

What People Should Learn About Cosmology and Why

Kim Coble

University of Chicago
Adler Planetarium

In Collaboration With:

Todd Duncan, Portland State University and the Science Integration Institute

Useful Discussions:

Cosmo-02 Cosmology Education Forum Participants

Aparna Venkatesan, University of Colorado, Boulder

Craig Tyler, Fort Lewis College

Jean Quashnock, Carthage College

• Many others

Check Out the Book!

“The Big Bang Happened Here: An Introduction to Modern Cosmology”

by K. Coble and T. L. Duncan

Illustrations by Jose Francisco Salgado

And the Websites:

Course materials available on my website

Book will be adapted for the Adler Planetarium education site

“Why” Motivates What and How We Teach

- Clearly articulate why you think your audience should learn cosmology because your answer determines the selection and organization of topics you teach.
- True for any educational context: college liberal arts course, museum exhibit, popular book, public lecture, or even a press release or informal conversation.
- Litmus tests for teaching:
 - "What good will it do someone to know this?"
 - "Will the information sink in if we use this method?"
 - "What would success in cosmology education look like?"

Why Should People Learn Cosmology?

- Variety of reasons often cited: technological spin-offs, entertainment, technical literacy
- Worldviews: cosmology gives us the big picture of where we came from, the context and stage in which our lives play out.
- We make choices and take action based on how we see the world, consciously or not.
- Science provides a good way to discover the nature of our Universe.

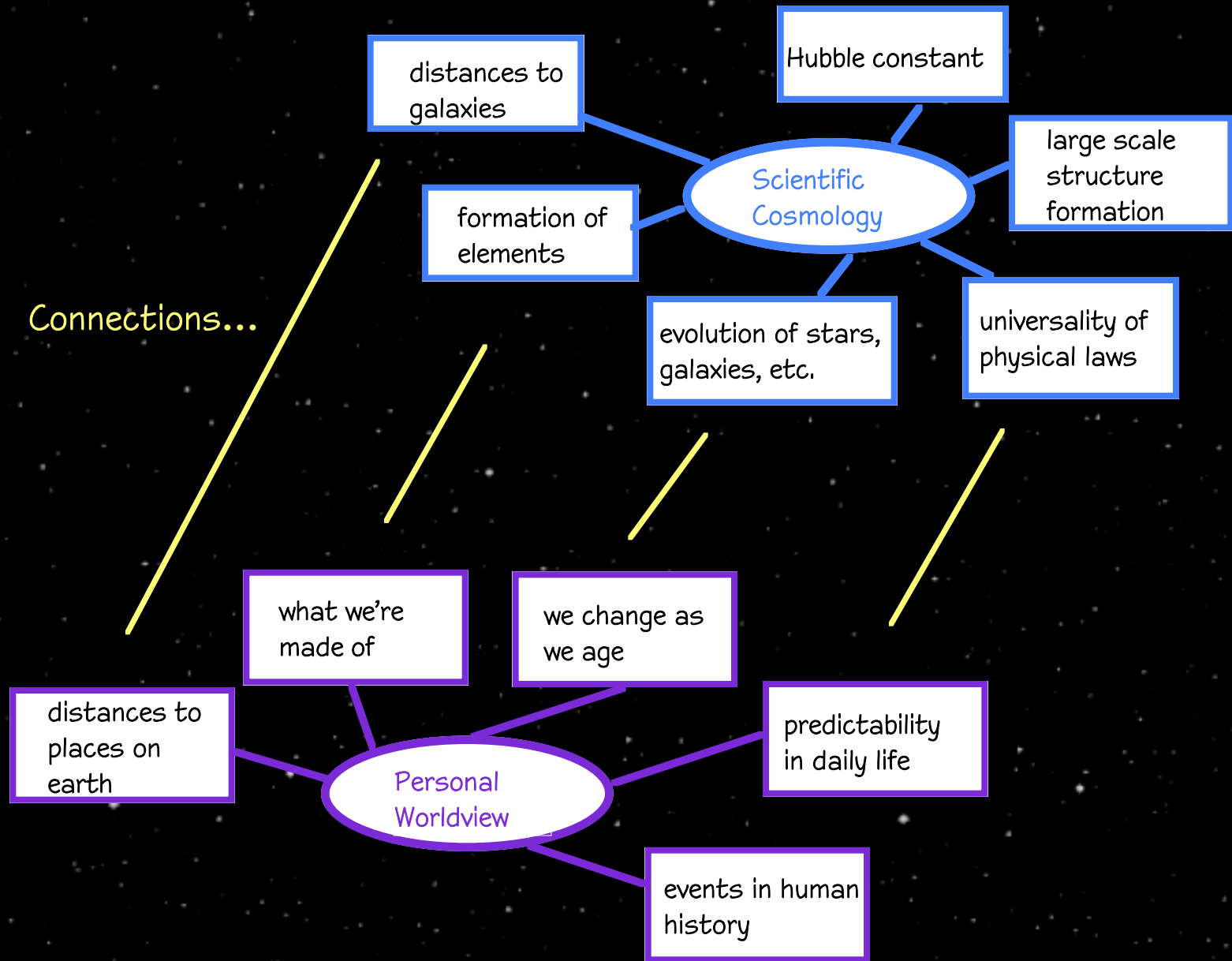
Students' Worldviews

- Students come to the classroom with worldviews already established.
- Information from cosmology can significantly influence the personal worldviews of students.
- Must be presented in such a way that the scientific concepts and facts make real contact with elements of a student's worldview.

How To Teach Cosmology From This Perspective

- Help students examine their own personal worldviews.
- Presentation guided by objective of establishing *connections* between elements of students' worldviews and the web of concepts from scientific cosmology.
- As opposed to presenting the information strictly within the organizational framework of cosmology as a scientific discipline.

Connections...



Key Concepts: What to Teach from This Perspective

From the worldview perspective, the most important concepts from cosmology that people should know are:

- The Universe is vast in space and time
- The Universe is evolving
- The empirical process of science

Organization of Topics

1. Why study cosmology?
2. Process of science and science integration
3. Questions: what would we like to know?
4. Observing our Universe to answer questions
5. Important tools for understanding the observations
(physical principles, computer models, analysis)
6. Weaving the observations together (theory: big bang model, structure formation, etc.)
7. Tying it all together: what does it mean to me?

Sample Exercises and Activities

- Describe Your Universe
- Observing the Night Sky
- Interpreting New Information
- How Has Your View Changed?
- Timeline Project
- Artistic Project
- Standard Exercises Framed in New Context:
parallax, etc.
- Discussion questions

Summary

- Clearly articulate why you think your audience should learn cosmology because your answer determines the selection and organization of topics you teach.
- Information from cosmology can significantly influence students' worldviews, if presented in such a way that the scientific concepts and facts make real contact with elements of a student's worldview.
- Use exercises and activities to help students connect with concepts in cosmology in a personal, non-abstract manner.
- Check out the book!

<http://astro.uchicago.edu/~coble>