



Gamma-Ray Bursts/Supernovae/Magnetars  
*THINKSHOP*

Concluding  
Remarks

**BORMIO, January 20-24 2014**

TOPICS:

GRB-SN connection  
GRB central engine and magnetar formation  
Magnetar observations and theory  
Transient Universe  
Massive star progenitors

*Sergio Campana*  
*Norbert Langer*  
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*Nanda Rea*  
*Alicia M. Soderberg*

**Many thanks to:**

# Many thanks to:



**Andrea**  
**Federica**  
**Giancarlo**  
**Maria Grazia**  
**Paolo**  
**Sergio**



**Alicia**  
**Andrew**  
**Nanda**  
**Norbert**  
**Sergio**

# Many thanks to:



Andrea

**Federica**

Giancarlo

Maria Grazia

Paolo

Sergio



Alicia

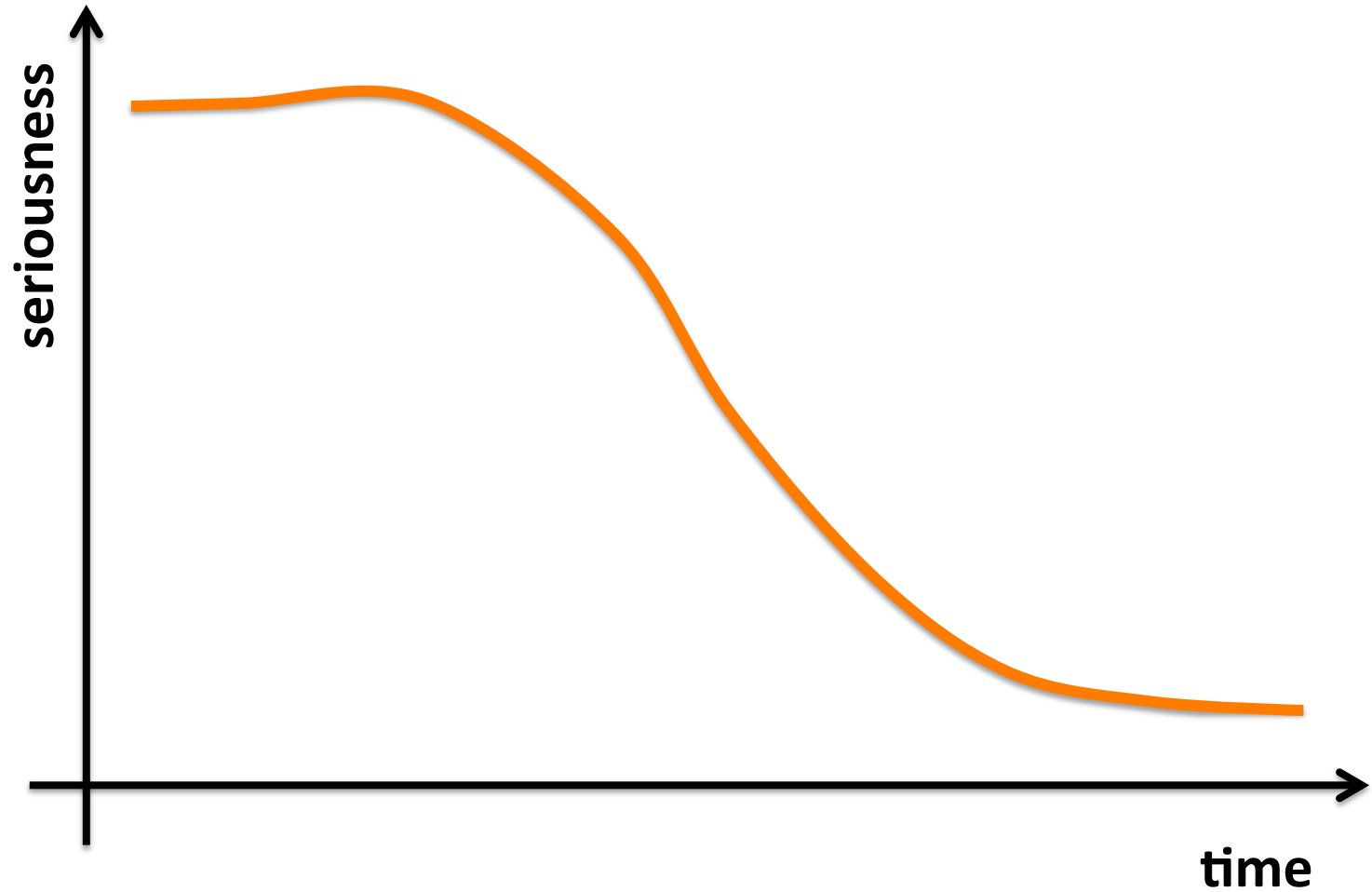
Andrew

Nanda

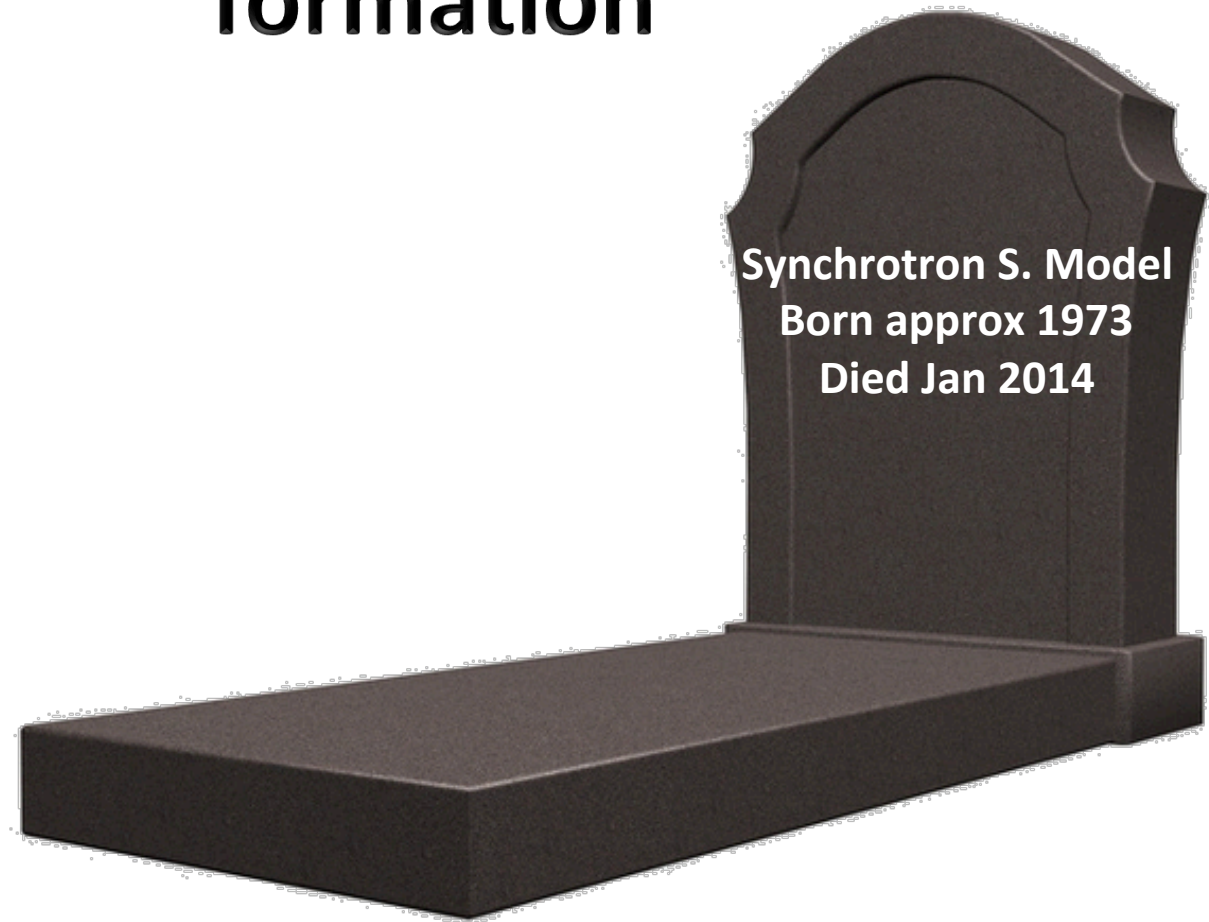
Norbert

Sergio

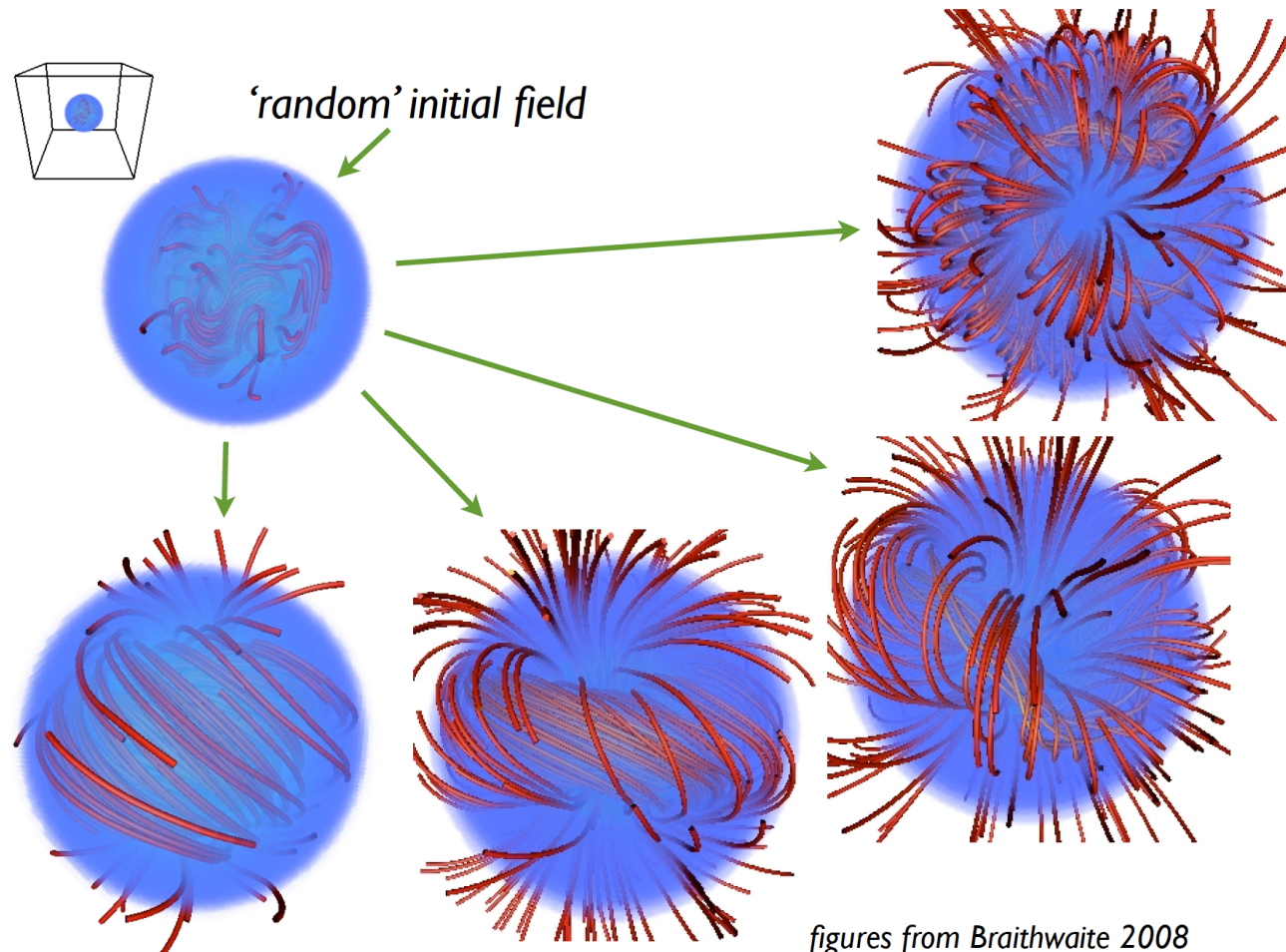
# Outline of the remarks



# Day 1: GRB's central engine and magnetar formation



# Day 2: Magnetar observations vs. theory



figures from Braithwaite 2008

# MAGNETARS



Magnetars perform post-punk sprinkled SpacePop with psychedelic, shoegazing aspirations heaped upon bursts of raw power, jettisoning song capsules that are equally suited for jaunts via mass transit or voyages to the deepest recesses of space...

REDSHIFT

<http://www.magnetars.net>



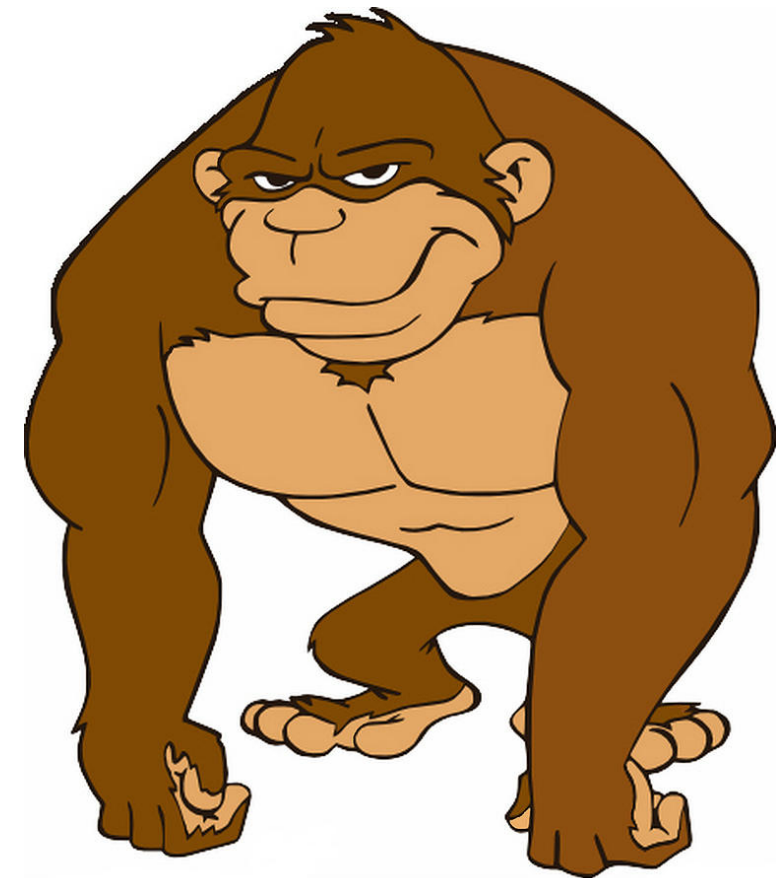
# Day 3: GRB-SN connection

**WANTED  
DEAD OR ALIVE**

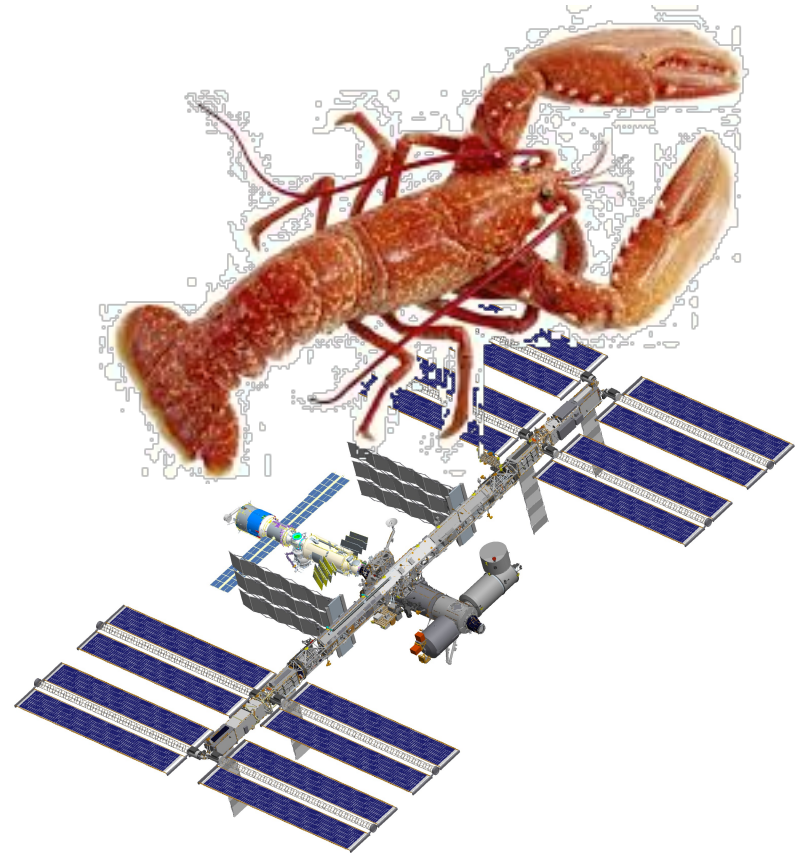


**REWARD  
1,000,000 \$**

**Day 4:**  
**Massive stars as SN/GRB/magnetars**  
**progenitors**



# Day 5: Transient Universe: Magnetar bursts/ short GRBs/SN breakout



# Special mention 1: the scientific method

## The Scientific Method

- The *Scientific Method* refers to the general procedures scientists use to construct their ideas about how nature (everything) works. The hope is to come up with a:
- **Scientific Theory/Model/Law**
  - Concerns observable and measurable things.

- Must be testable.
  - Must be disprovable.
- **Predictive!**

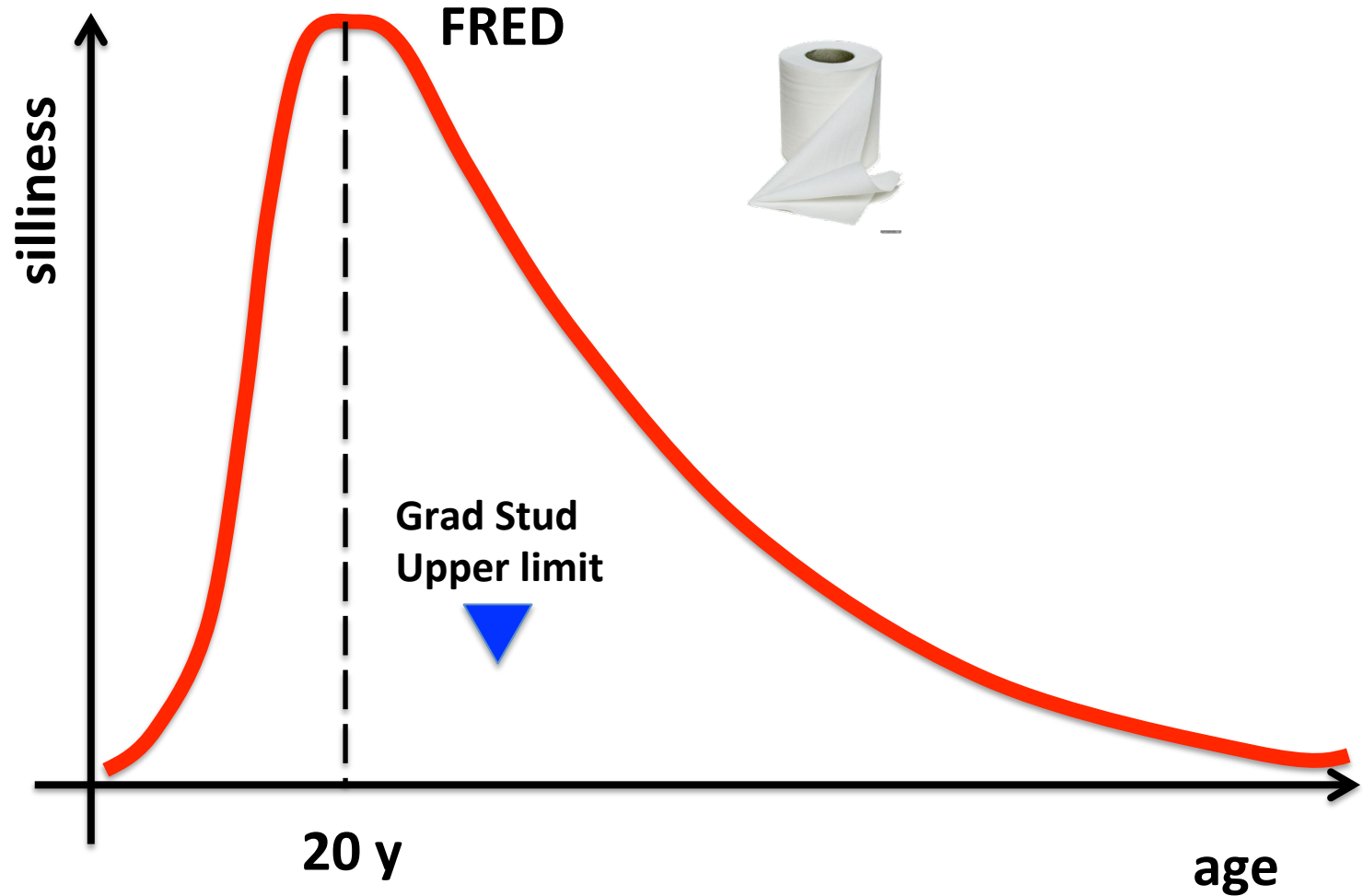
# Special mention 2: zoo vs. bestiary



“While the zoo is made of **real** animals, bestiaries also contain **fantastic** and **imaginary** creatures” (Turolla 2014)

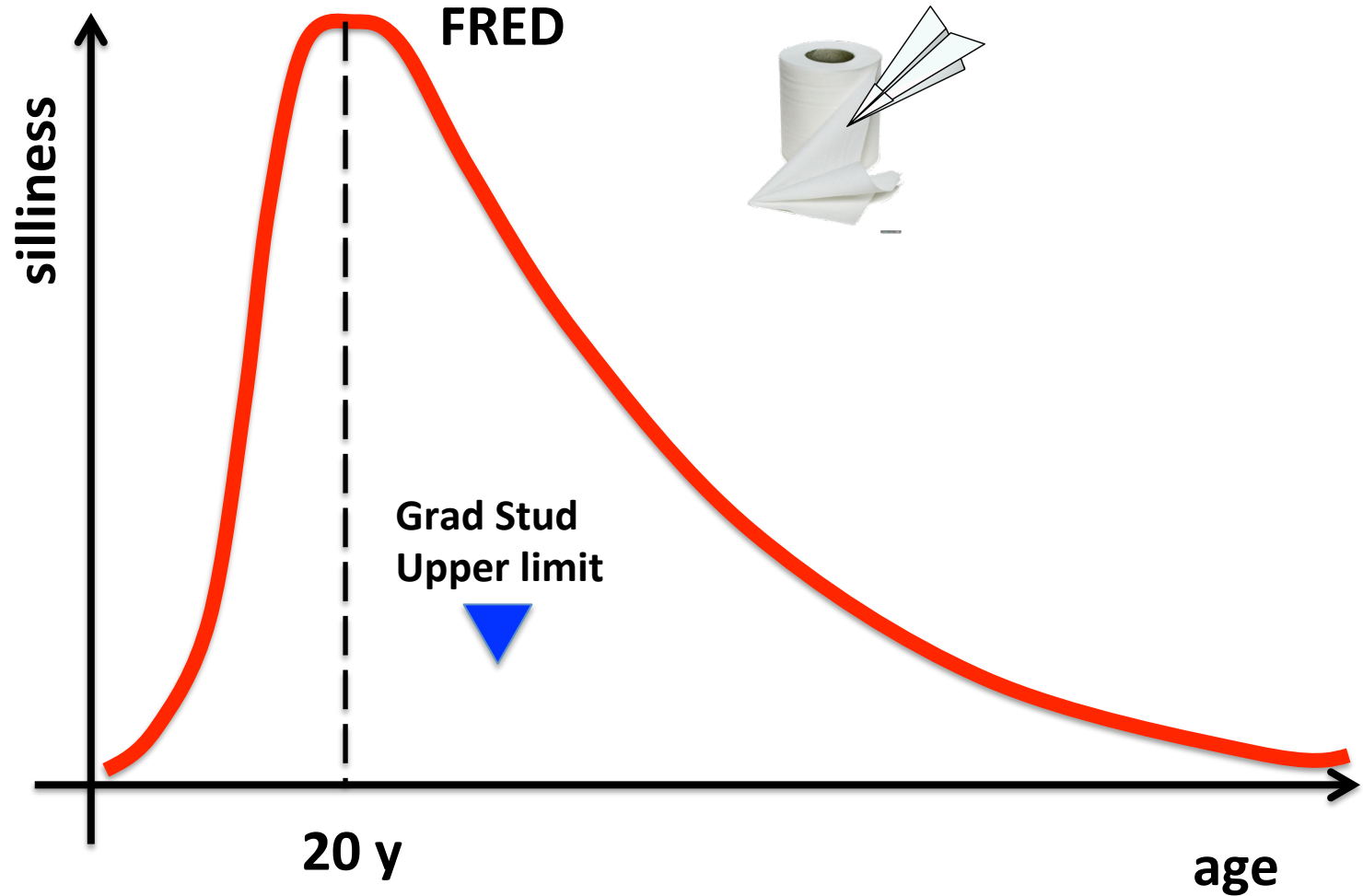


# The "Bormio" law





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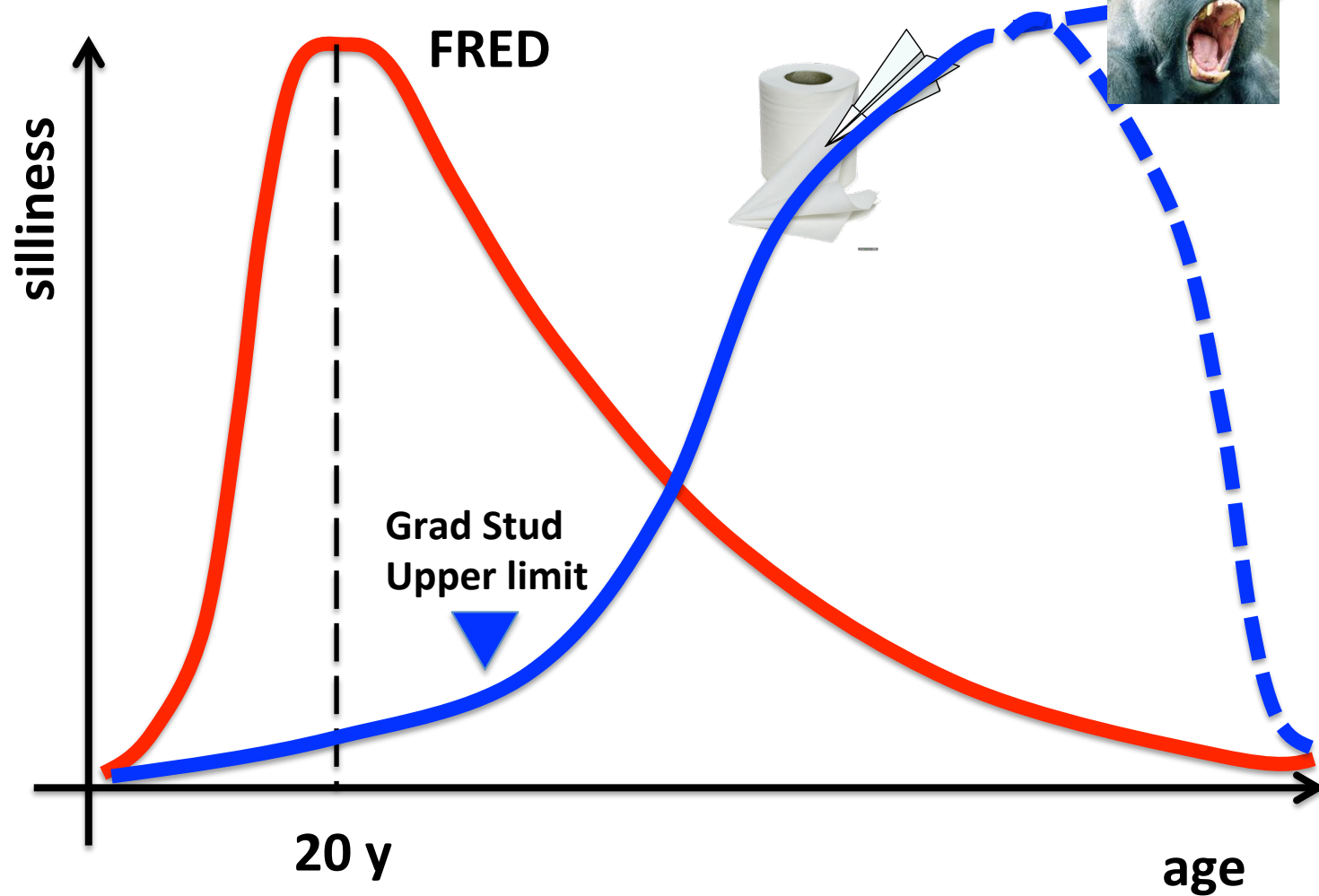








# The "Bormio" law



# **Collapsar Entertainment**

**Presents**