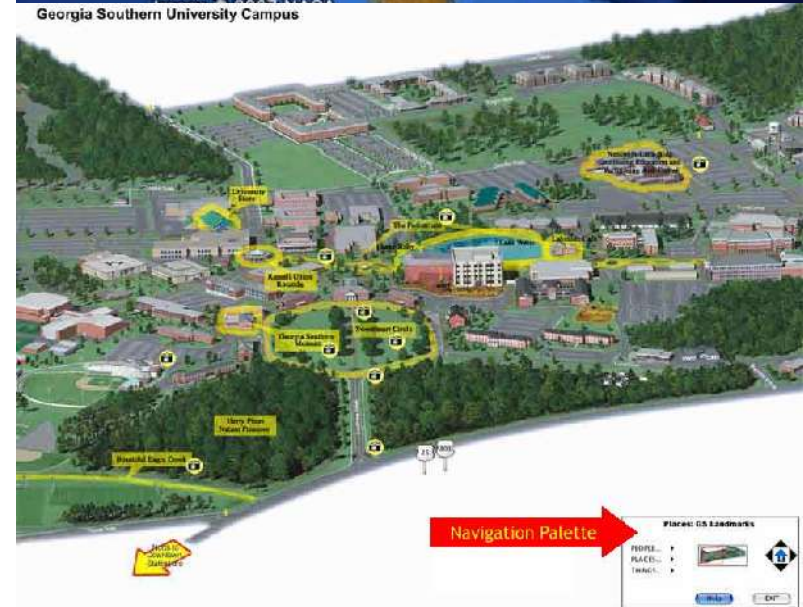
Role of 3D in Cartography

4

- Naïve geographic exploration
- Intuitive recognition of third dimension
- Unique combination of top- and front- view
- Possibility to overcome spatial illiteracy (especially true for top-view codings – topographic maps)



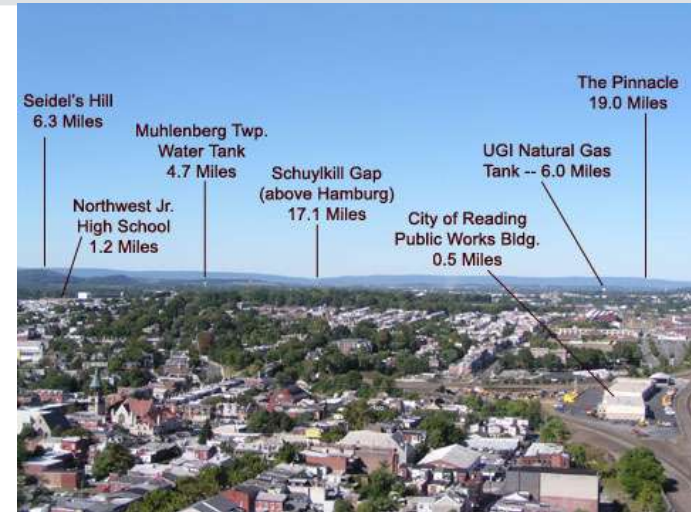
Georgia Southern University Campus



Spatial Relations

5

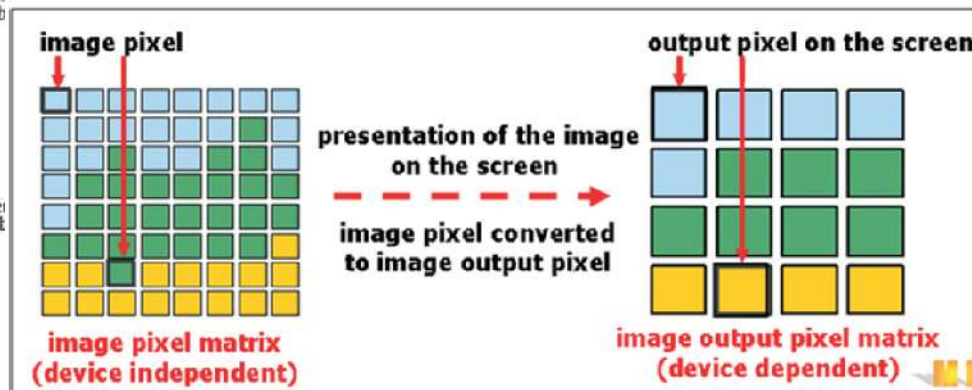
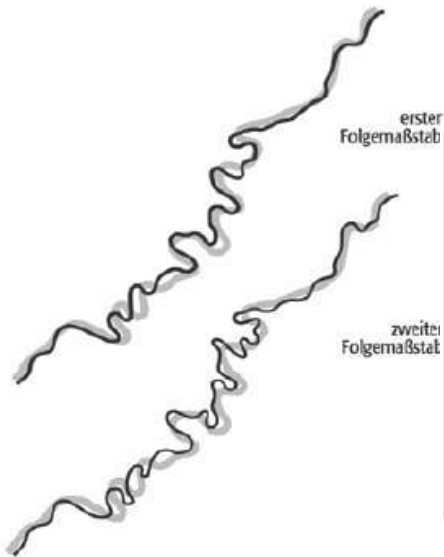
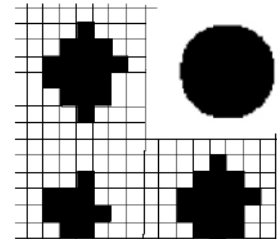
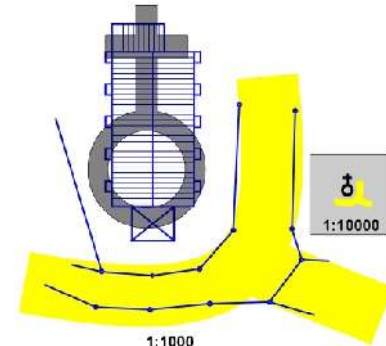
- Spatial relations are key for the individual (self-) referencing in a map
- Referencing enables exploration and acquisition of new knowledge
- Mostly done by visual landmarks, their abstraction and a somehow “emotional” reference (at the recipients side) – individual importance
- Presupposes clear perception on the used transmitting media/interface (display)



Characteristics of digital displays

6

- Lack of resolution
(leads to low info-depth)
- Importance of interactivity
- Dependency on transmitting media
(its resolution / characteristics)



Lechthaler 2007

Central perspective views

7

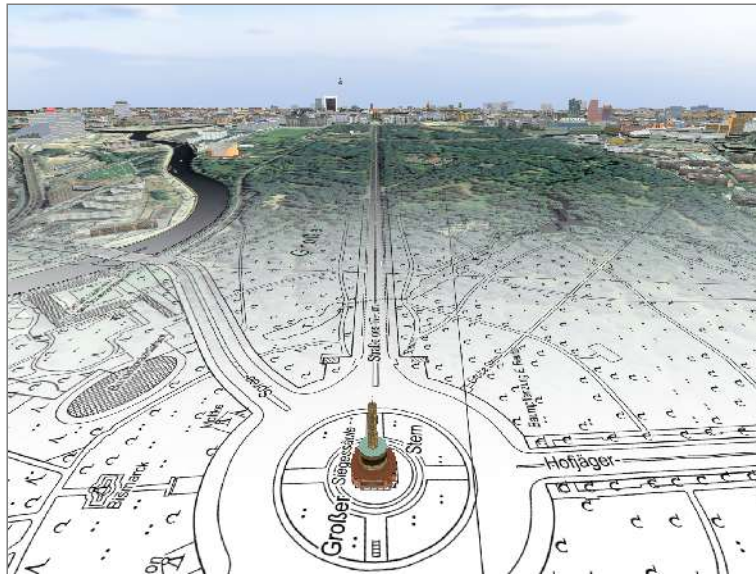
- Variables are camera orientation, distance and field of view
- Amount of dead values
- Dead values: clustered undifferentiated pixels lead to an unclear information transfer
- Aim: reduction of dead pixel amount
- Leads to a number of extended perspectives



Possible Perspective Variations

8

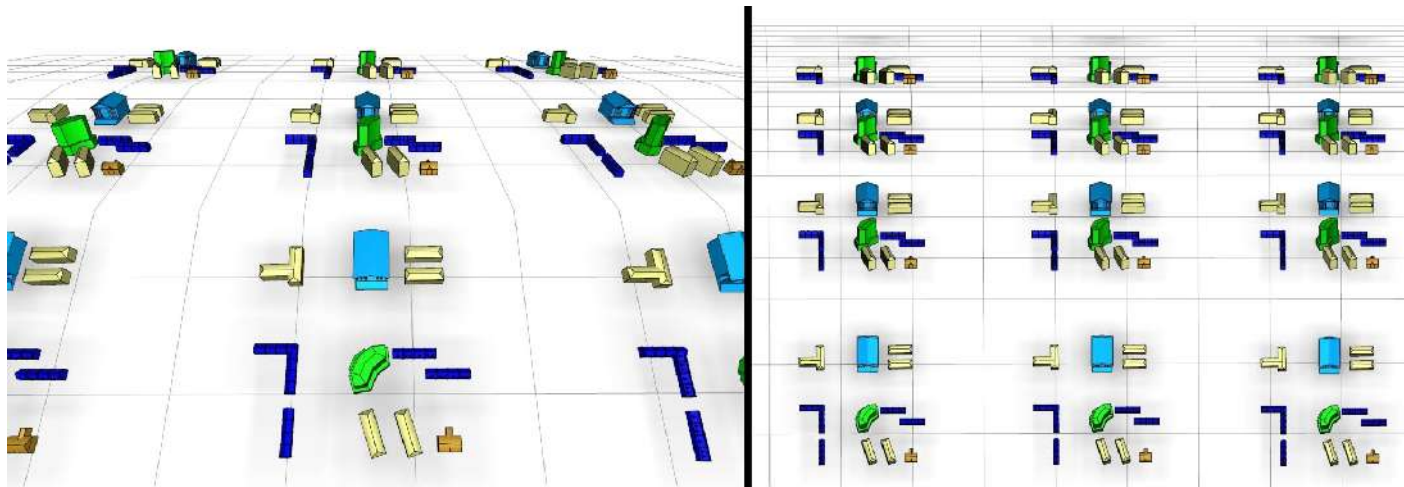
- So far: guided by syntactic considerations in terms of expressive geospatial communication (does not concern semantic and pragmatic influences at the moment)
- Progressive approach (central and parallel perspective)
- Degressive approach



Progressive central¶llel perspective

9

- Cartographic advantages
 - Zonal scales (scale clustering)
 - Lead to adapted generalization
 - „useful“ combination of top- and front view
 - Enhanced LM's in the back
- Disadvantages: ongoing investigation

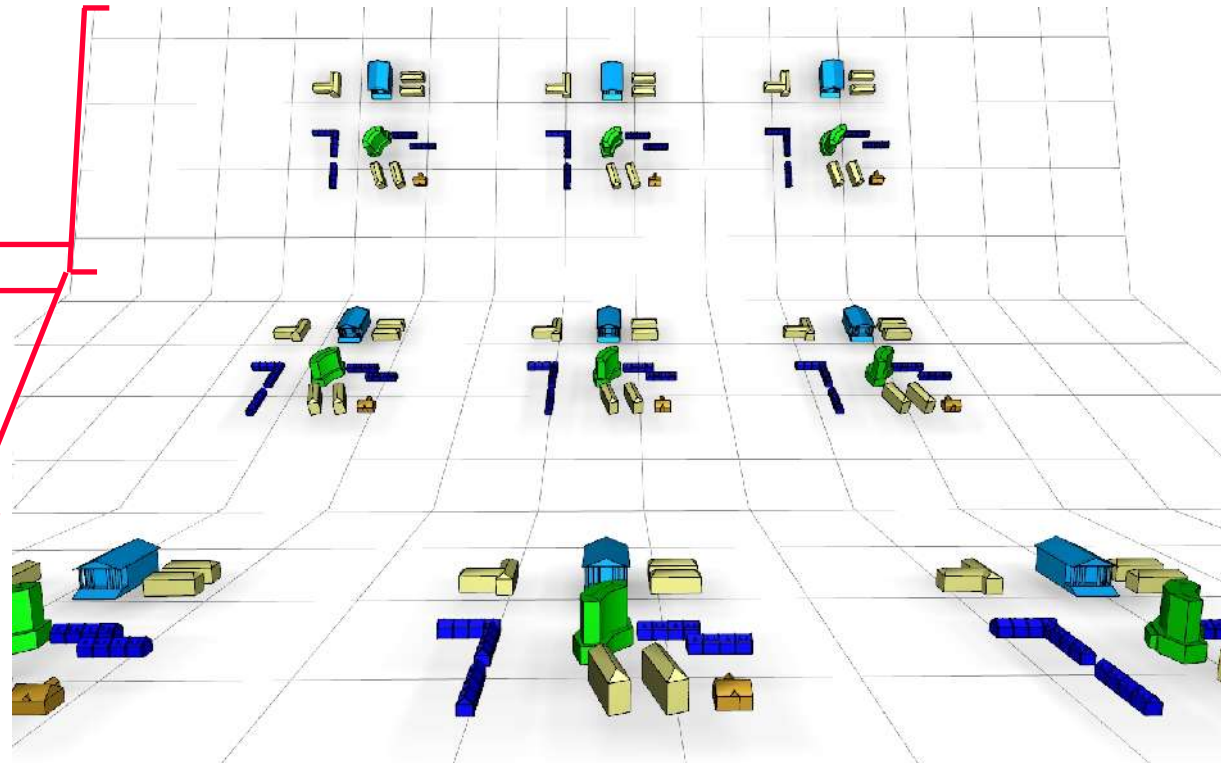
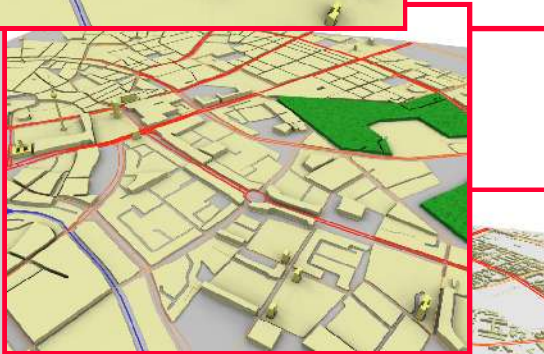
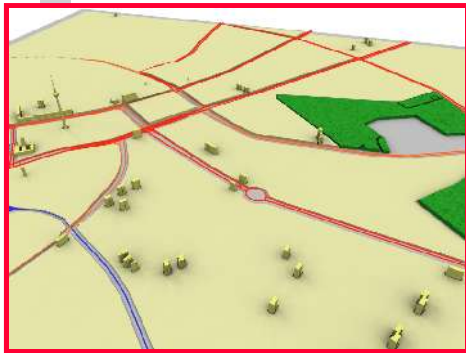


Better Perception of 3D-Spatial Relations by Viewport Variations | Markus Jobst

Degressive central perspective

10

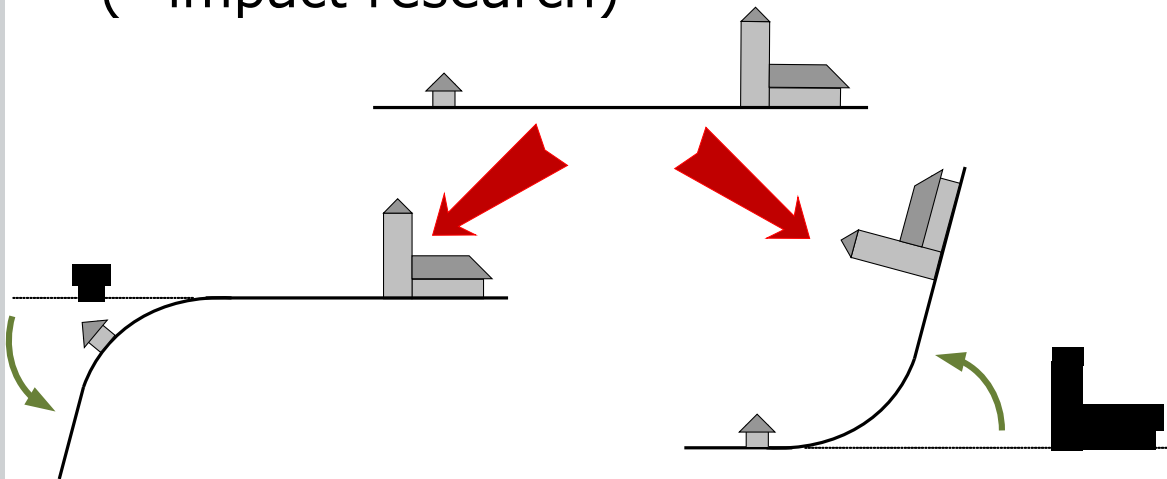
- Cartographic advantages
 - Overview in driving direction



Exemplary realization

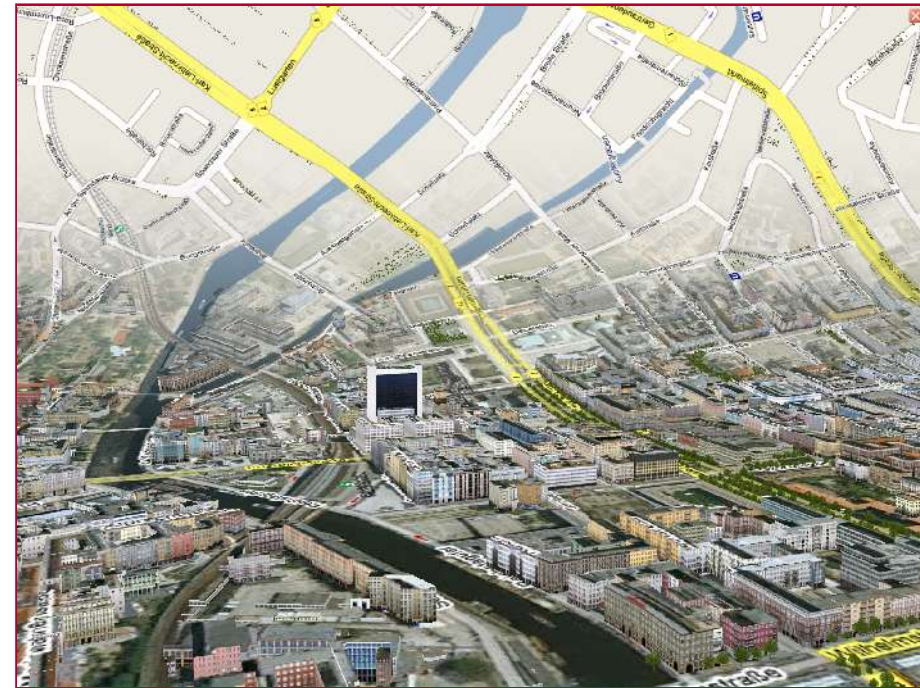
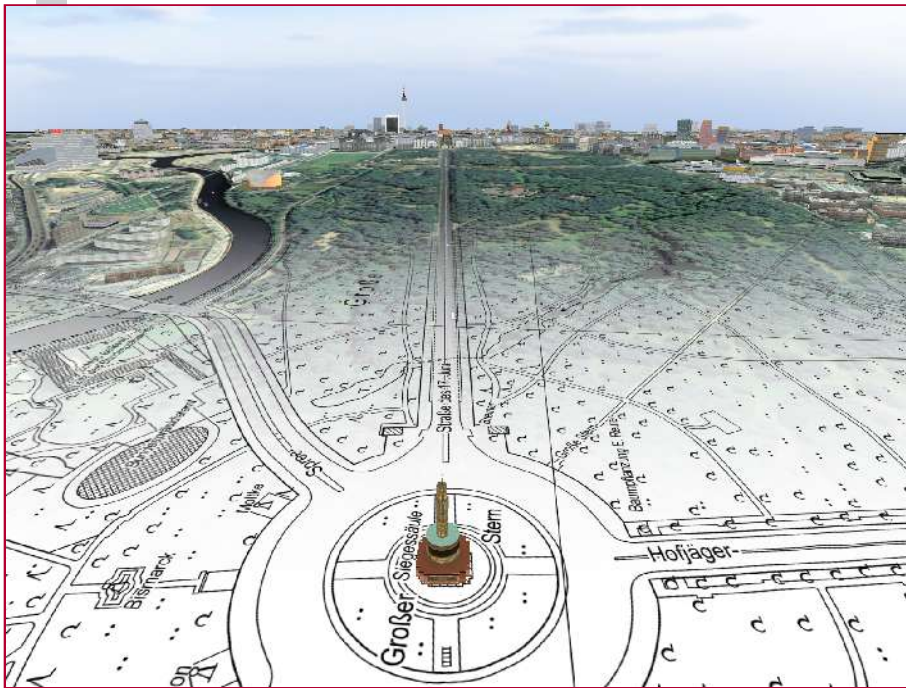
11

- Viewport variation by deforming the ground plate
- Leads to progressive and degressive views
- Useful variations of rendering techniques are under investigation (=impact research)



Exemplary realization – Demo film

12



Conclusion

13

- Progressive and degressive approaches enable a better perception of 3D spatial relations by means of transmitting media characteristics
- Dead information pixels can be reduced with appropriate content preparation (generalization)
- Expands the overview of the virtual 3D environment
- 3D spatial relations can be accentuated in an impressive way





Dr.techn. Markus Jobst
markus@jobstmedia.at