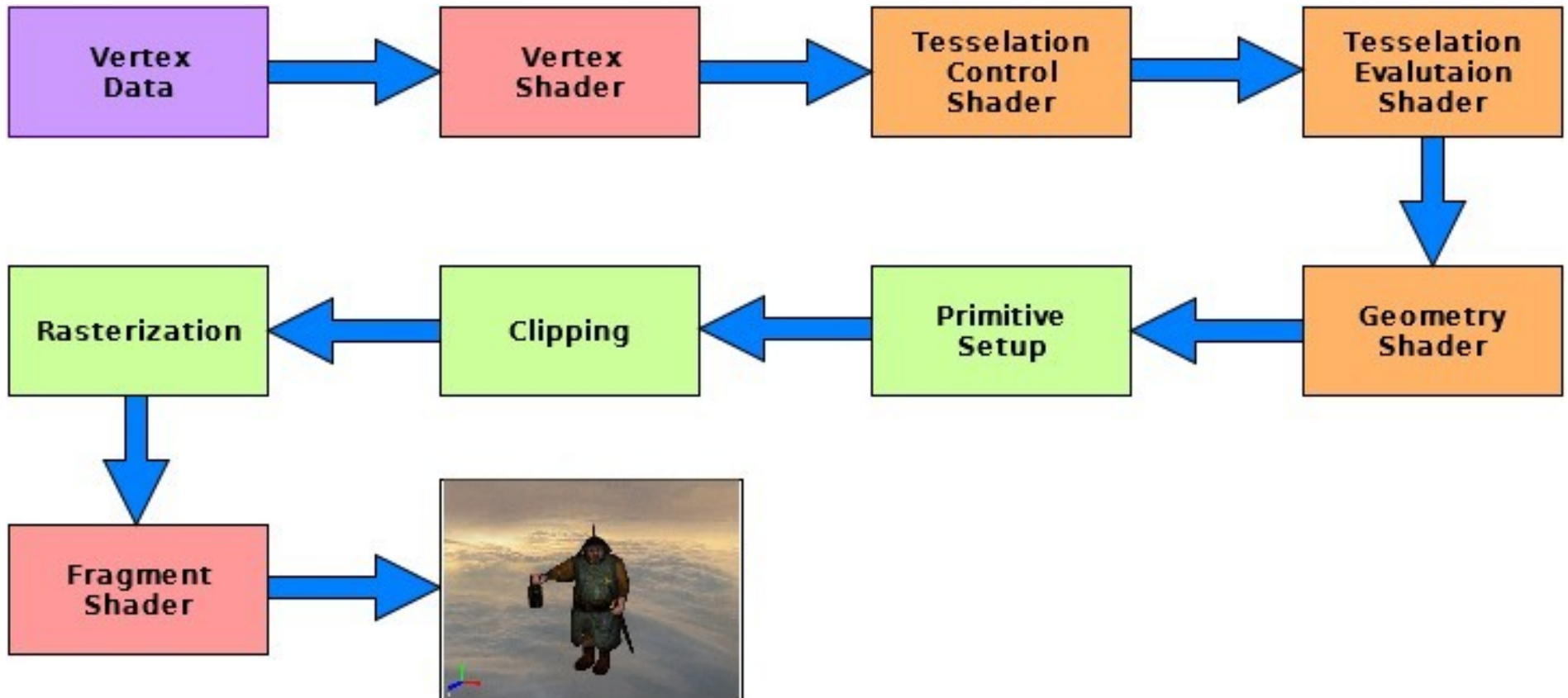# Hierarchical View-Frustum Culling for Z-buffer Rendering

17. 3. 2019

Aleš Koblížek
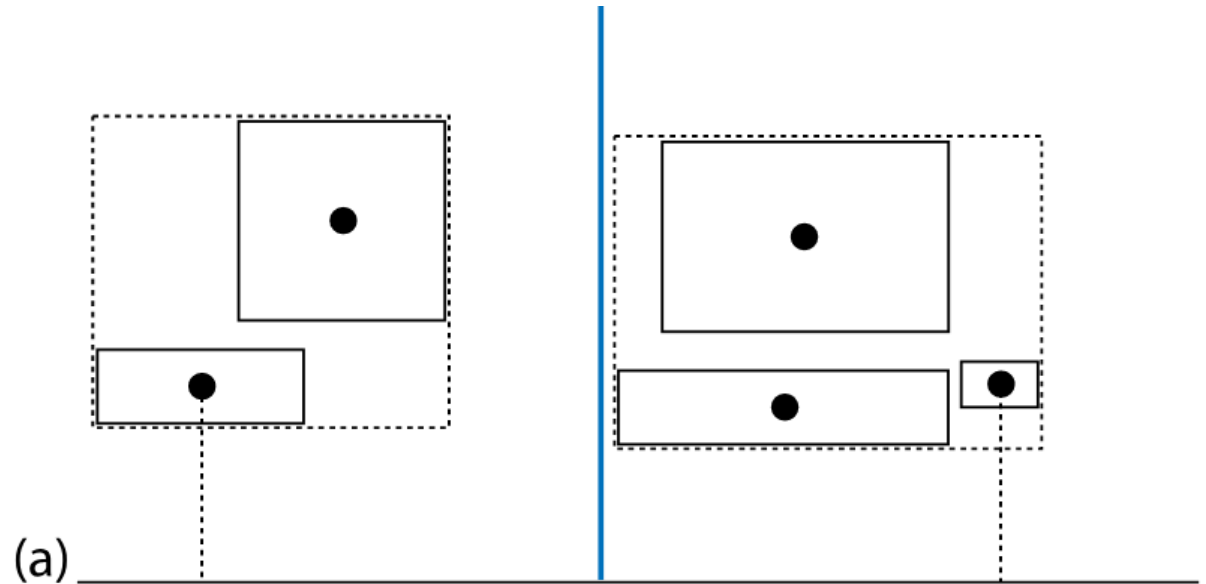
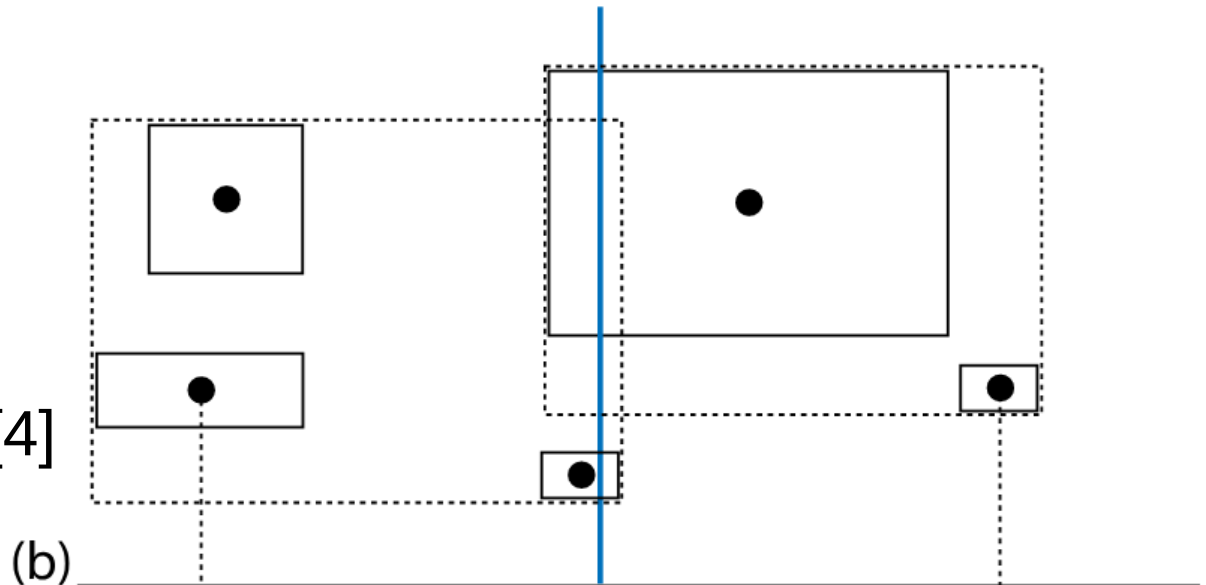# Why?

Rendering pipeline. From [3]

BVH construction

- Top down
- Midpoint subdivision
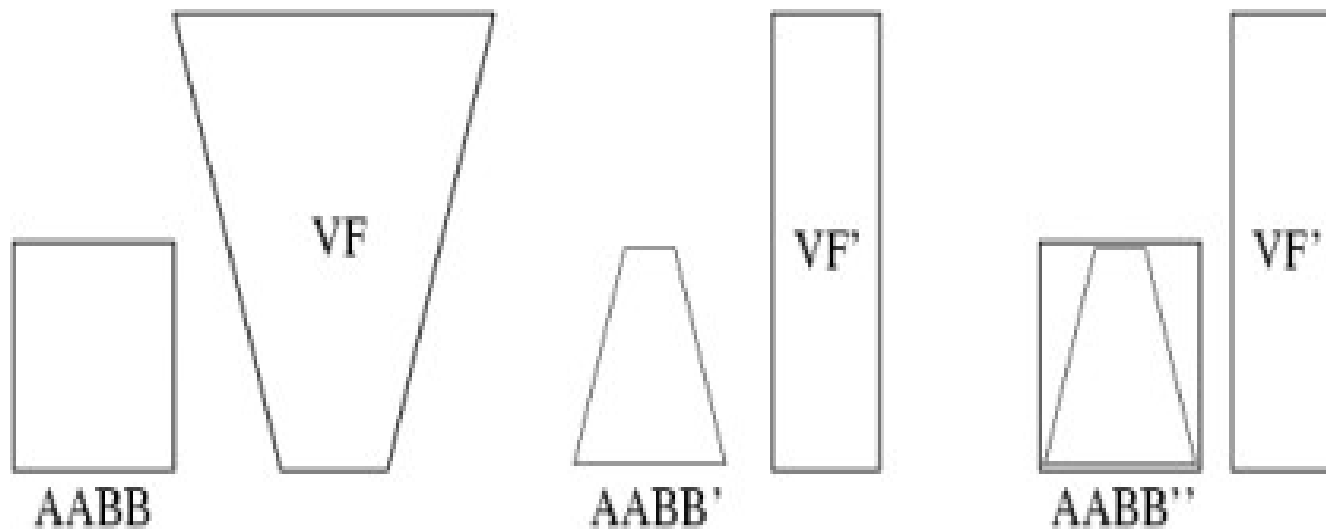

Midpoint subdivision. From [4]

View-frustum & box intersection

Projection space

- Transformation
- 6 comparisons
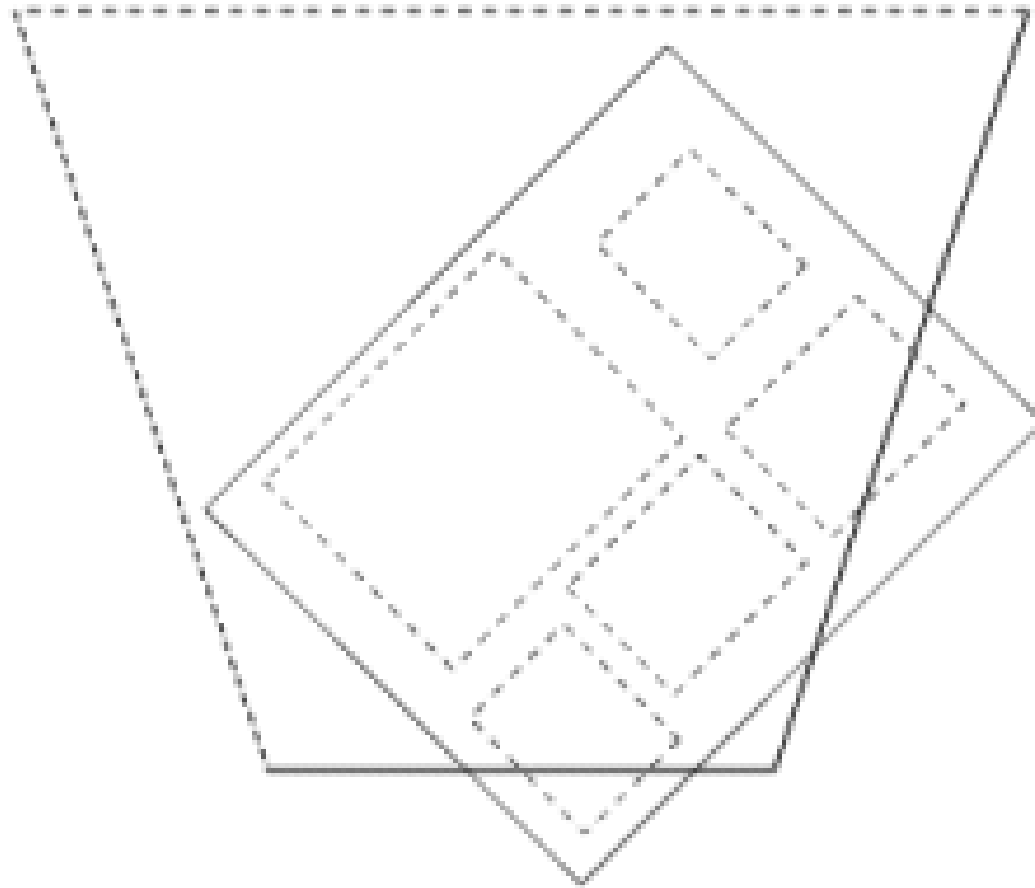
World space

- 6x box & plane

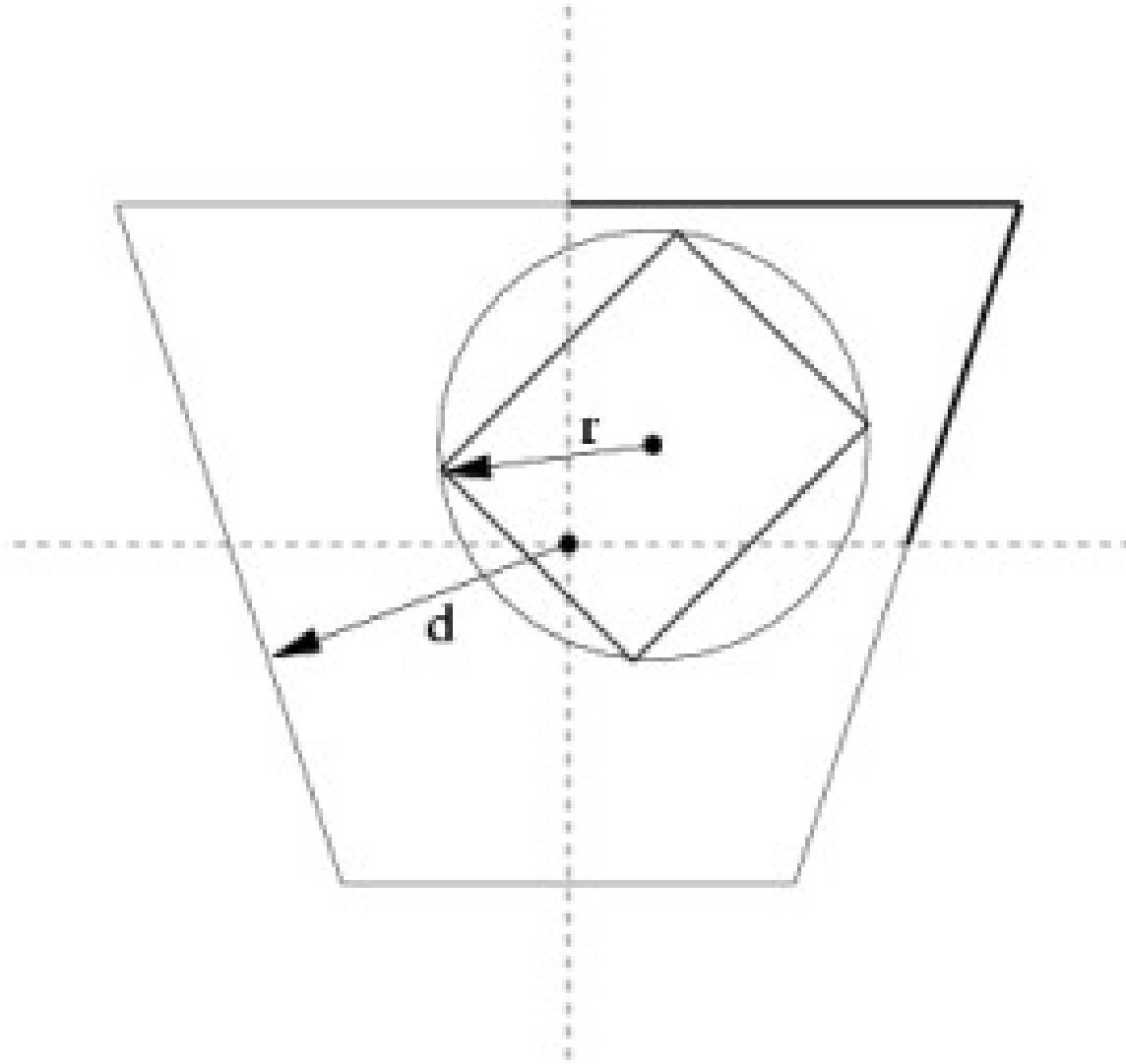AABB and view-frustum transformation. From [1]

Plane-coherency test

If the node was outside the plane last frame, ….
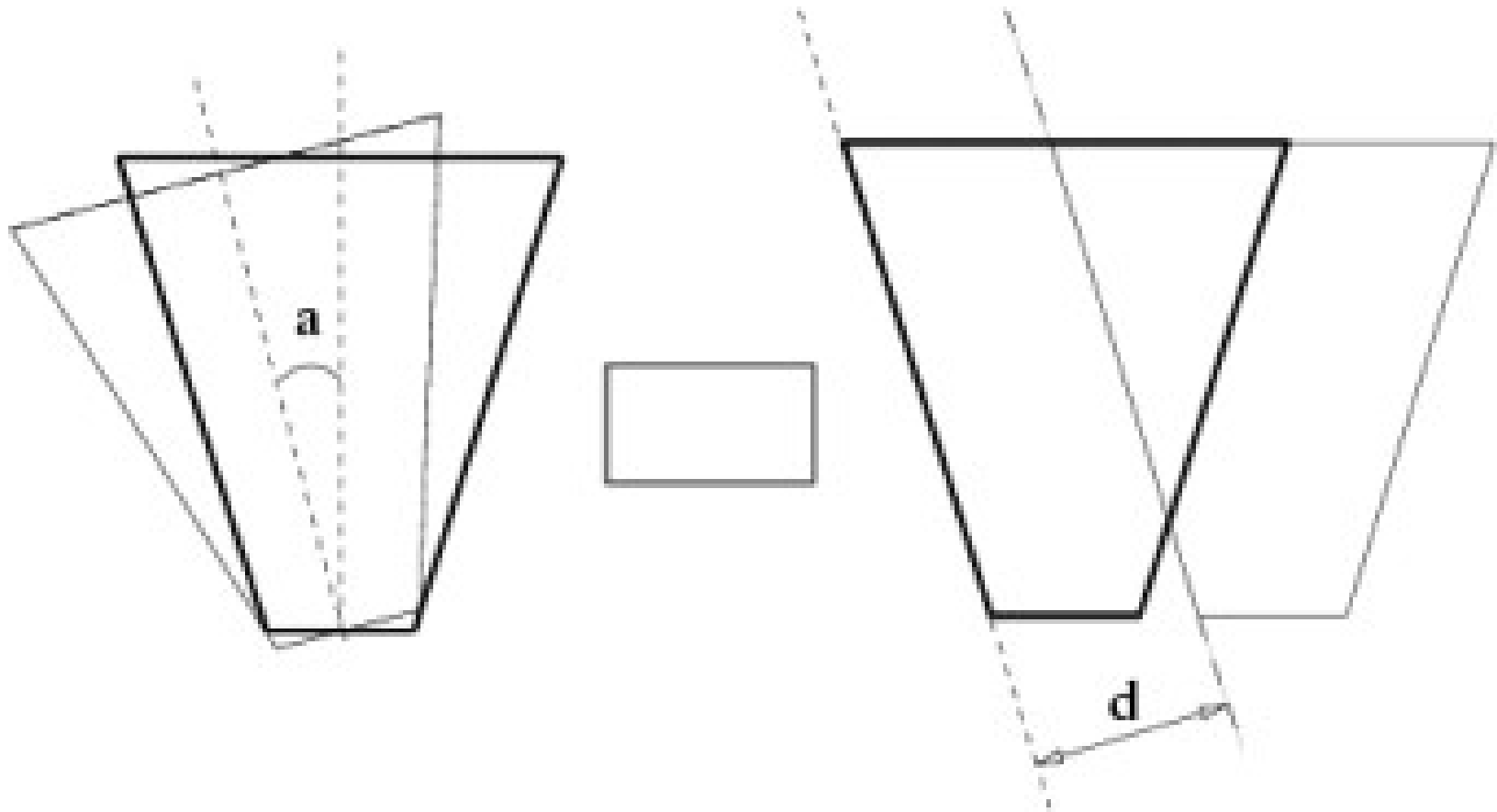
Plane masking

If the parent is inside the plane, the children are too. From [1]

Octant test

It must hold that r <= d. From [1]

Rotation and translation coherency

Can be used only when BB did not change. From [1]

Performance tests outline

- Frame time with and without culling
- Culling speedup (camera flythrough)
  - each optimisation individually
  - all optimisations at once
  - scenes of various sizes
- Number of triangles sent for rendering
 - (should not change with optimizations)

Sources

[1] http://old.cescg.org/CESCG-2002/DSykoraJJelinek/index.html

[2] http://www.cse.chalmers.se/~uffe/vfc_bbox.pdf

[3] https://shot511.github.io/img/beginner_opengl/GL-Pipeline.jpg

[4]
http://www.pbr-book.org/3ed-2018/Primitives_and_Intersection_Acceleration/Bounding_Volume_Hierarchies.html

Box & plane intersection
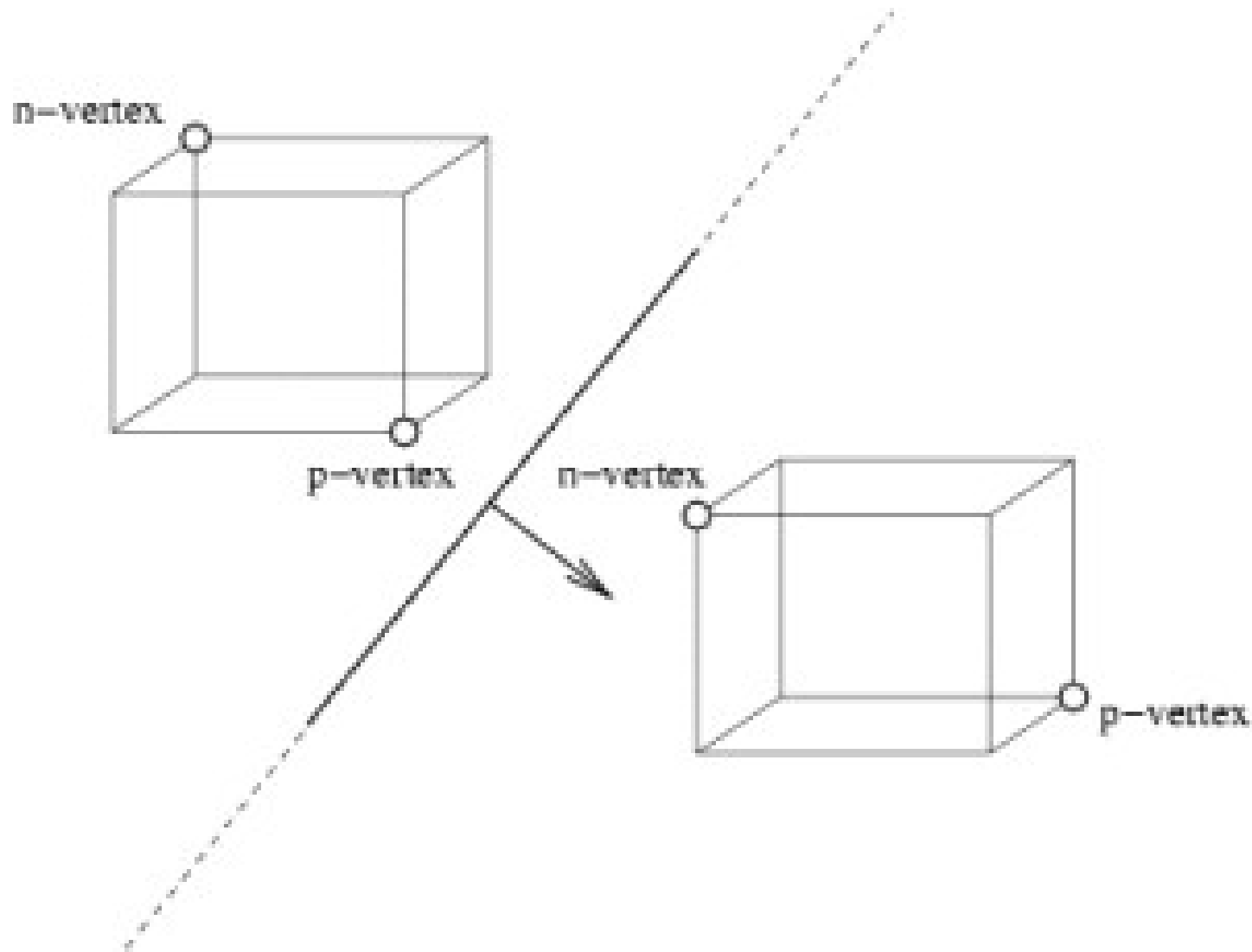
Choice of N and P vertices to be tested against the plane. From [1]

Box & plane intersection
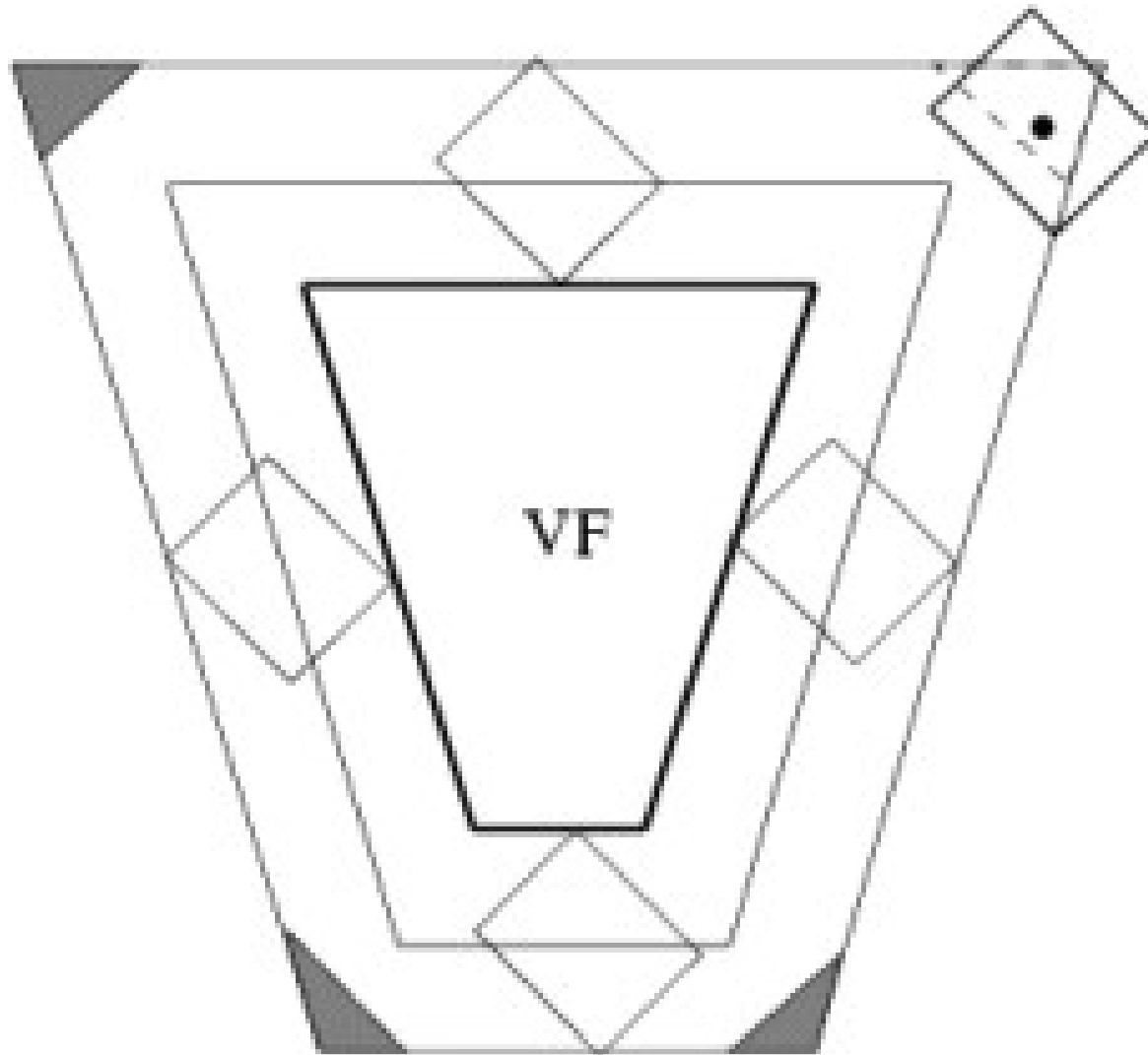
False-positive intersections. From [1]