In the Shadow of Desargues

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Year 1:
Bob Devaney,
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Tom Banchoff, Brown University
from Bosse’s 1648 book,

Maniere universelle de Mr. Desargues, pour pratiquer la perspective par petit-pied, comme le Geometral
EXAMPLE OF ONE OF S.G.D.L’s GENERAL METHODS concerning drawing in Perspective without using any third point, a distance point or any other kind, which lies outside the picture field.

(1636)
Poncelet

Traité des propriétés projectives des figures
(1812–1814)
Mathematical Perspective and Fractal Geometry in Art

M F A C
What happens when students who can’t draw well learn some geometry?
Like most freshmen, Tim hadn't had art since 6th grade.
Even though Sid was aiming to become a film director, his first picture was so bad he had to label the objects so I would know what they were.
Carra (like all her classmates) tried hard to convey a sense of space, but were embarrassed by how childish their drawings turned out.
But by the end of the first semester in college, things looked different. Literally.
How did Carra know that all these angles represent right angles in the real world?
How did Sid know that the peak of each roof is in the middle of its tower?
How did Tim know how to space those bricks, or those sidewalk tiles, so they look like they're the same size?
To get at the answers to these questions, we first have to understand projection from a point.
Looking through a window gives us a projection of the real world onto a 2-d canvas.
A shadow is also a projection
We can also think about pin hole projections
Other, weirder things can happen . . .
We say that two triangles with vertices \{A_1, A_2, A_3\} and \{B_1, B_2, B_3\} are

*perspective from a point* \(O\)

if the points \{O, A_k, B_k\} are co-linear.
We say that two triangles with vertices \( \{A_1, A_2, A_3\} \) and \( \{B_1, B_2, B_3\} \) are 

*perspective from a point \( O\)*

if the points \( \{O, A_k, B_k\} \) are co-linear.

We say that two triangles with edge lines \( \{a_1, a_2, a_3\} \) and \( \{b_1, b_2, b_3\} \) are 

*perspective from a line \( \ell \)*

if the lines \( \{ \ell, a_k, b_k\} \) meet at a point.
The paper triangle and its mirror image are perspective from a line.
The paper triangle and its mirror image are perspective from a line.
The triangles are here to stay;
the cow is just visiting.
DESARGUES’ THEOREM

Two triangles that are perspective from a point are perspective from a line.
Bosse's diagram shows that
Bosse's diagram shows that two triangles
Bosse's diagram shows that two triangles perspective from a point.
Bosse's diagram shows that two triangles perspective from a point are perspective from a line.
PERSPECTIVE COMIX

WHEN THE LINE ON THE GLASS IS EXTENDED TO THE EDGE ON THE GROUND...

... IT MEETS ITS SHADOW THERE!

~THE END~