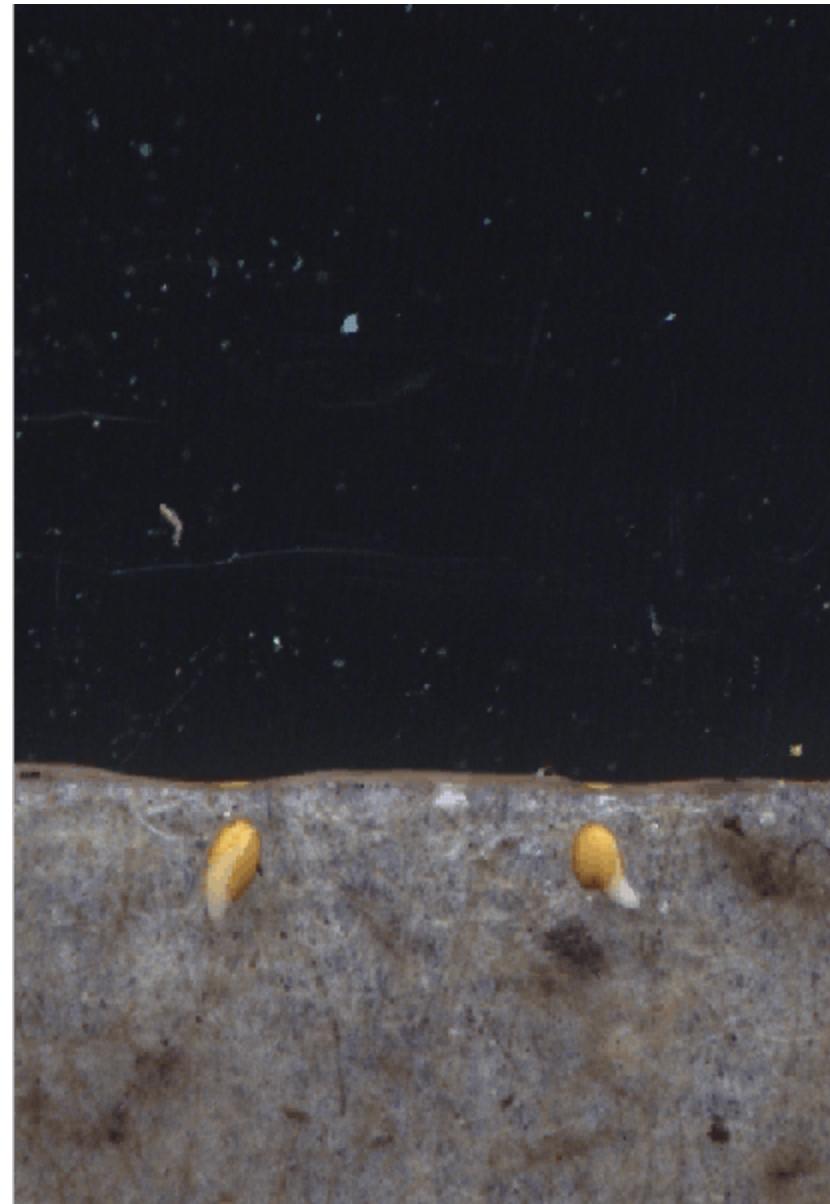


cry1



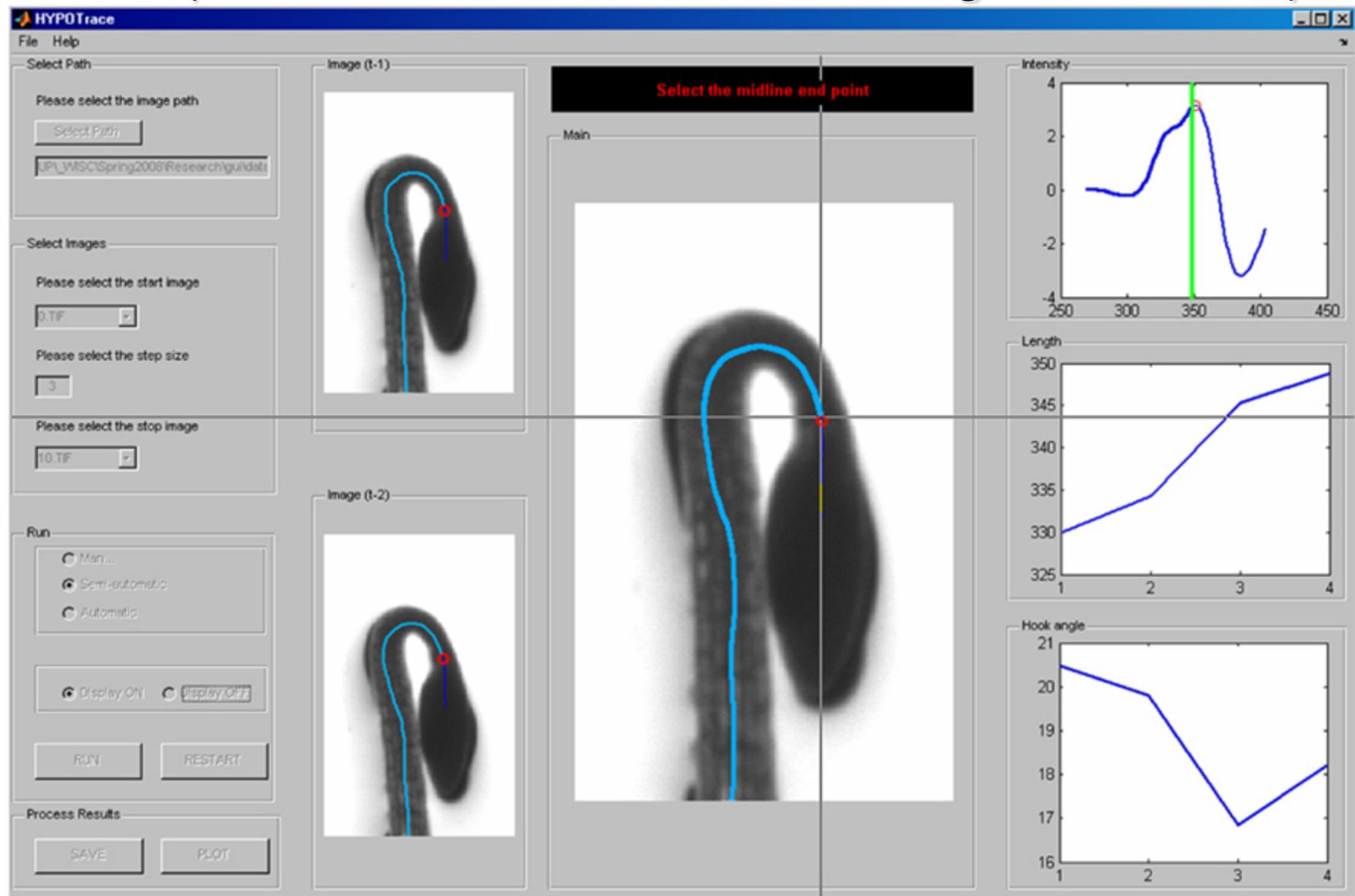
wild type

A multicamera image acquisition platform



In different rooms for different purposes we have approximately 20 of these CCD cameras equipped to image Arabidopsis or maize seedling development.
<http://phytomorph.wisc.edu/hardware/fixed-cameras.php>

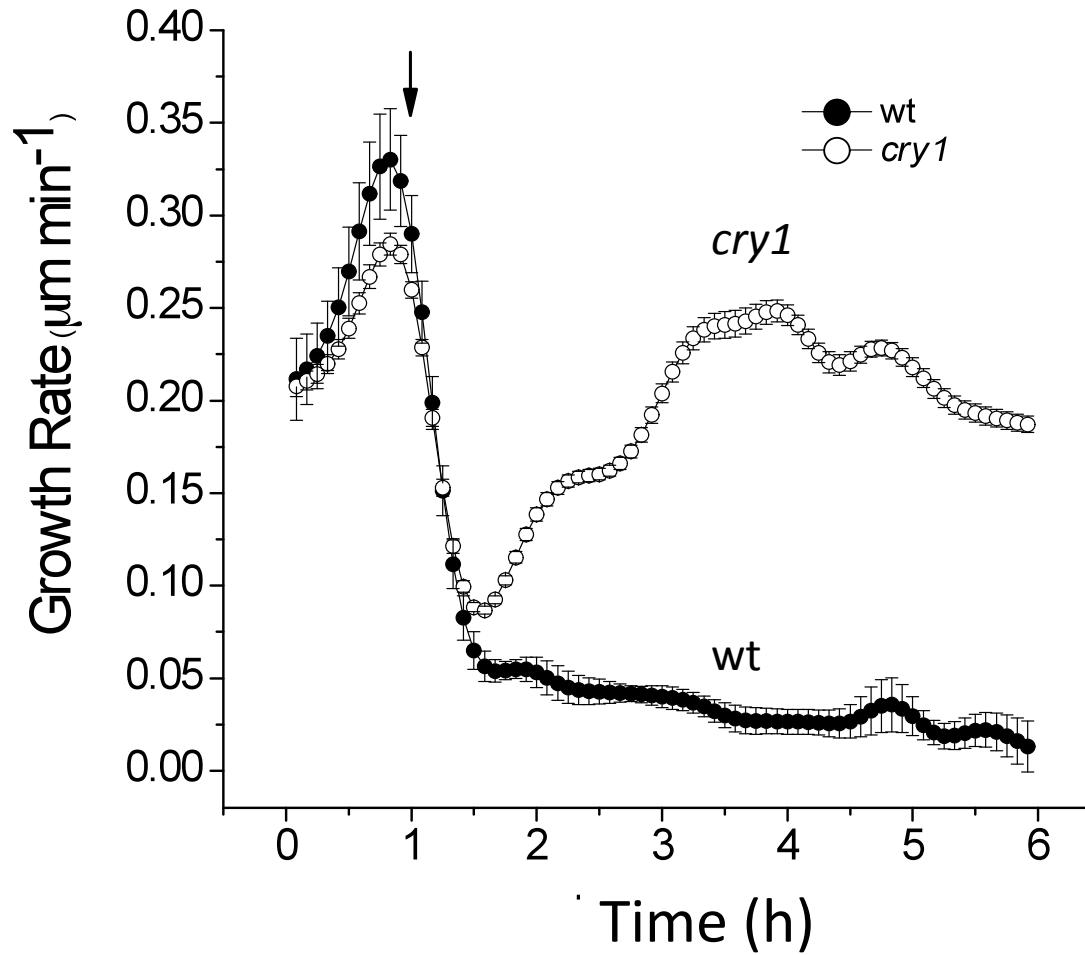
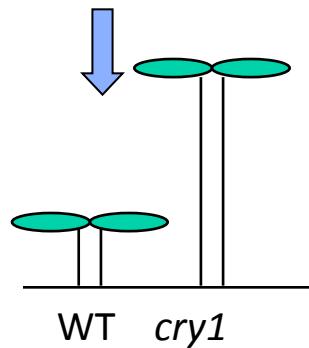
Screen shot of the HYPOTrace program (software that automates some seedling measurements)



download at <http://phytomorph.wisc.edu>

Example HYPOTrace Results

(the basis of the height difference is revealed)



Machine vision studies of obvious phenotypes provides detail about the missing gene's function.

Automation Changes the Game

Automation does more than remove tedium.

It enables more variables to be explored.

This produces a richer description.

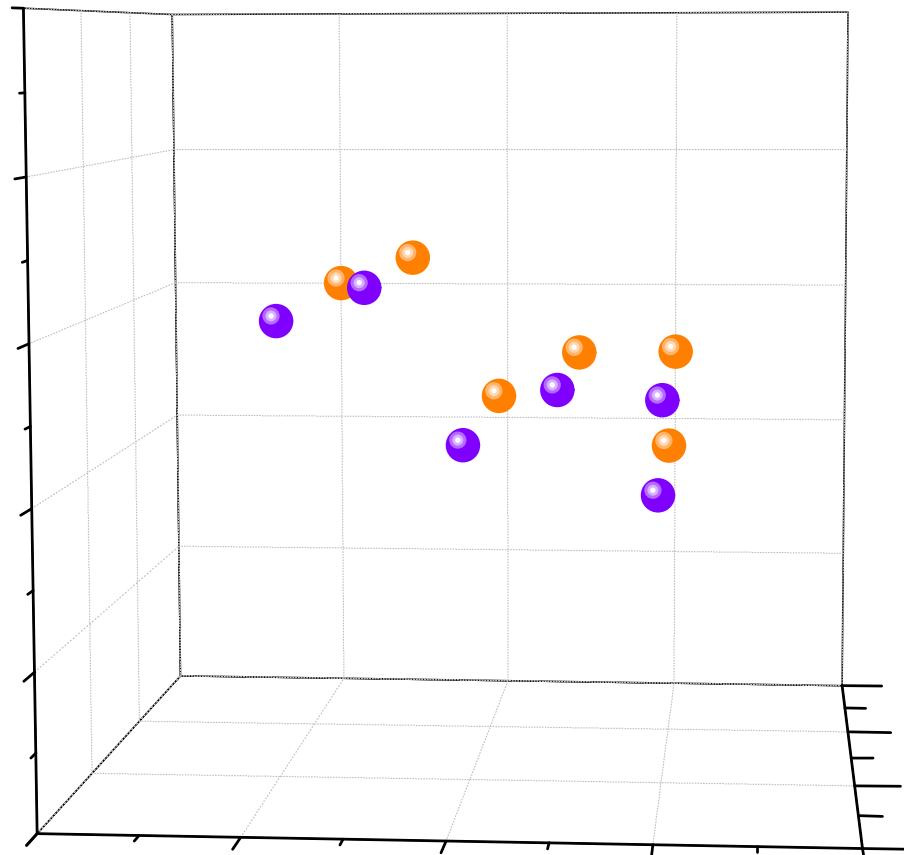
The data can support computational analysis.

Together these things may change the way you think about phenotypes.

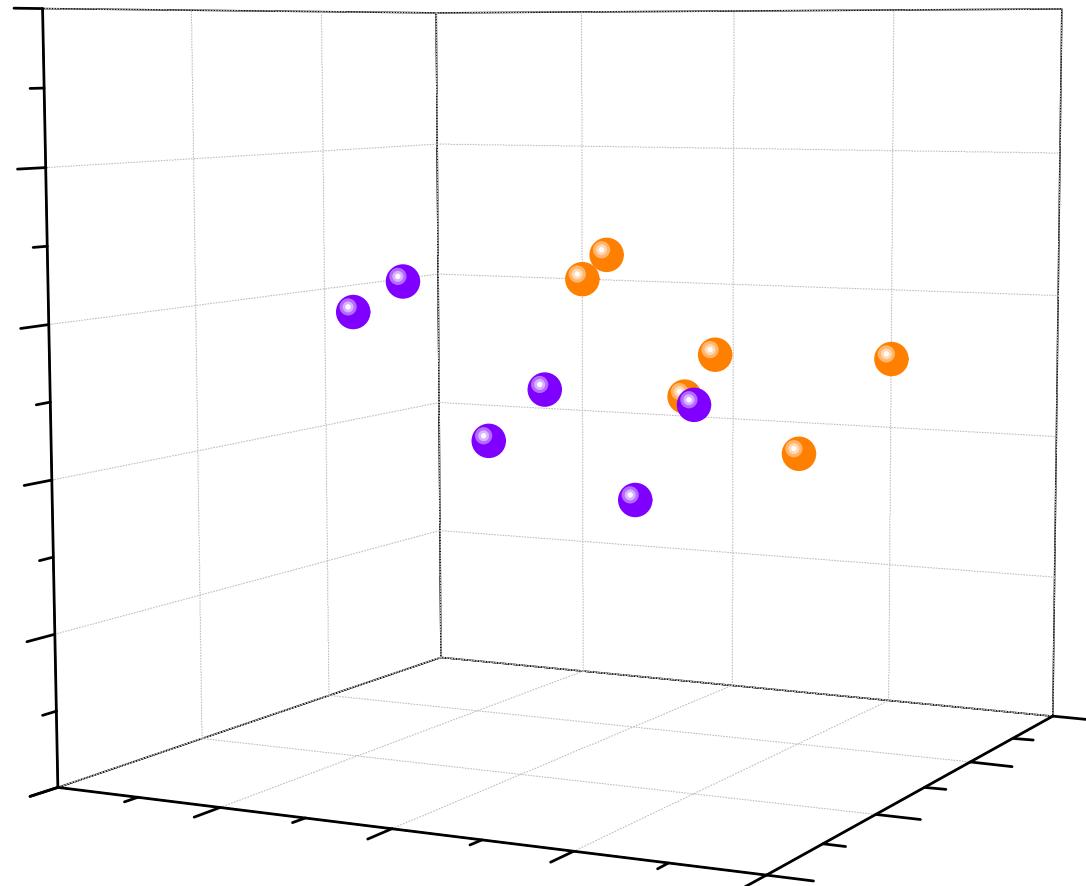
Automation allows more dimensions to be explored. A description in three dimensions can be much more useful than a two-dimensional description.

For example...

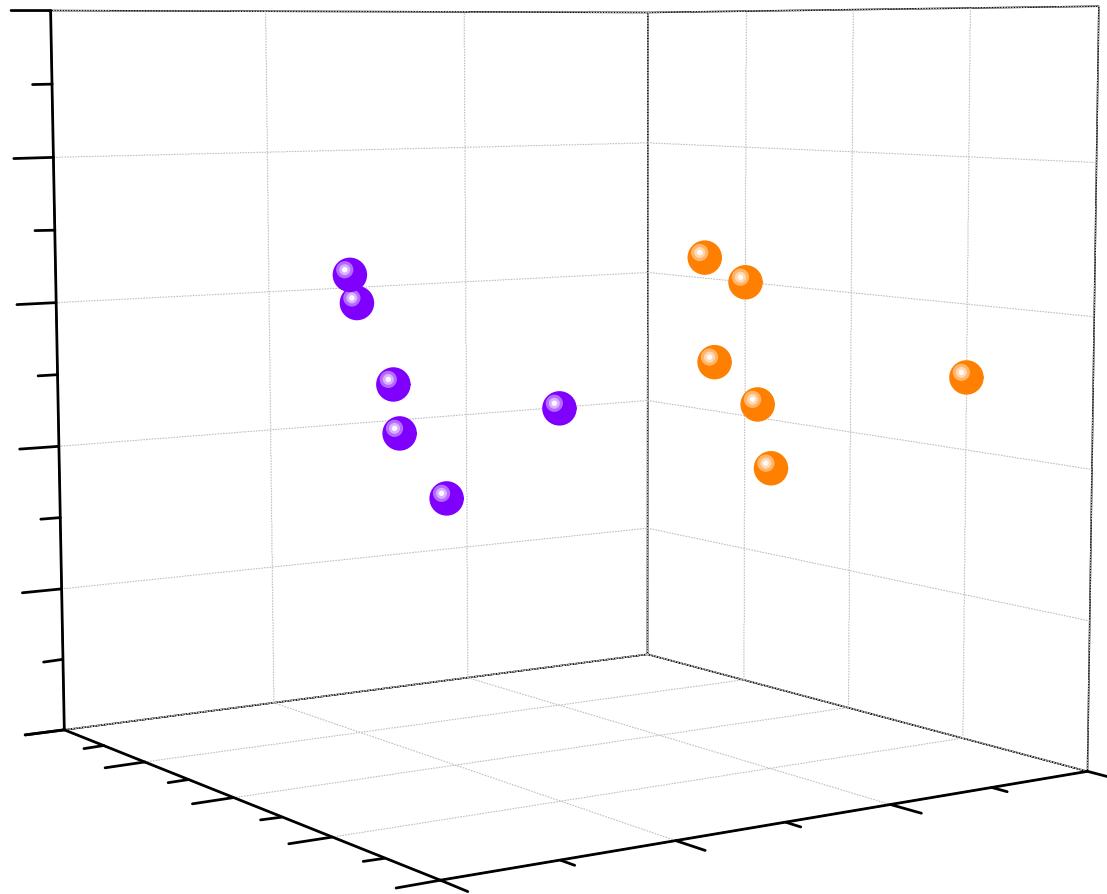
My mutant has no phenotype! #!*@!!^&#!



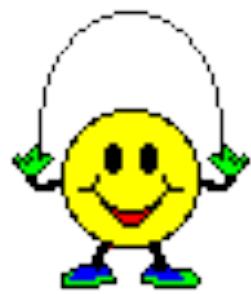
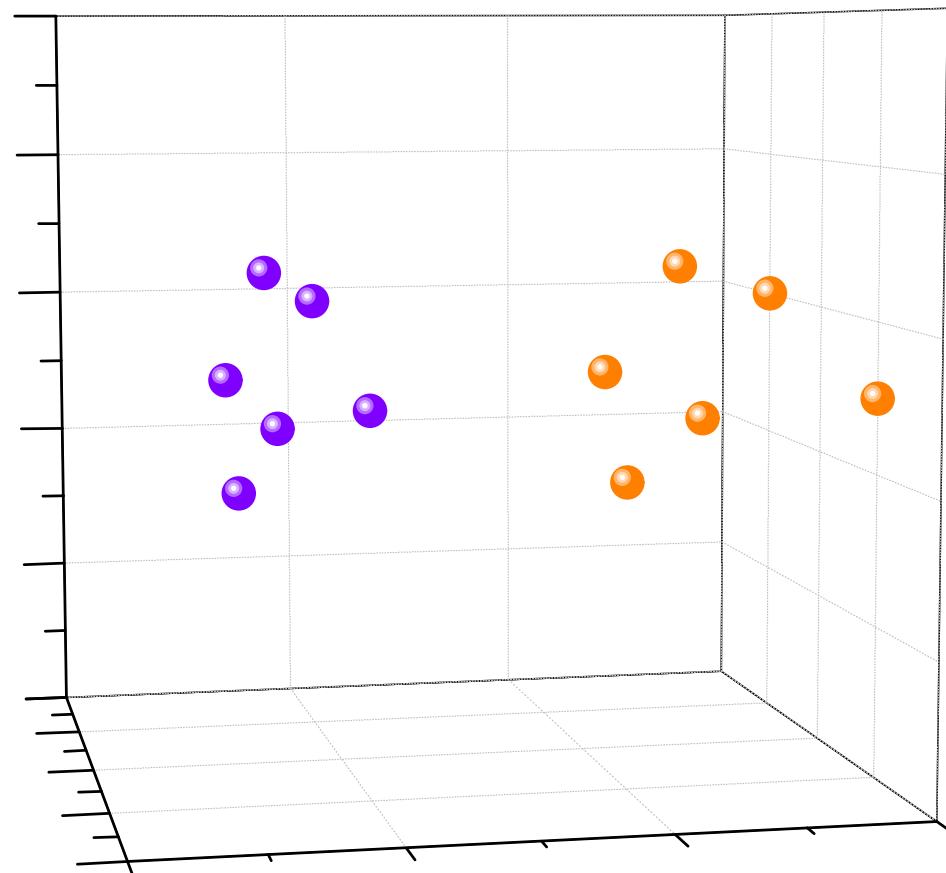
Does my mutant have a phenotype?



My mutant has a phenotype!

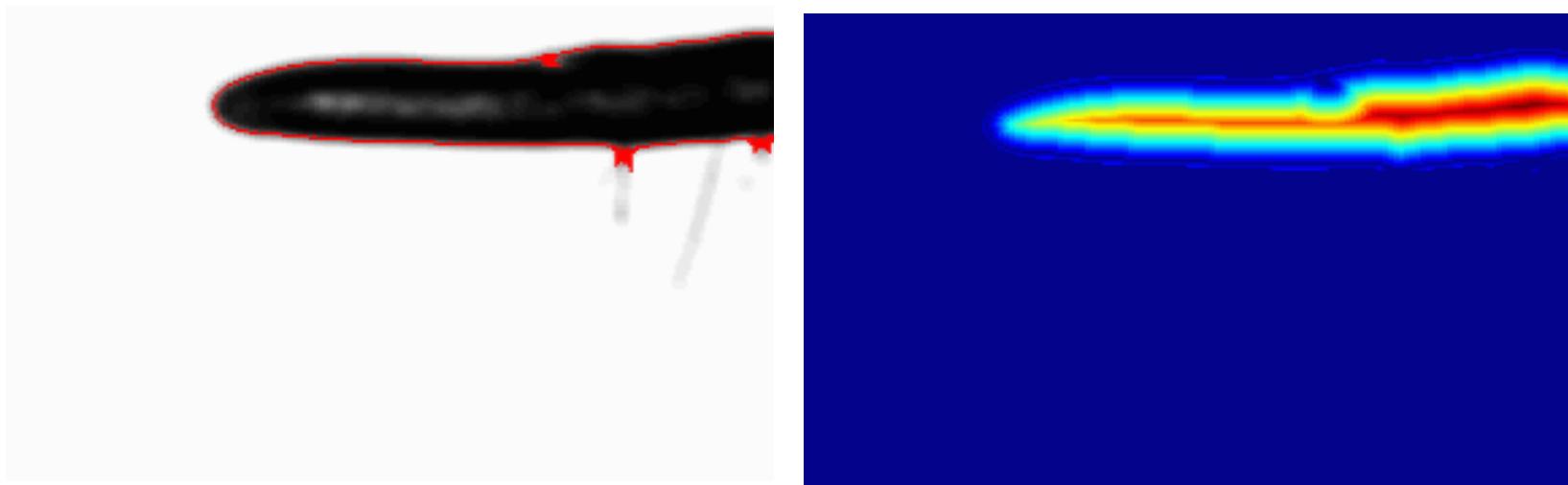


And if you are lucky....
My mutant has a BIG phenotype!



Root gravitropism is our first high-throughput test case

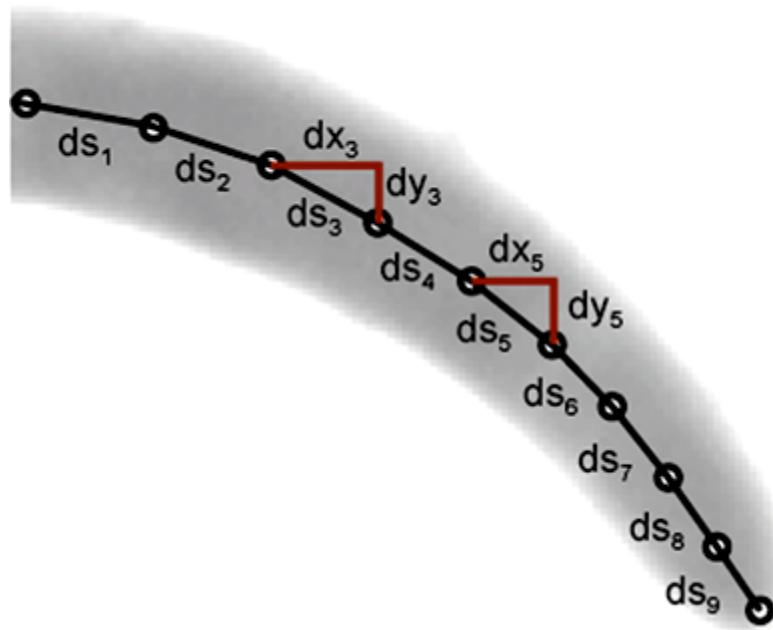
Image processing algorithms find the midline of the root in each frame



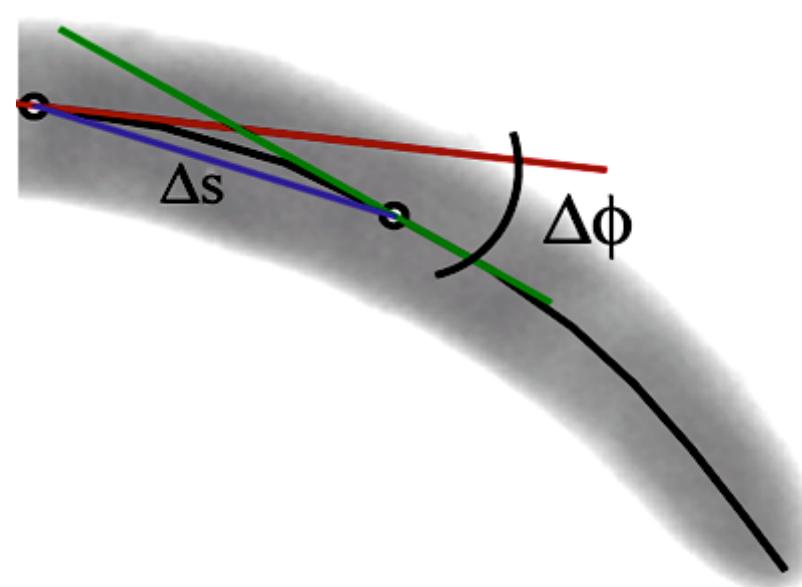
implemented by Nathan Miller

Parameters such as length and local curvature and their time derivatives are extracted from the midlines, or medial axis

length

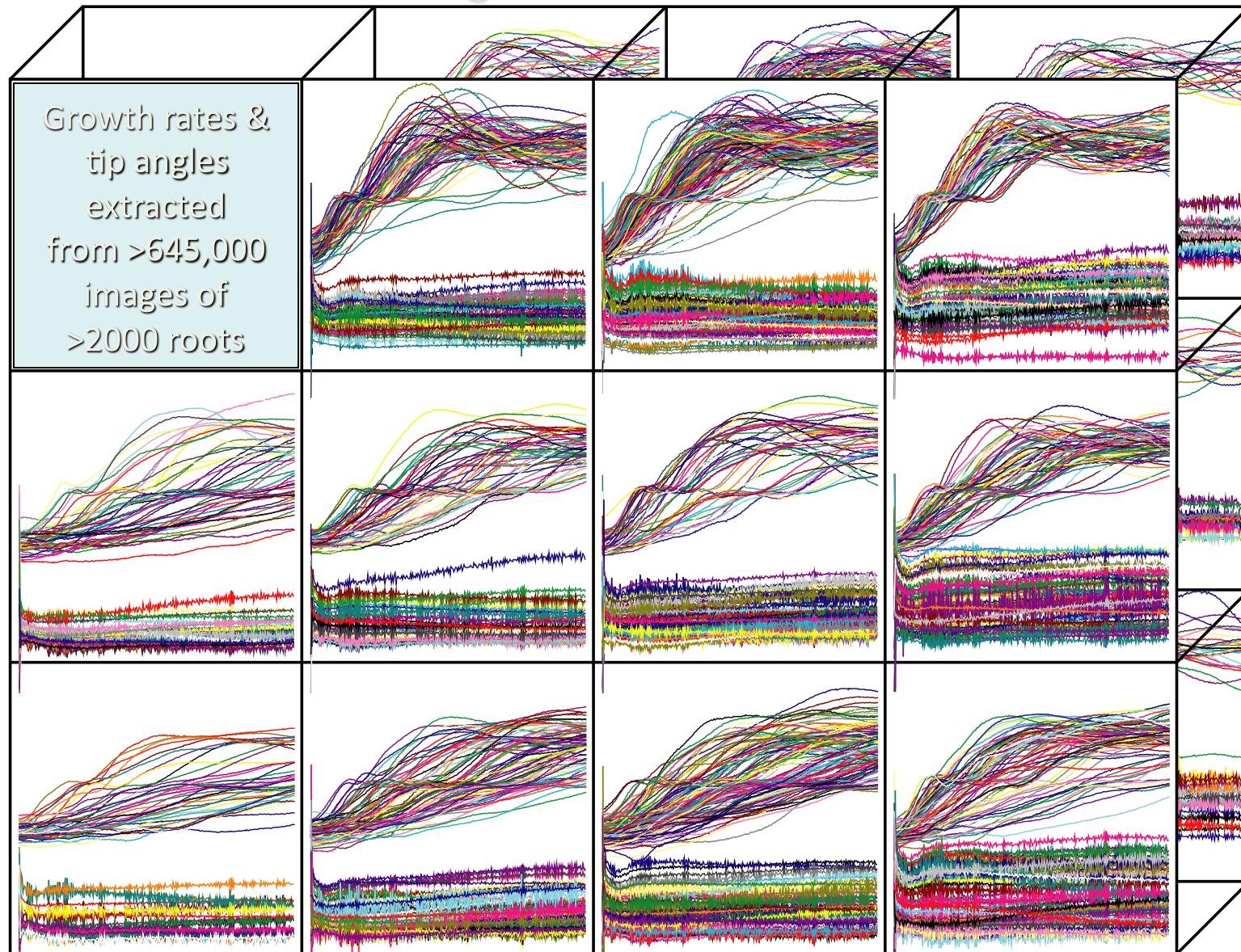


local curvature, $K = \Delta\Phi/\Delta s$



implemented by Nathan Miller

We measured the responses to gravity of a lot of roots across a grid of conditions

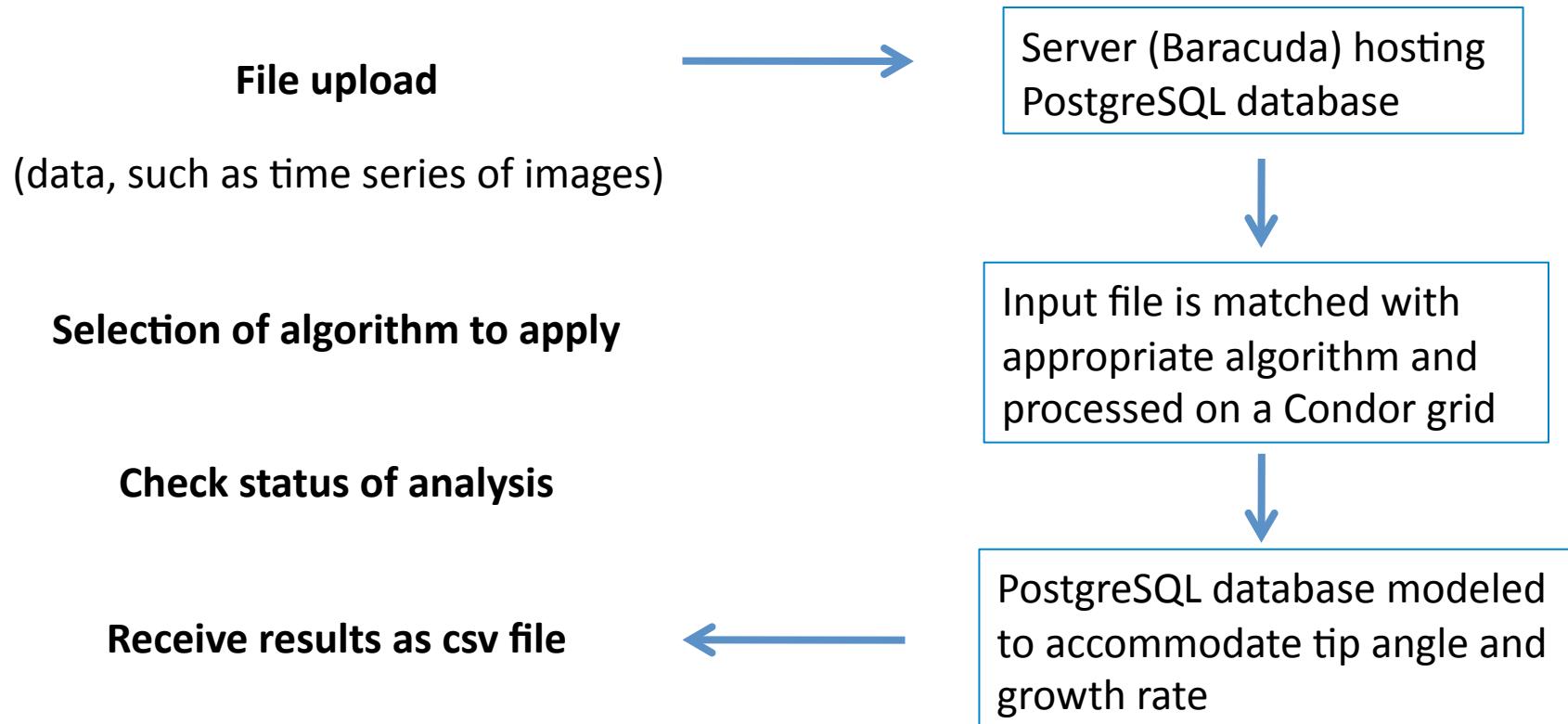


Then we met Miron Livny



Miron Livny
“you need a workflow, and you need Condor”

Here is a workflow we created that uses Condor and the CHTC grid



[Let's try it](#)



Captain Condor
“Make me the bottleneck – I dare you!”

Robotics is increasing our data acquisition throughput, hopefully making the computation once again the bottleneck



Geographically, the distance between Botany and CS is small, but building a functional bridge between them is easier said then done. Happily, the payoff has been large.

