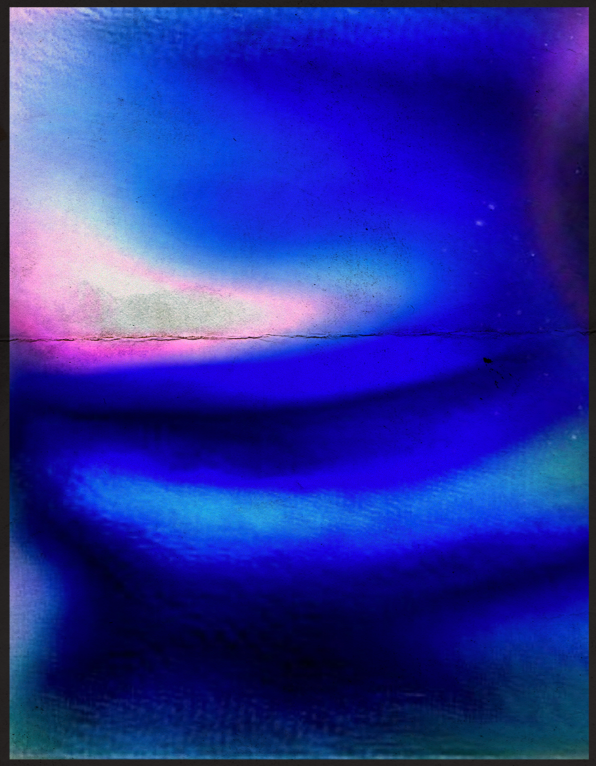
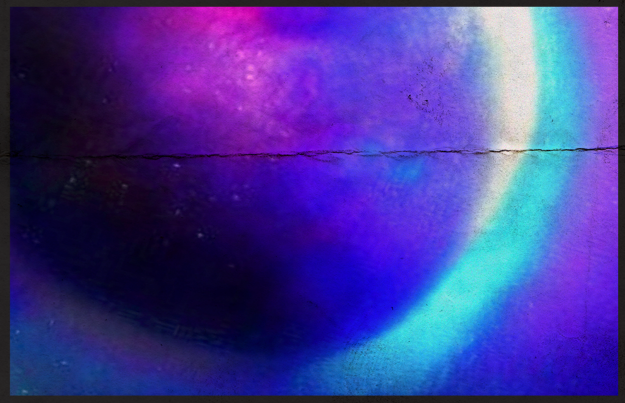
THE STARGAZING MACHINE

BUILDING SOFTWARE TO STUDY COSMIC EXPLOSIONS (and End World Hunger)



THURSDAY, DECEMBER 9
6 - 7PM CST



THE LITERARY
122 N. NEIL ST. CHAMPAIGN, IL

WITH **ALEX GAGLIANO**

lit.

THE STARGAZING MACHINE

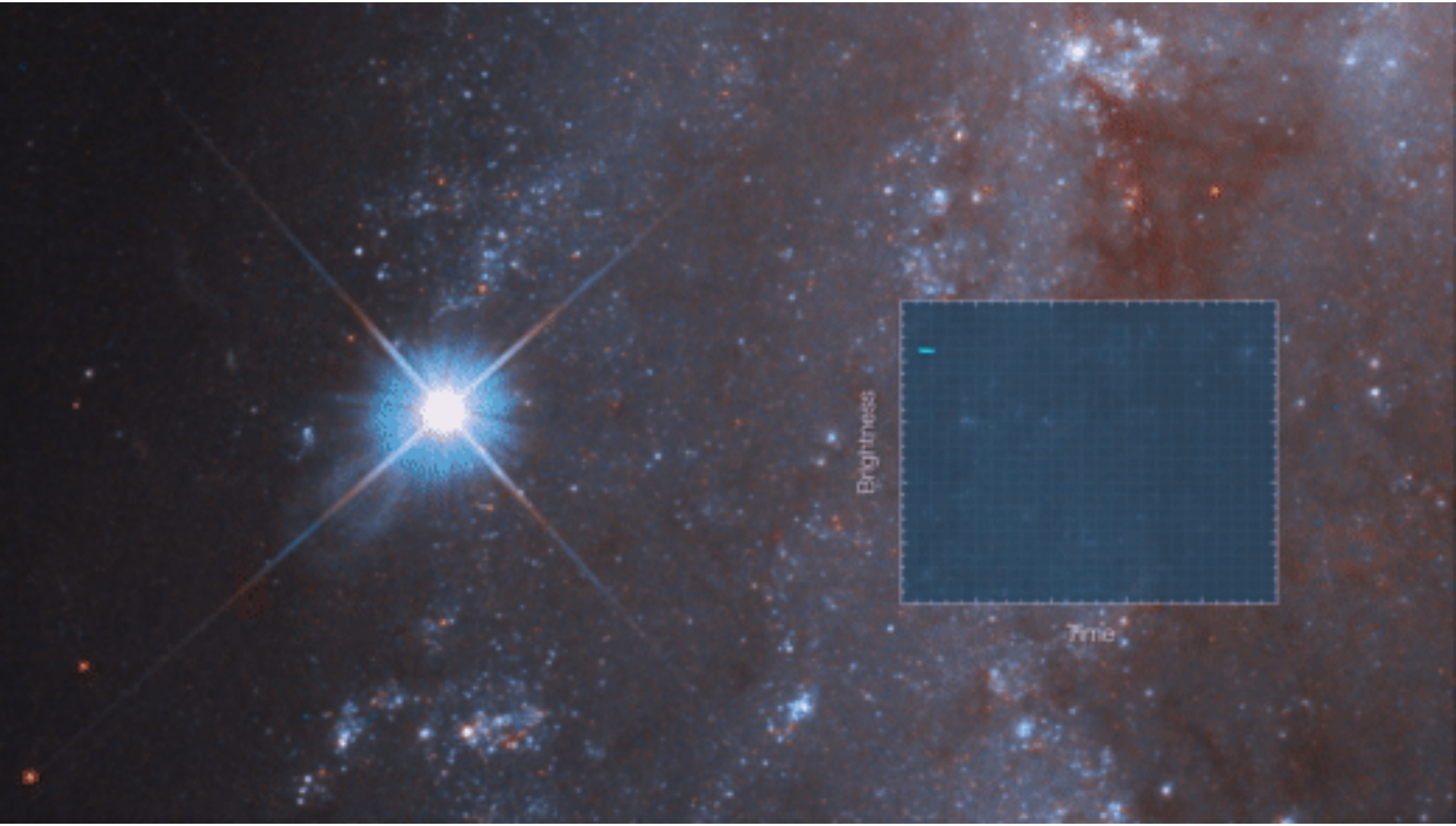
BUILDING SOFTWARE TO STUDY COSMIC EXPLOSIONS (and End World Hunger)

WITH ALEX GAGLIANO

lit.

You can’t miss it

What's in a Light Curve?



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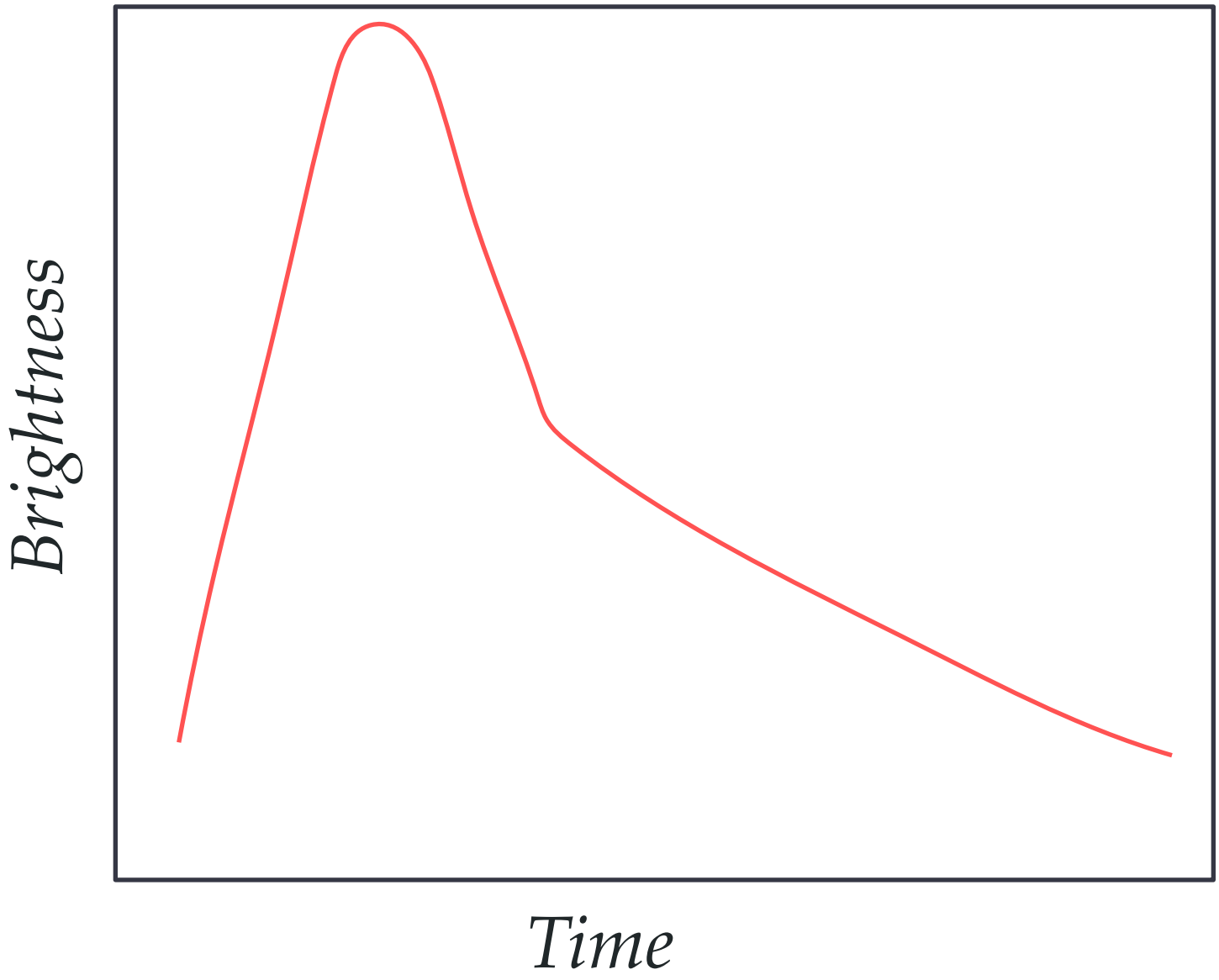

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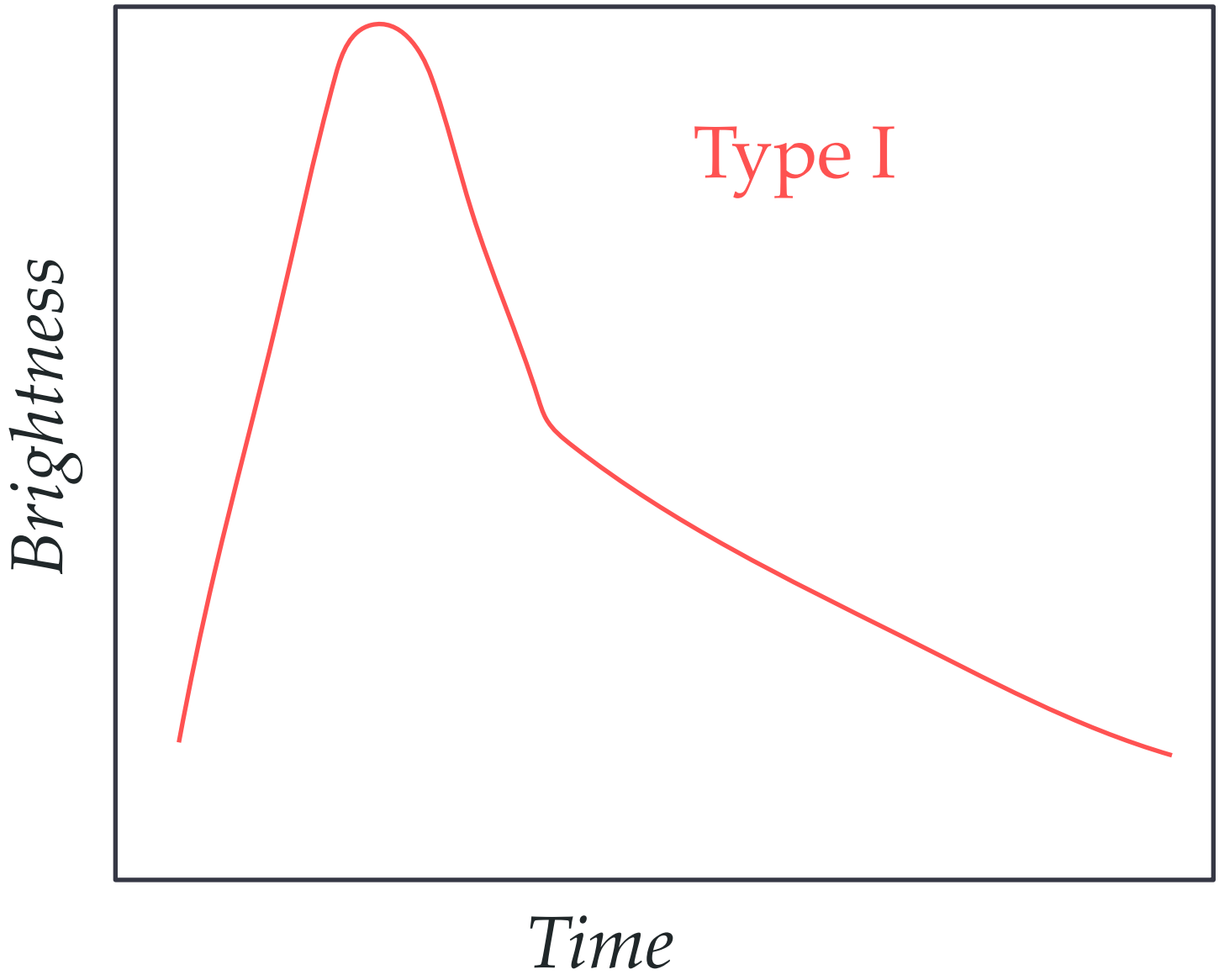

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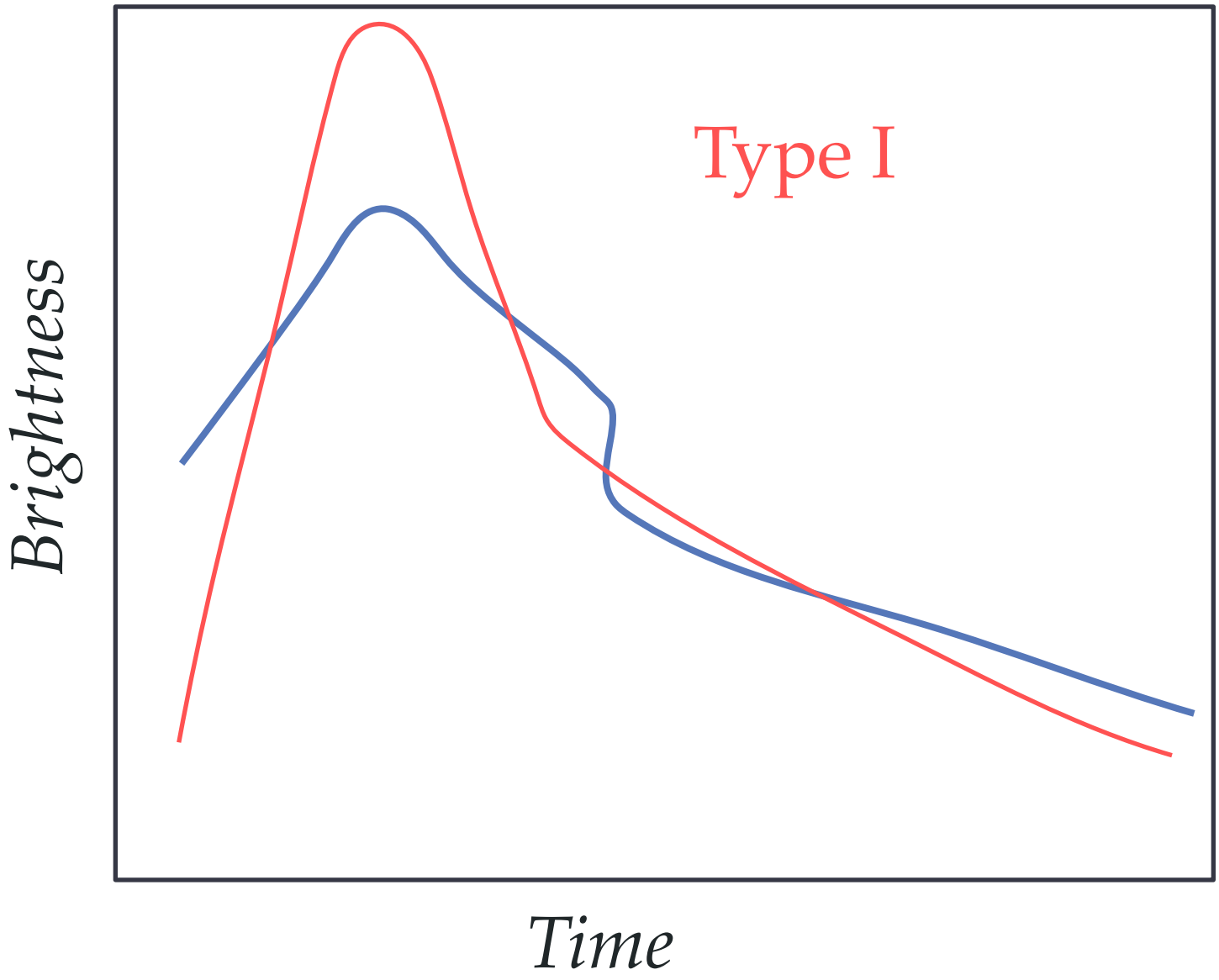

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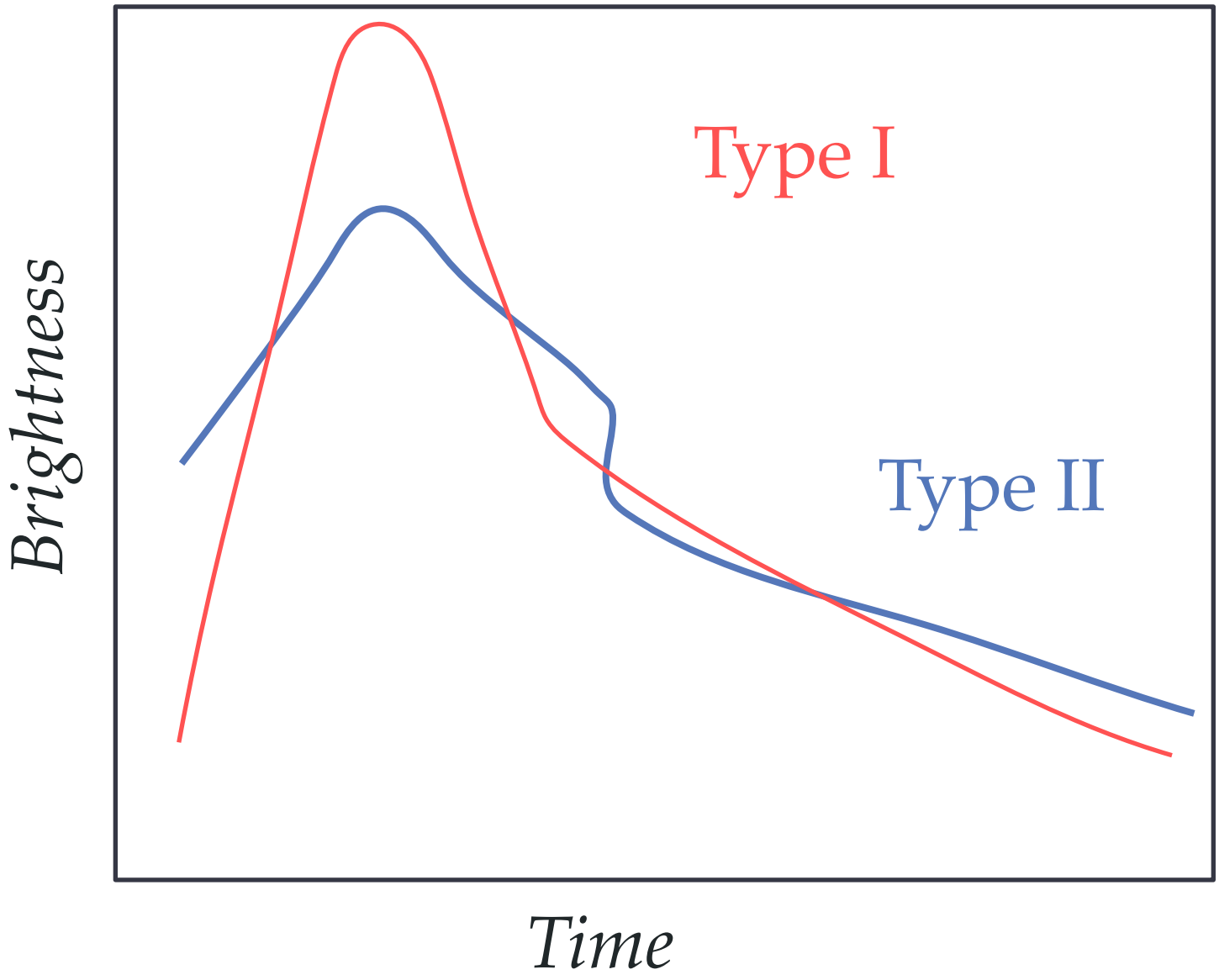
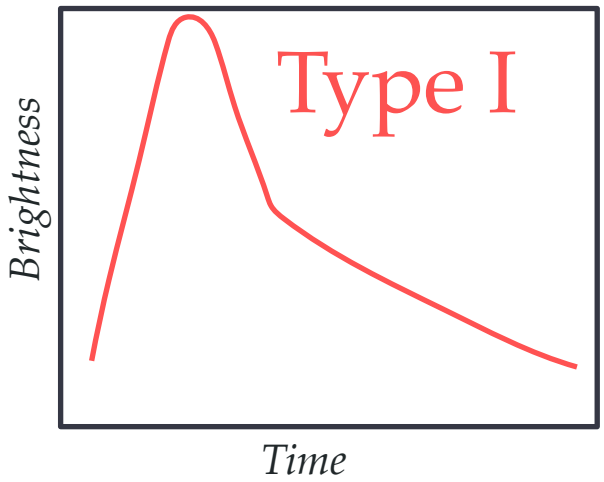
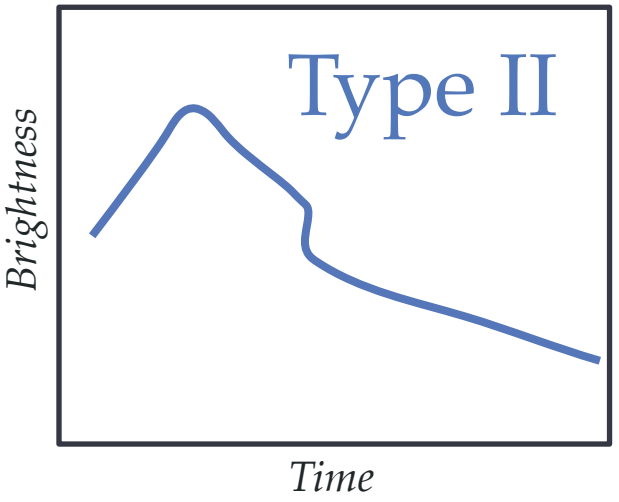


What Causes These Explosions?



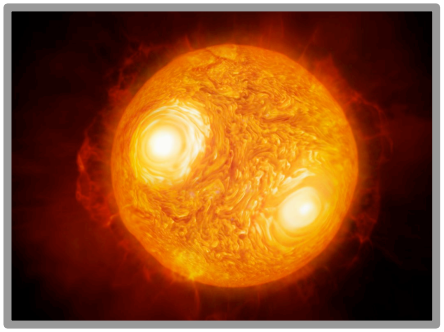
Parent stars are:

- Small (~sun's mass)
- Ol' (~8 Billion yrs)
- Reliable (dark energy)



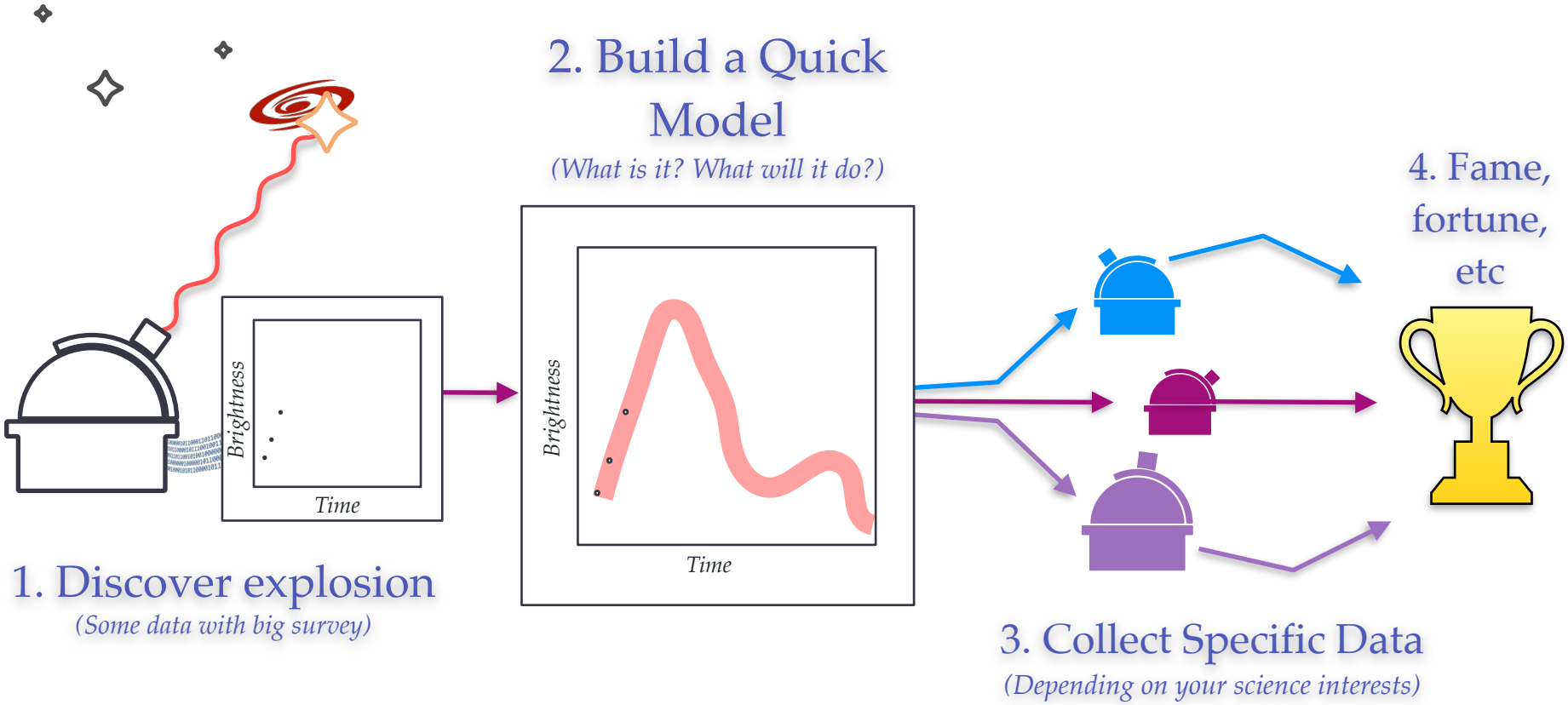
Parent stars are:

- Large (>8x sun's mass)
- Young (< 50 Million yrs)
- Diverse (explosion physics)

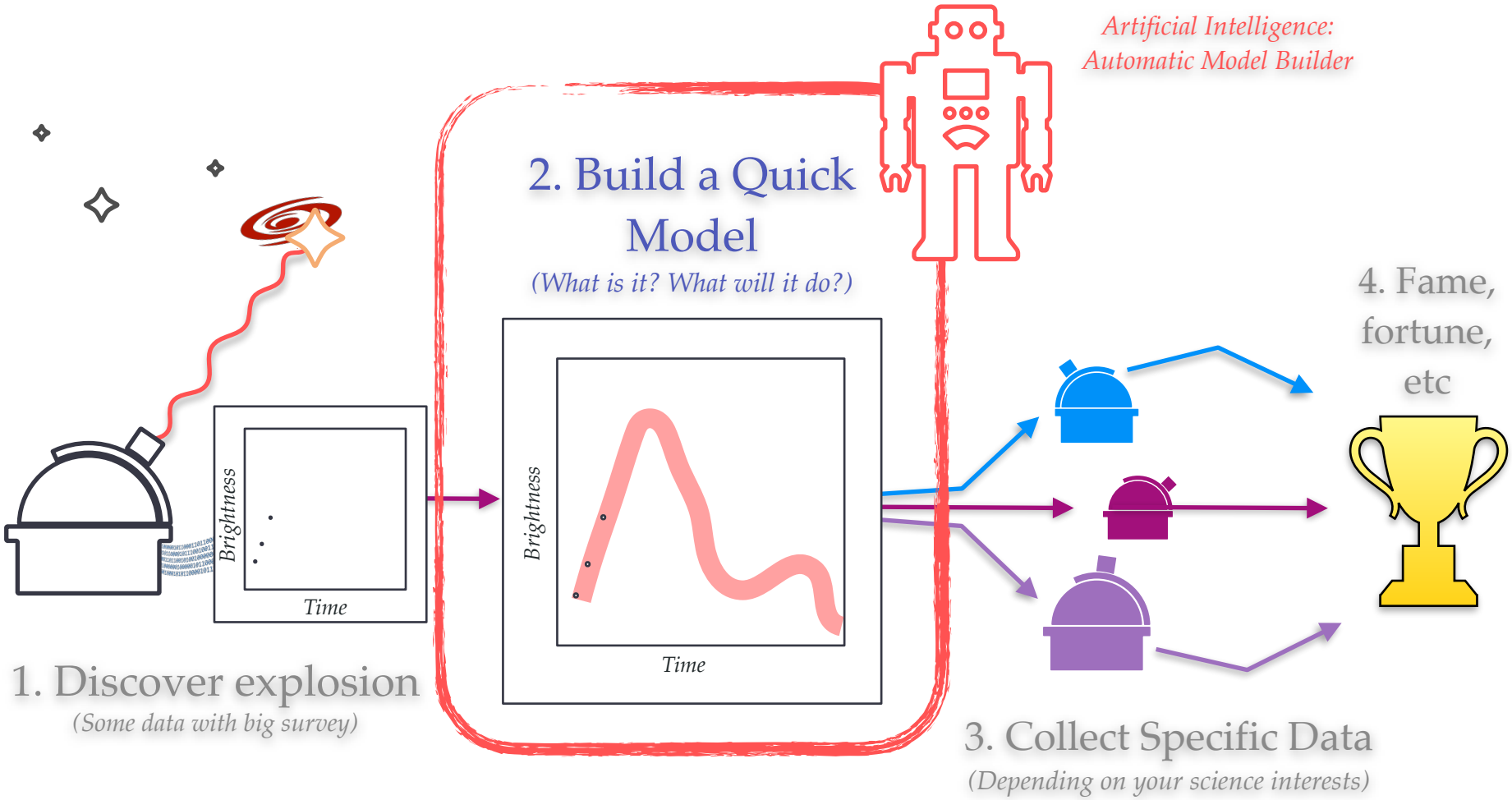


To study the "best" explosions, you have to catch them quickly.

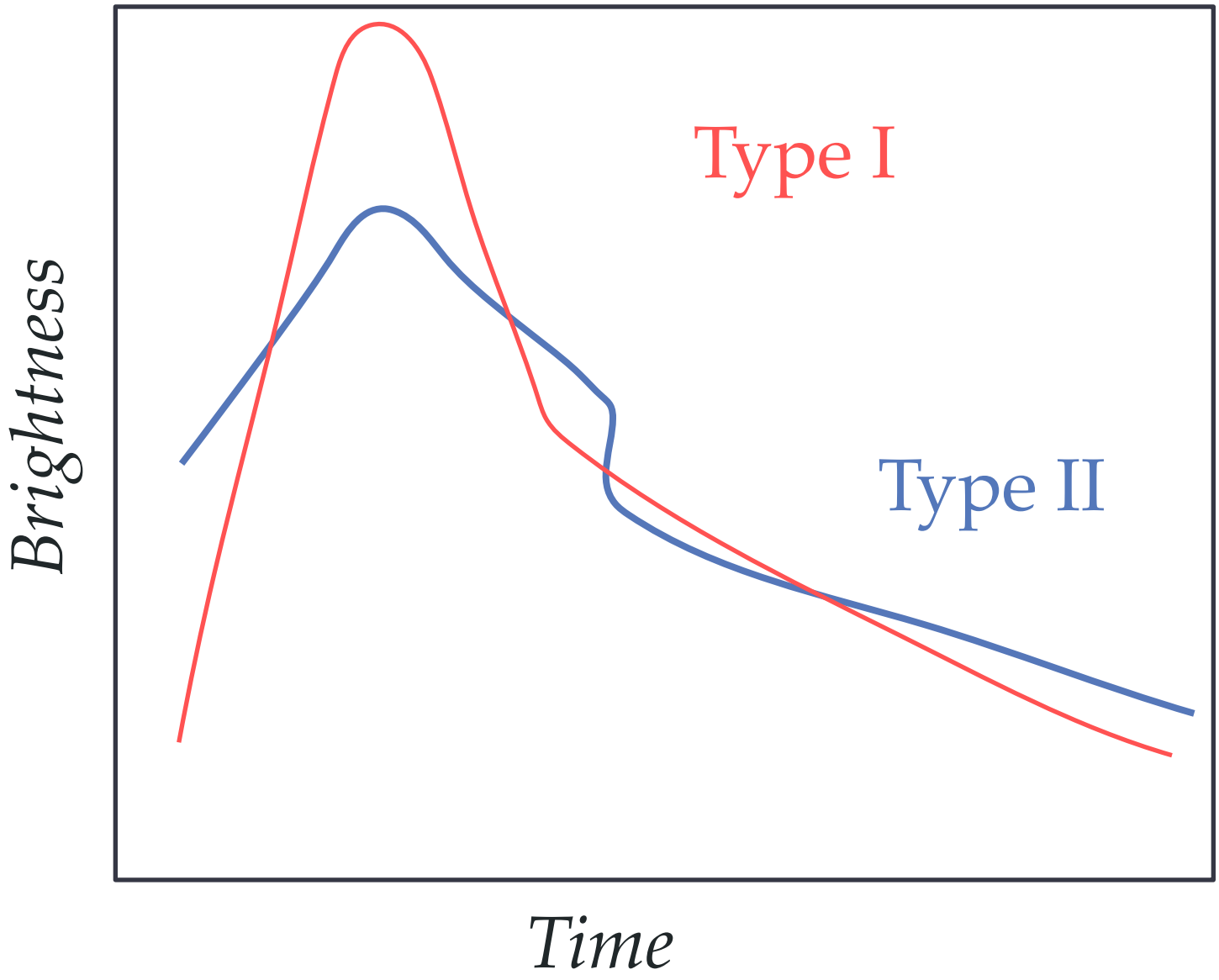
Learning From Nature



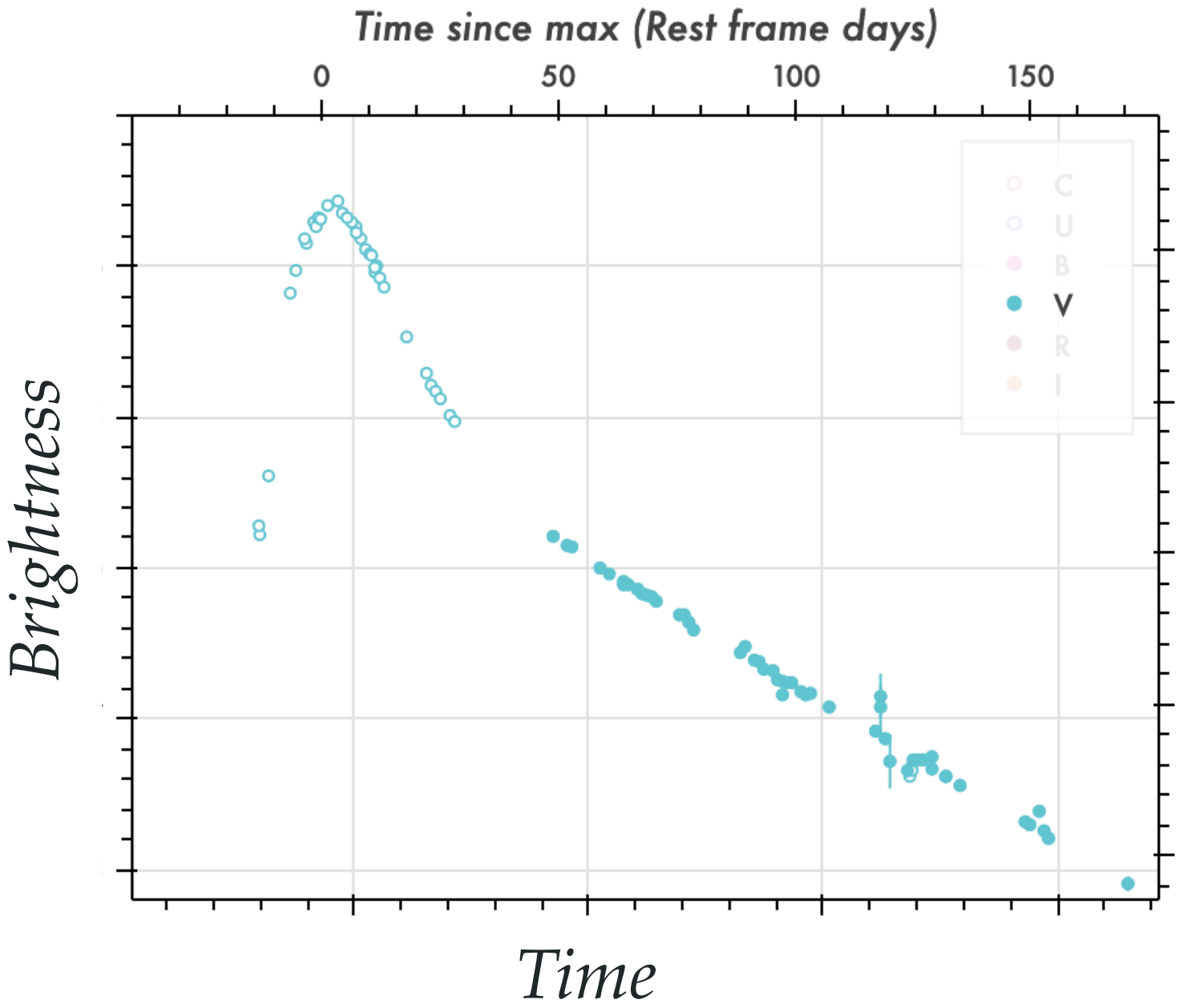
Learning From Nature



What's in a Light Curve?



SN 1998bw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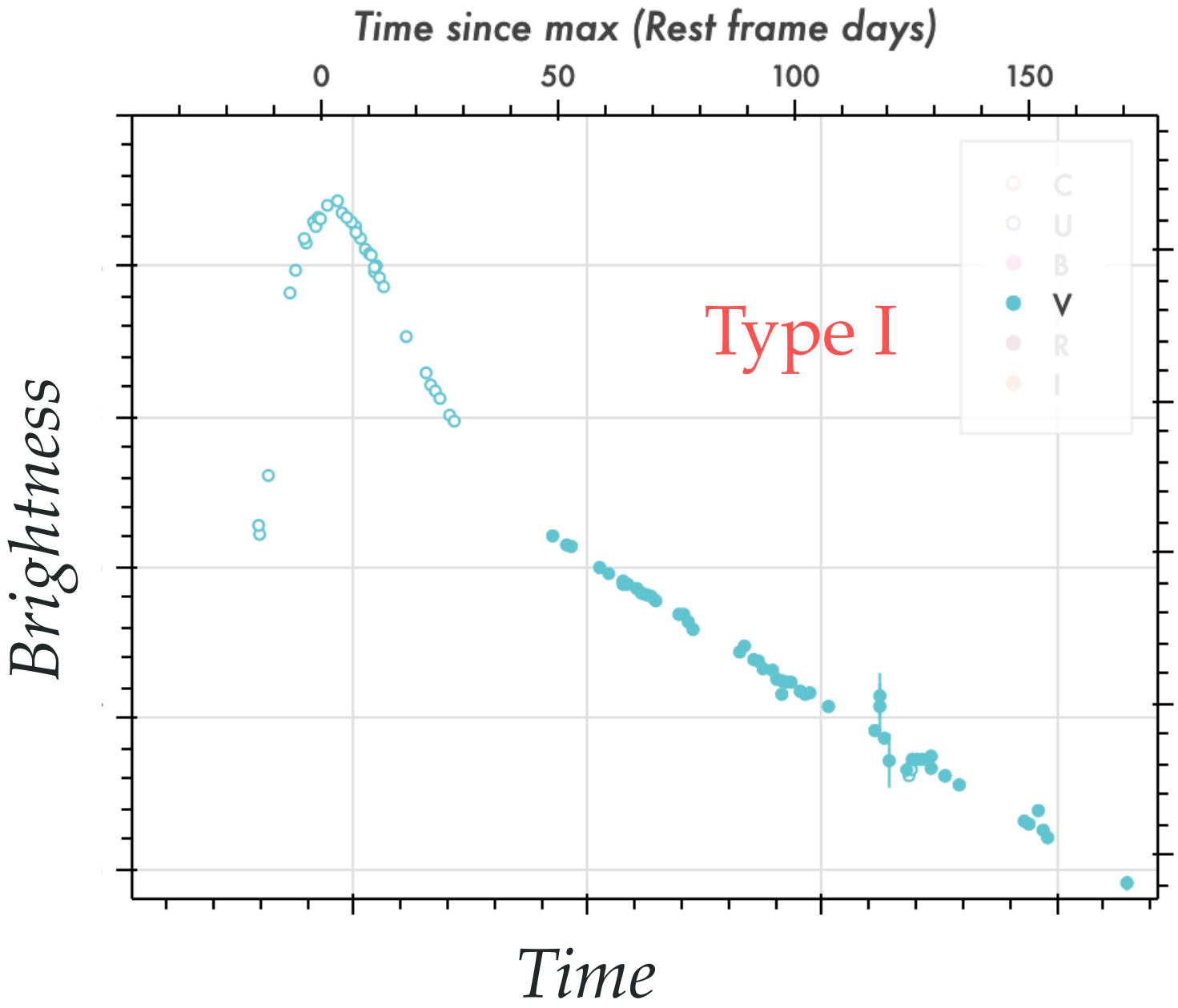
Brightness
Time

SN 1998bw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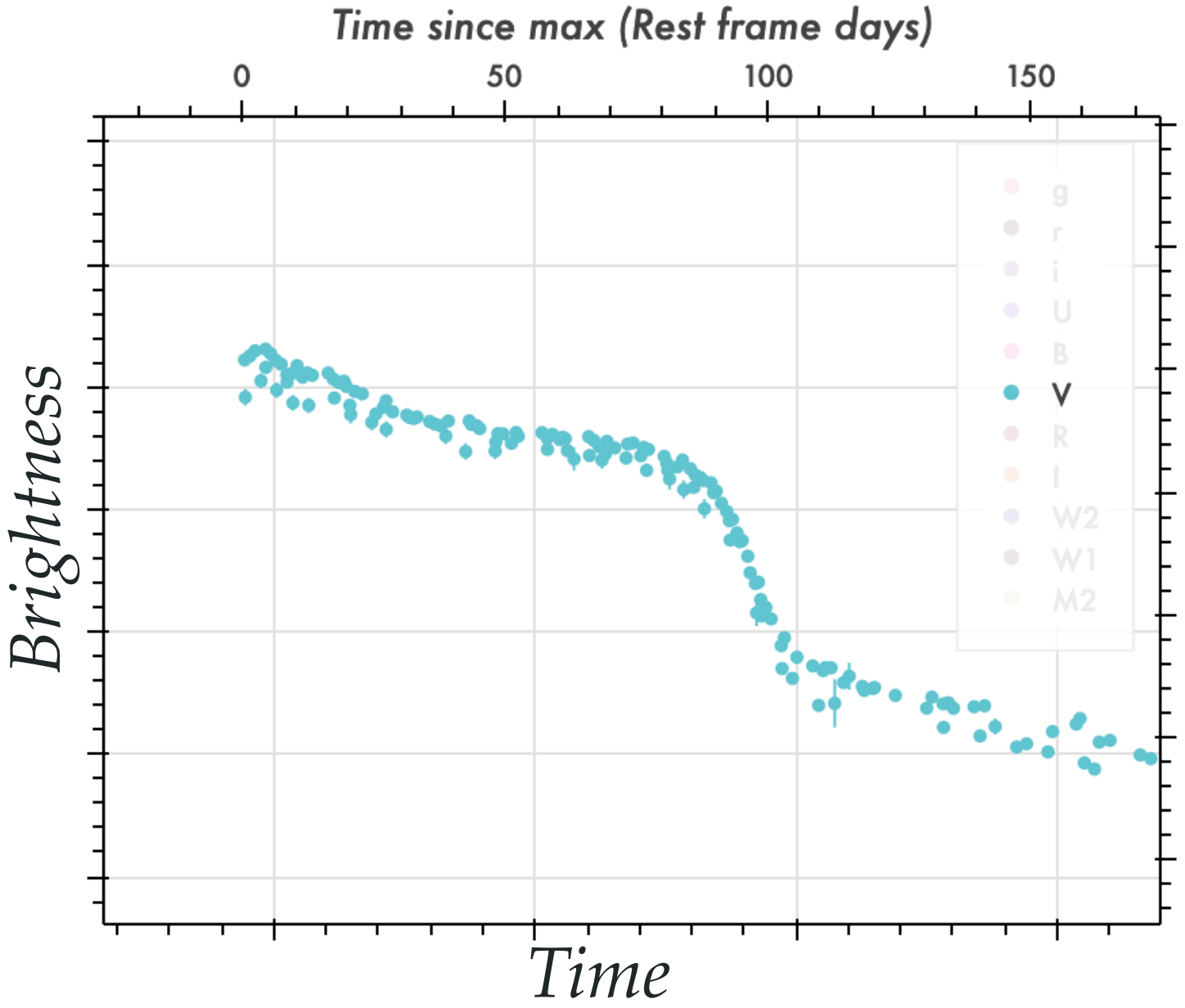
SN 2013ab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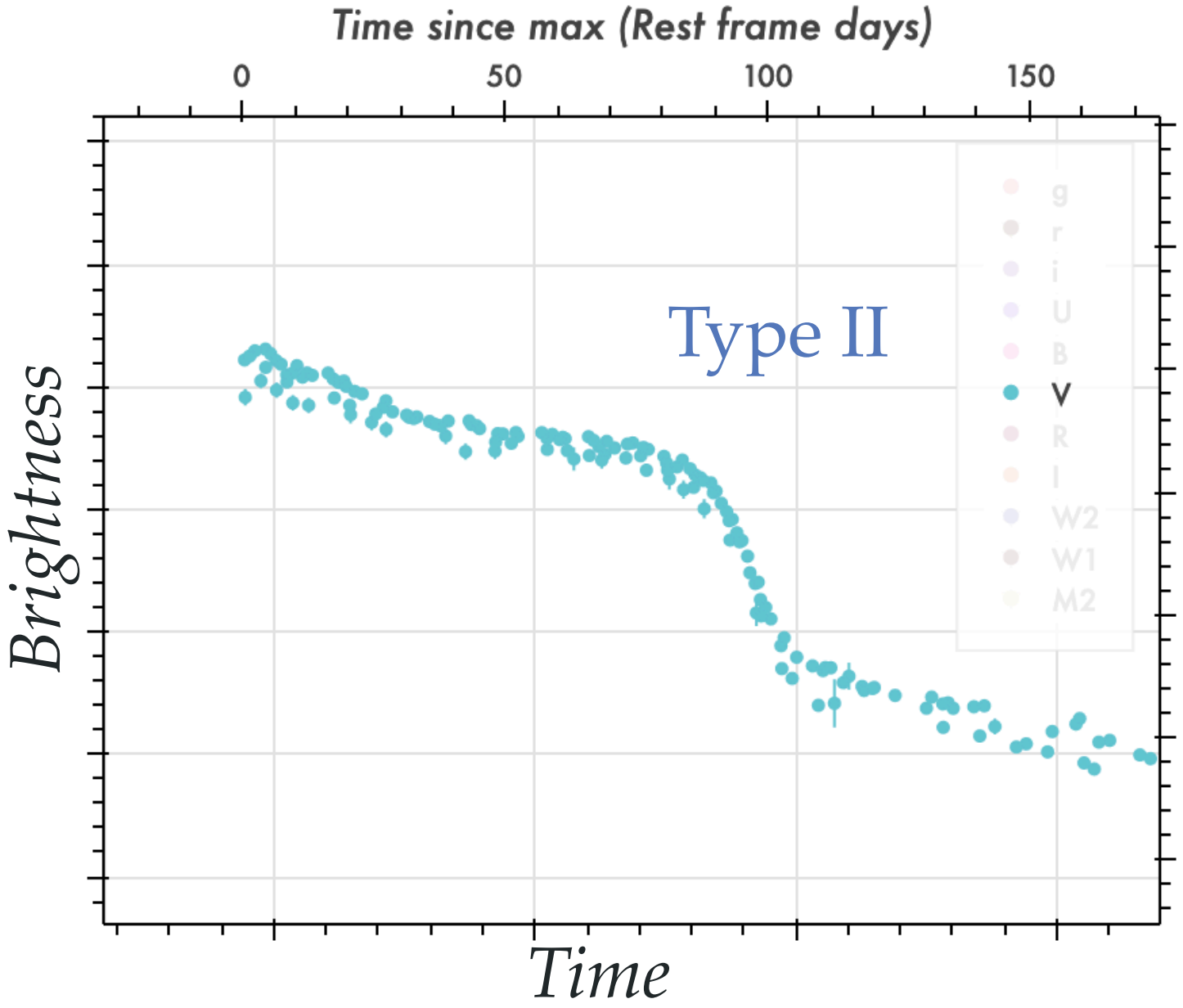
SN 2013ab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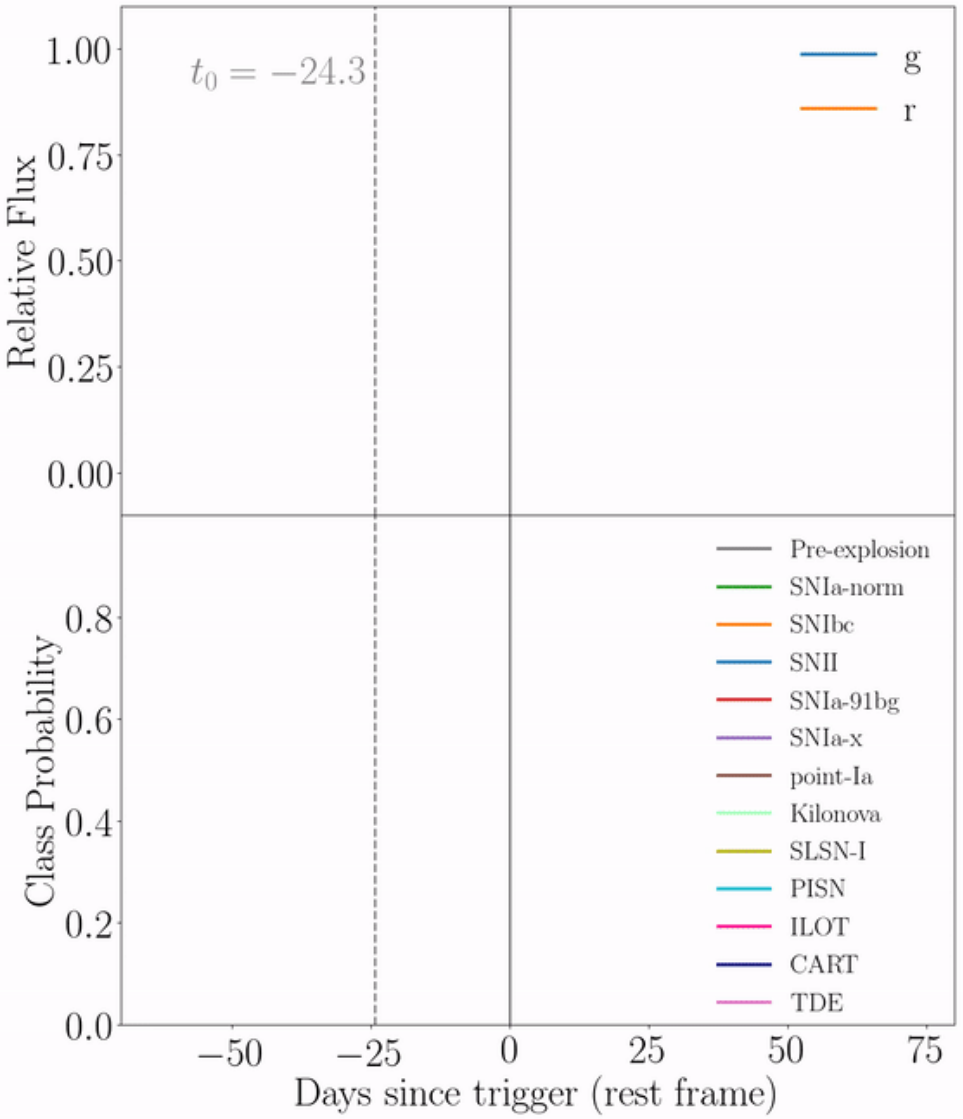
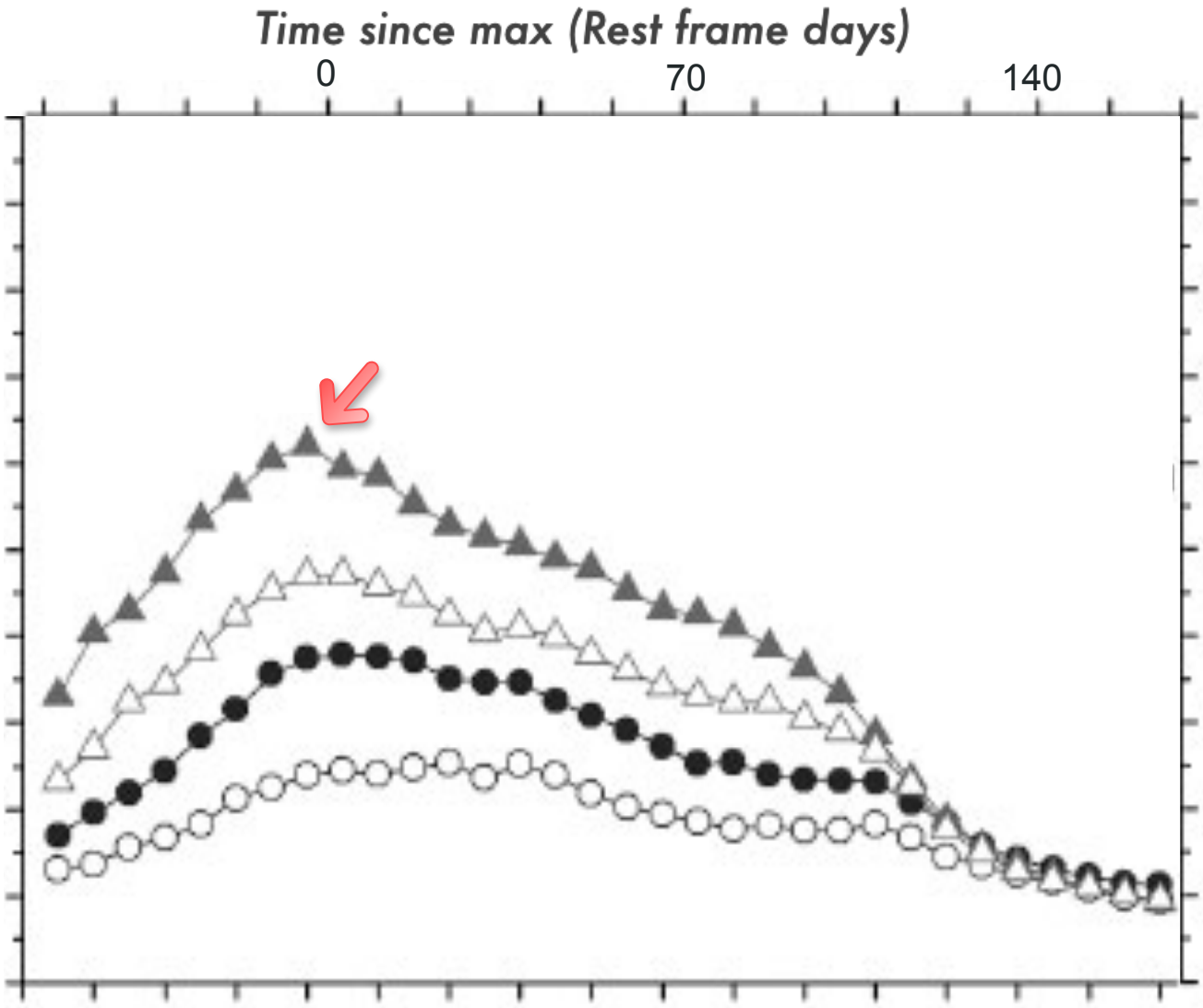
The Stargazing Machine



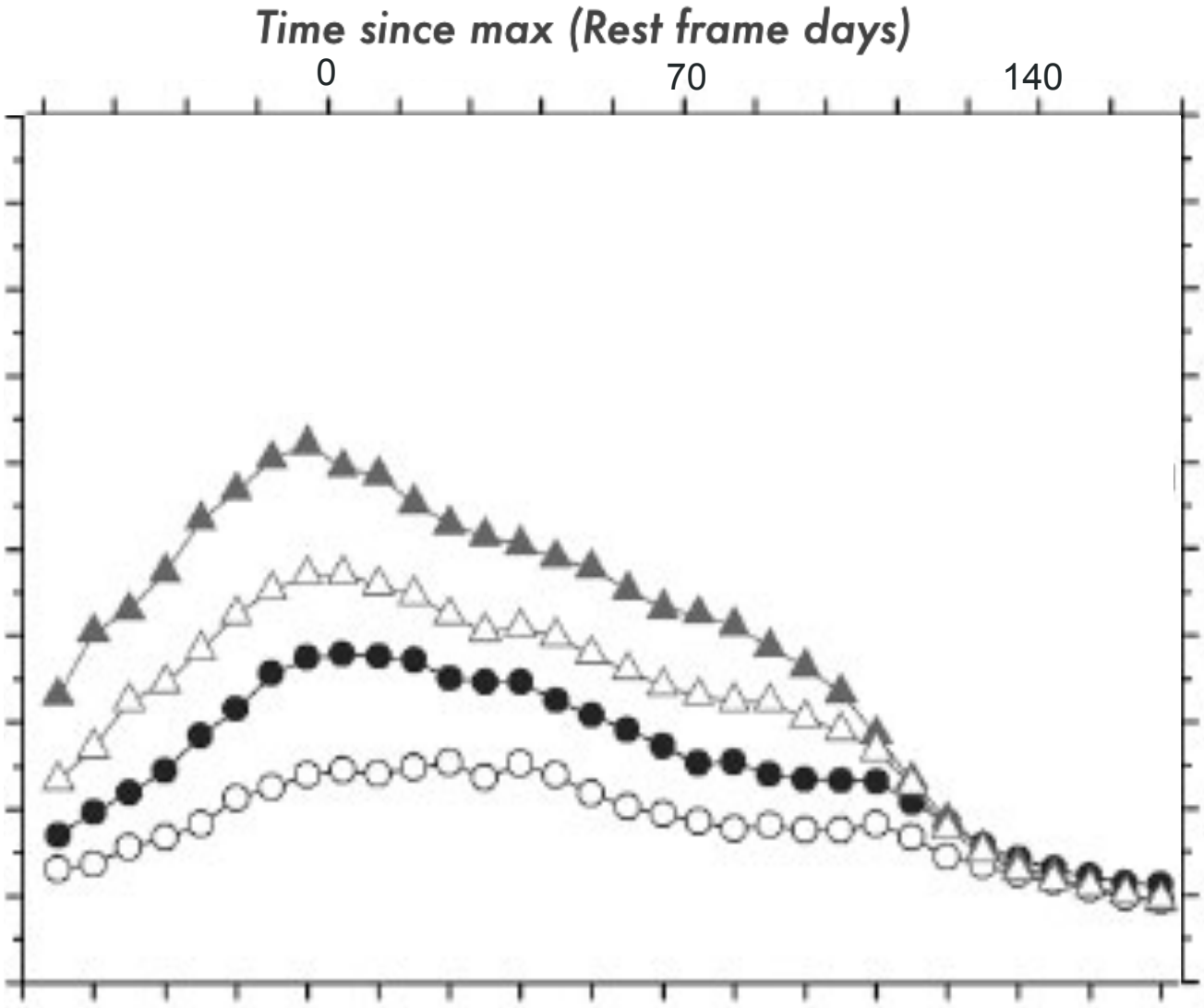
Muthukrishna et al., 2019

SN flr



Time

S(u)N fl(owe)r

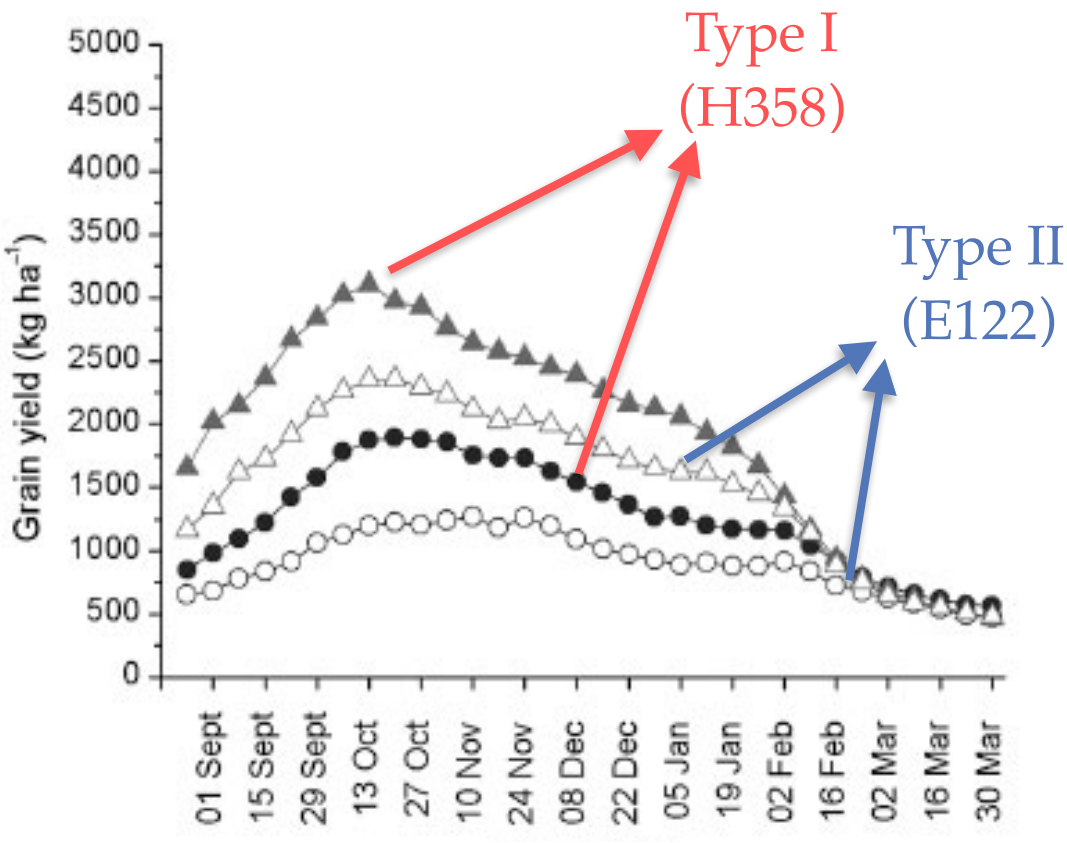


Time

Figure 1: Not a Star

A Crop Model-Based Approach For Sunflower Yields (2014)

ABSTRACT: Pushed by the Brazilian biodiesel policy, sunflower (*Helianthus annuus* L.) production is becoming increasingly regarded as an option to boost farmers' income, particularly under semi-arid conditions. Biodiesel related opportunities increase the demand for decision-making



What determines how a plant will grow?

- Genotype

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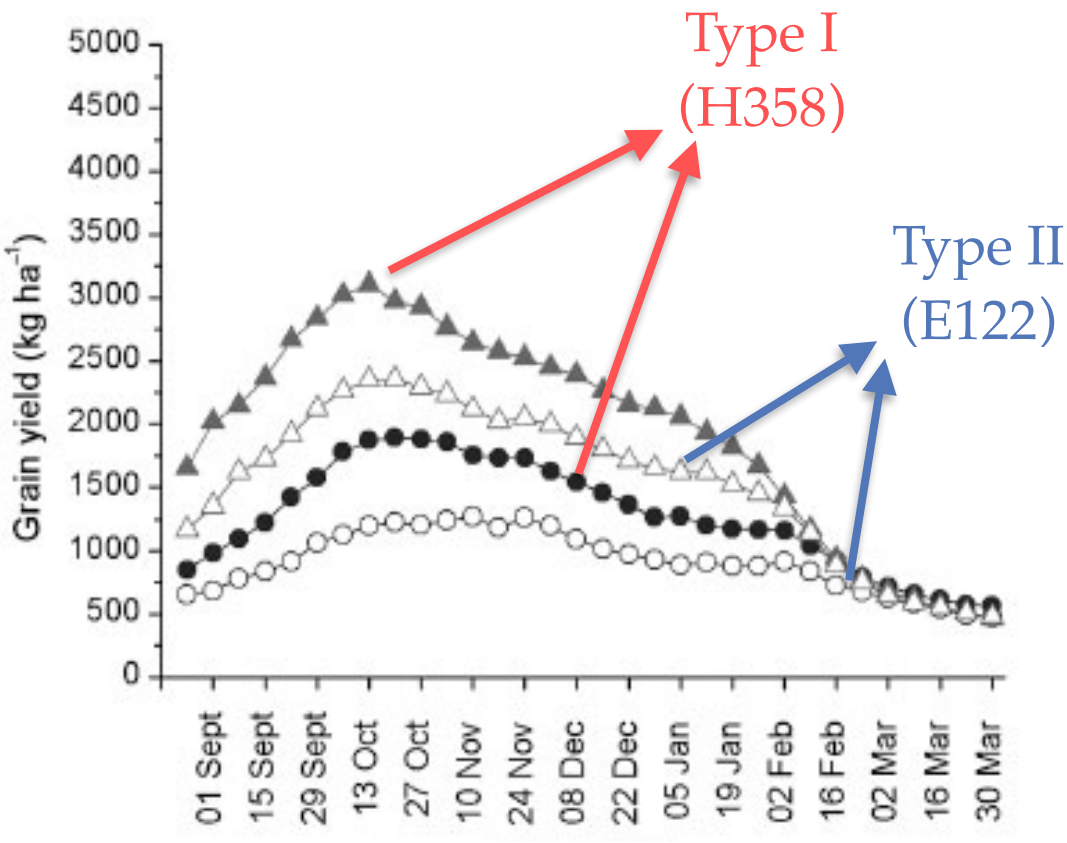
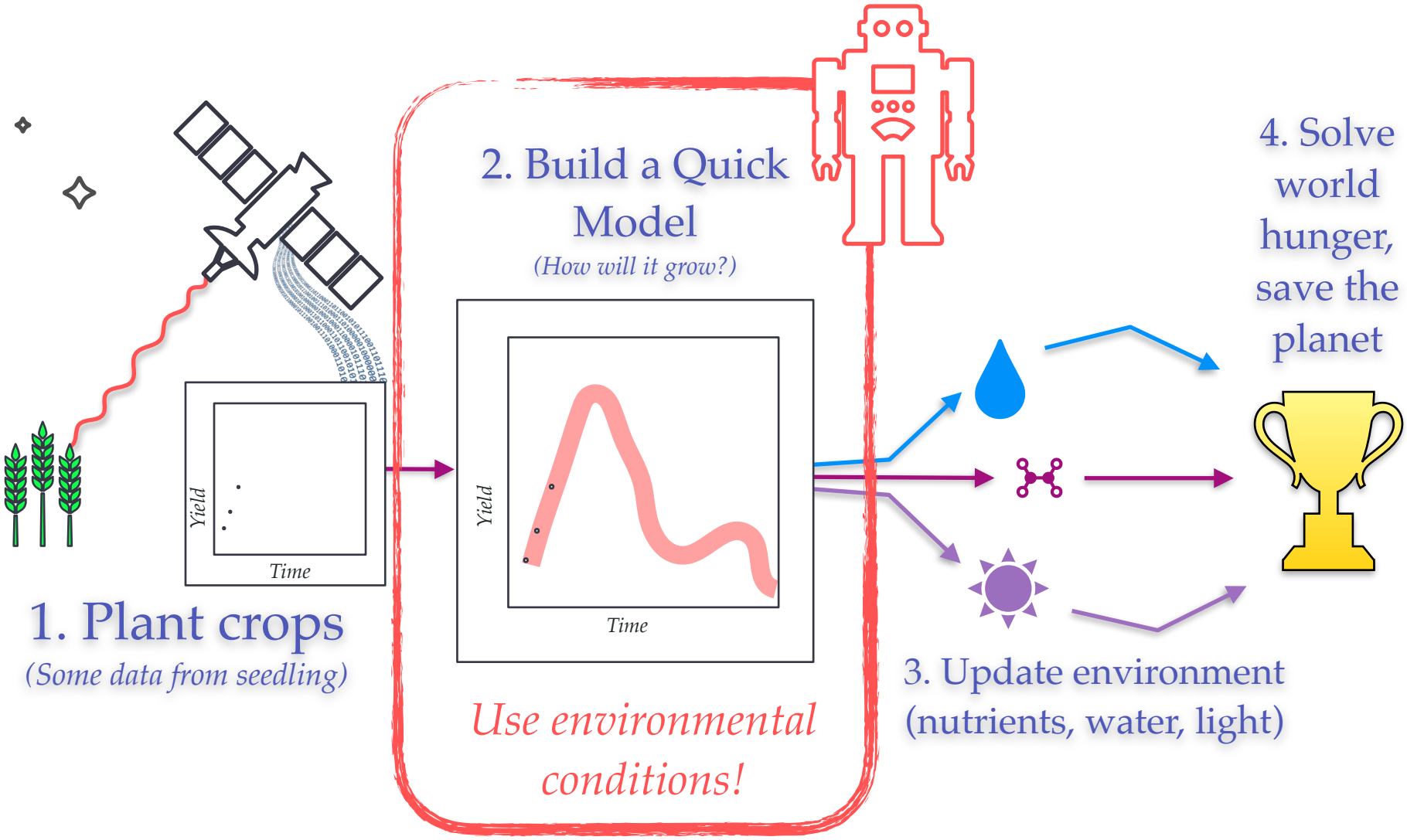


What determines how a plant will grow?

- Genotype
- *Environment: Soil, water, sunlight*

Learning From Nature *and* Nurture



europeanseed

TECH POLICY BUSINESS NEWS INSIDERS MAGAZINE VIDEO PODCASTS

Crops › Agriculture of the Future: Neural Networks Have Learned To Predict Plant Growth

Crops Technology Research

Agriculture of the Future: Neural Networks Have Learned To Predict Plant Growth

By European Seed - November 19, 2019

Sustainable AI sensor set to help growers get early warnings

Why Machine Learning Is Agriculture's New Best Friend

A Star Is Born

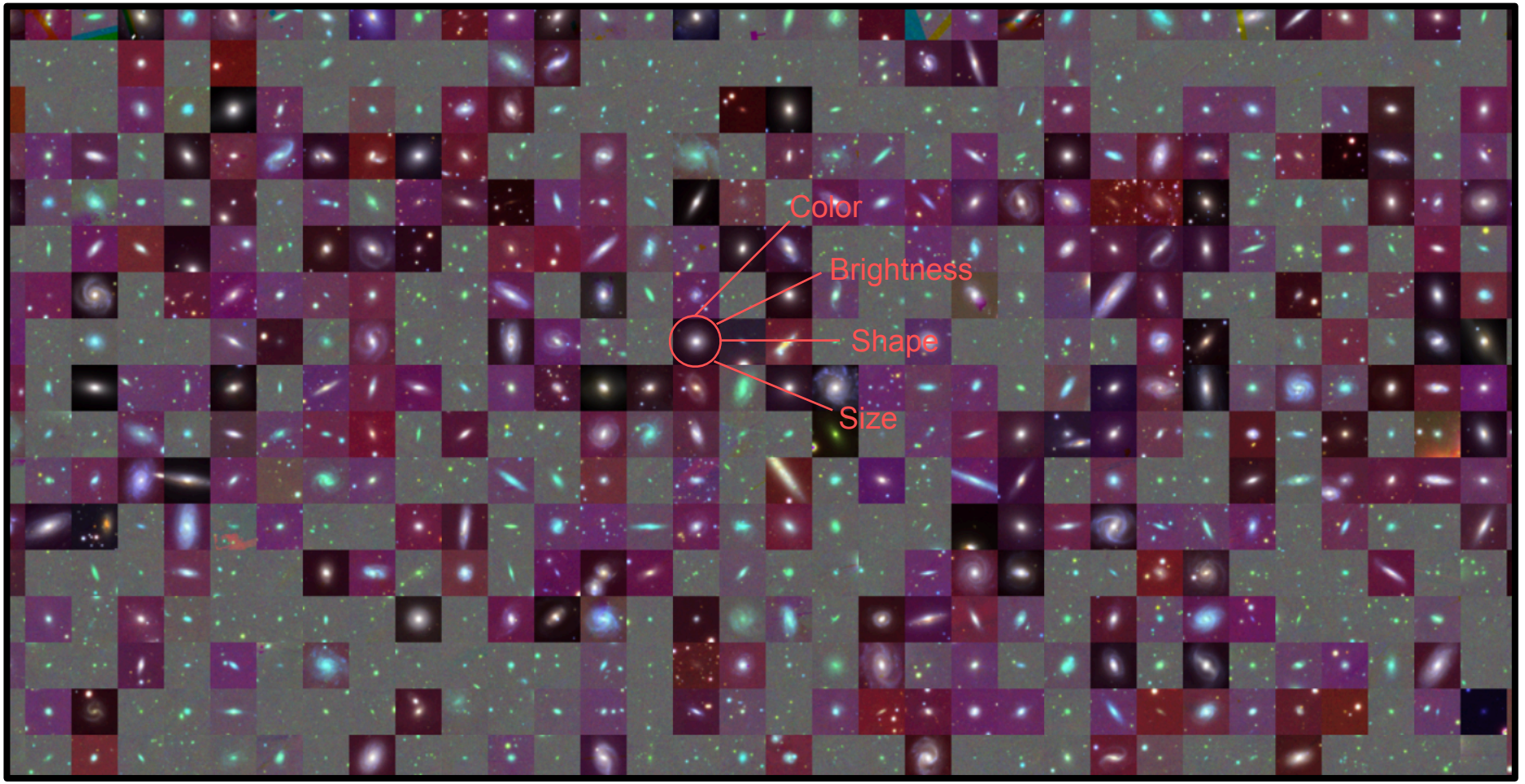
What Conditions Explain How A Star Explodes?

What kind of galaxy is it in?

Where in the galaxy is it?

How old are the stars around it?

Predicting Supernova Class With Galaxy Properties

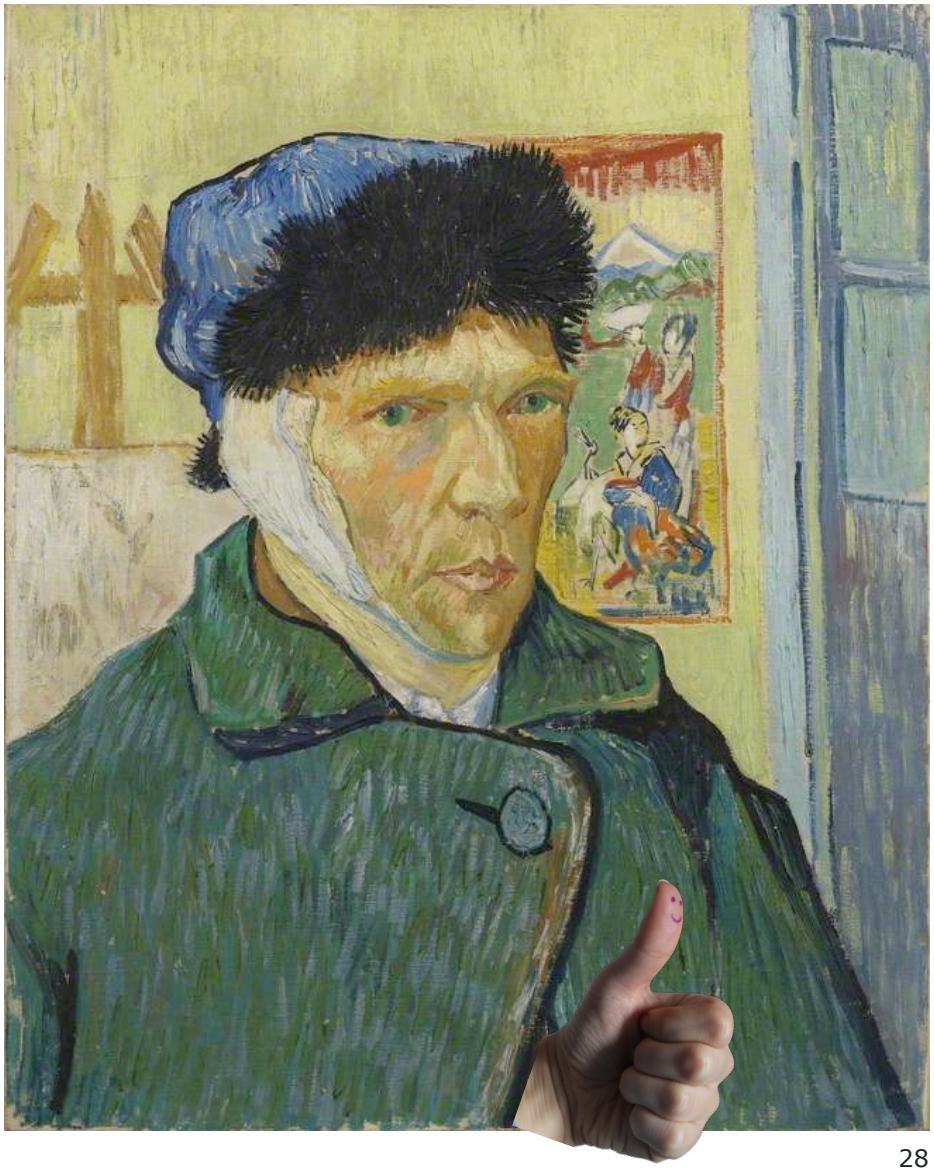


We predict supernova class (I or II) with ~70% accuracy

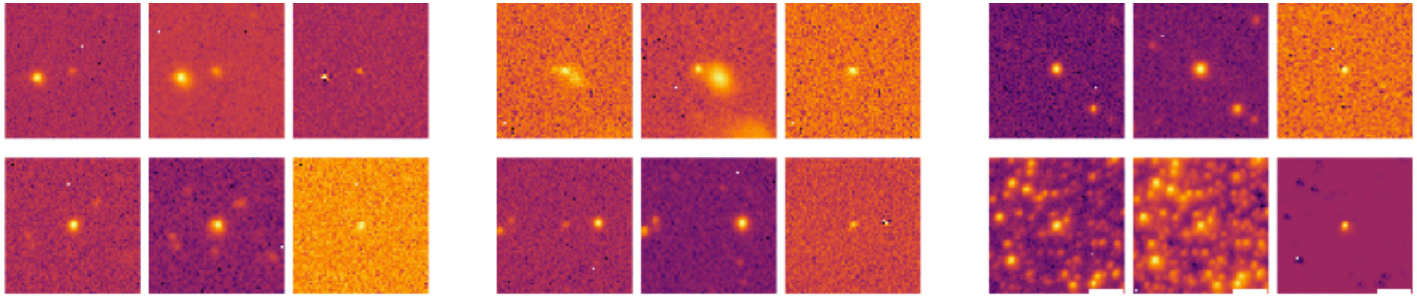
without looking at the explosion at all.

How Is a Star Like a Sunflower?

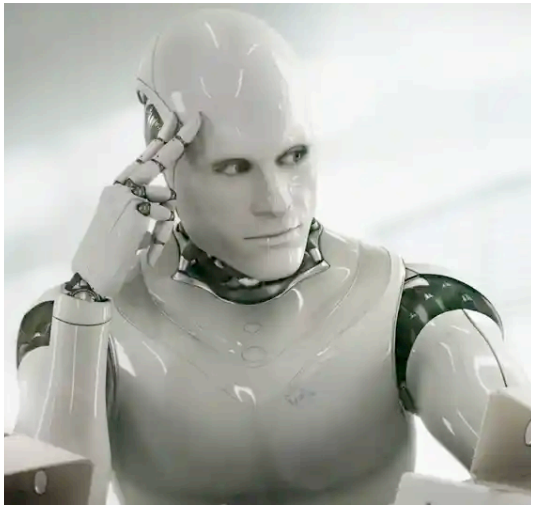
How Is a Star Like a Sunflower?

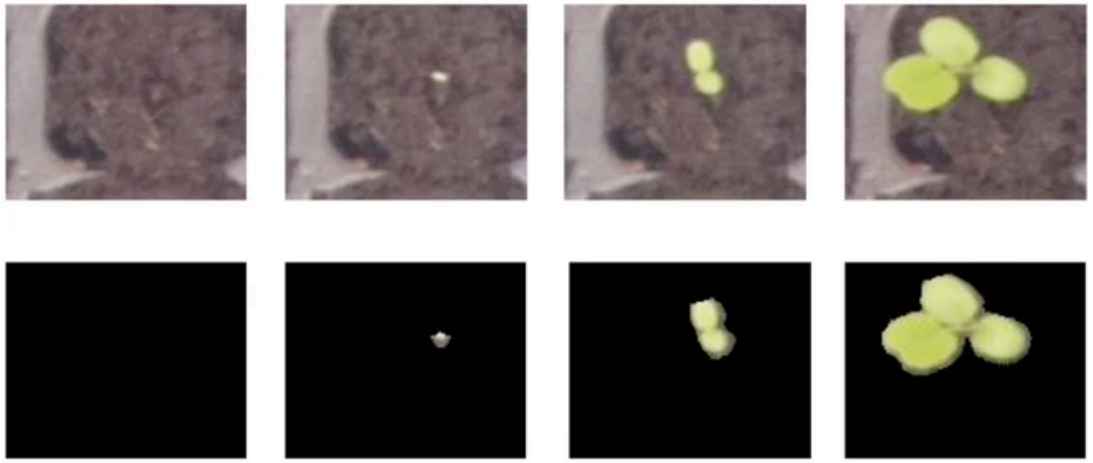


Computer Vision: From Measurements to Images



Carrasco-Davis et al. 2021





Samiei et al. 2020

Images contain both the event (the plant) *and* the environment (the soil)!

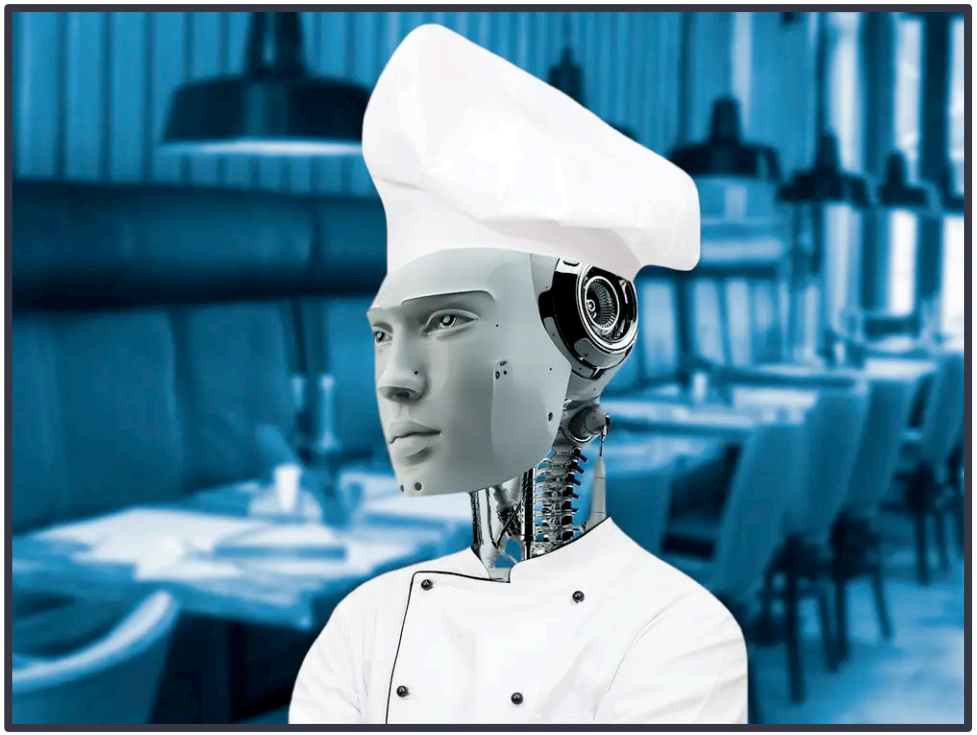
ANNALS OF TECHNOLOGY

THE PASTRY A.I. THAT LEARNED TO FIGHT CANCER

In Japan, a system designed to distinguish croissants from bear claws has turned out to be capable of a whole lot more.

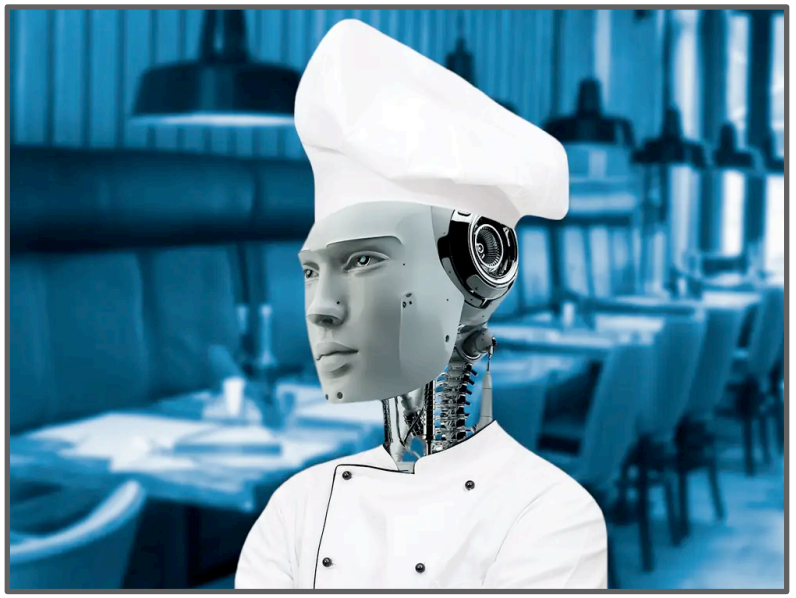
By James Somers

March 18, 2021

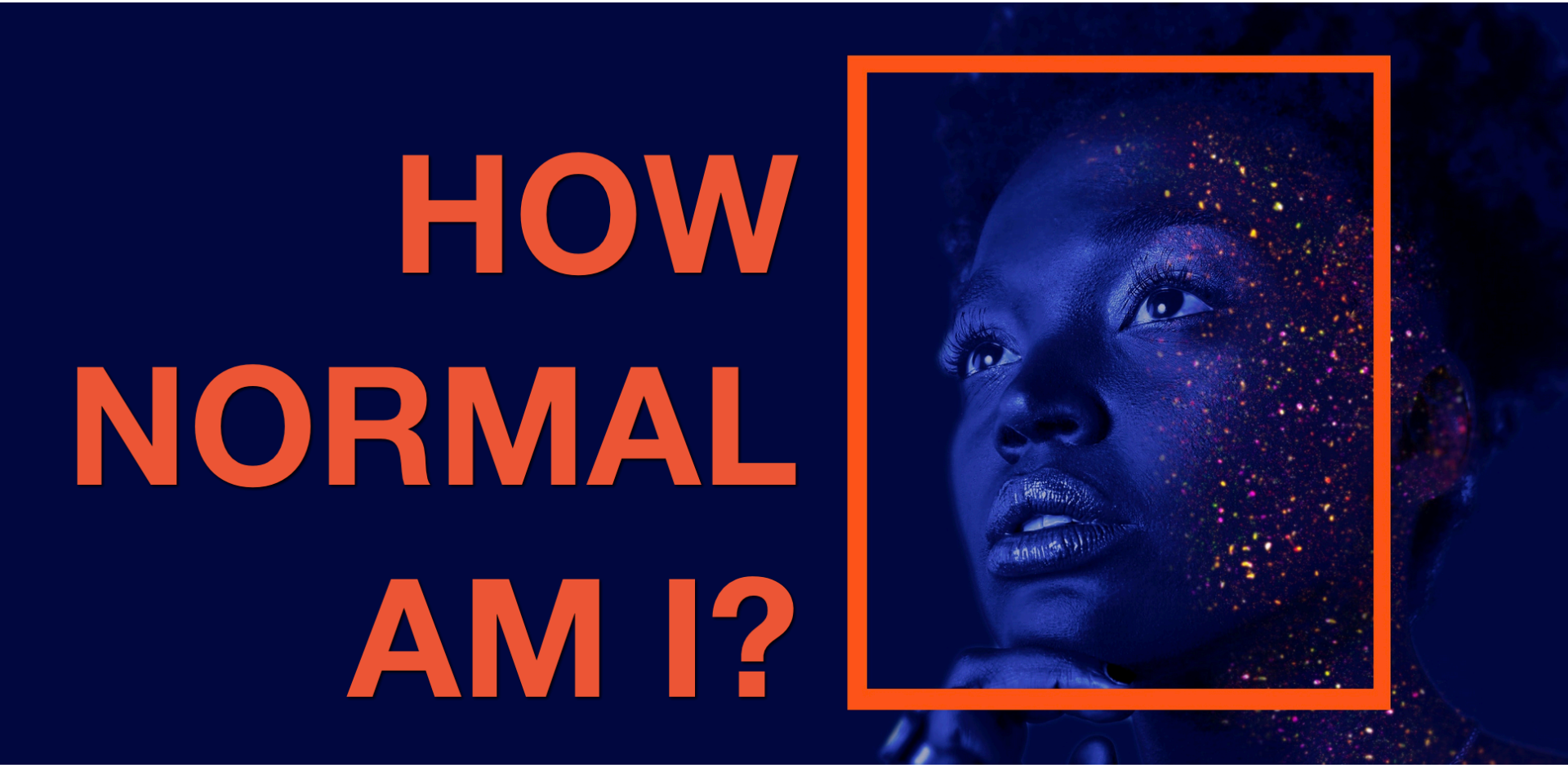


How GOAT Taught a Machine to Love Sneakers

Can One Robot Have it All?



A Caveat

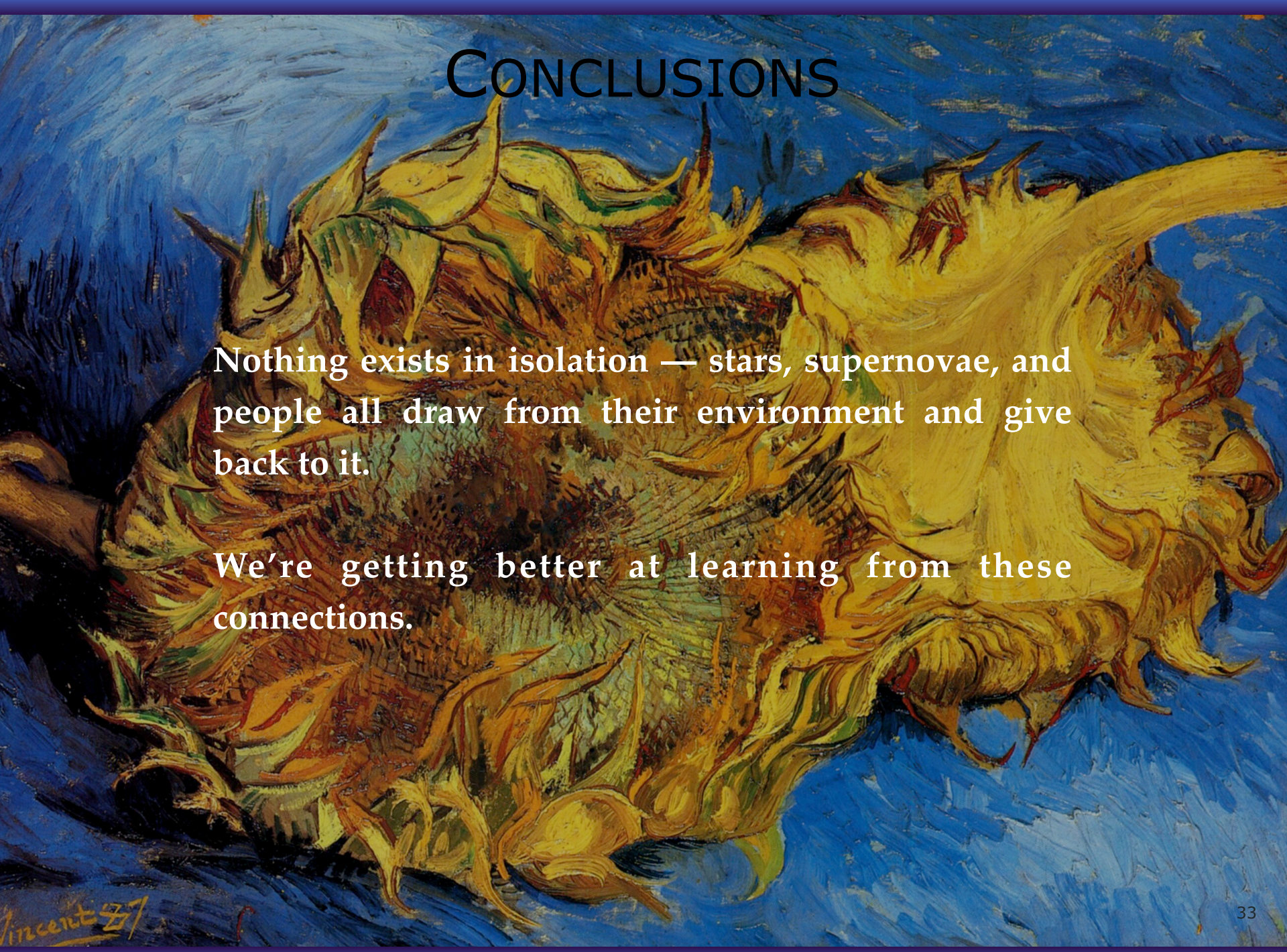


https://www.hownormalami.eu/

Artificial intelligence only sees what we choose to show it.

Who makes that decision?

Conclusions



Nothing exists in isolation — stars, supernovae, and people all draw from their environment and give back to it.

We're getting better at learning from these connections.