

Lecture 4.1 – Communicating Science Effectively

Learning Objectives:

3.6.5 – Understand the importance of accessibility to communicating ideas.

3.6.6 – Understand the principle of the Curse of Knowledge and how it impedes communicating ideas.

3.7.1 – Discuss the reasons for communicating scientific results to a variety of audiences.

How to Communicate Data Effectively

What aspects of effective
communication did the readings
suggest?

- Know your goal
- Know your audience
- Tell a story!

Know your goal

What's the point?

entertain people

convince people

look really smart

teach something

get money

change minds

... in a scientific talk?

transfer of knowledge

What's the secret to effectively
communicating your data?

Learn how to transfer
knowledge successfully!

Knowledge transfer is hard.

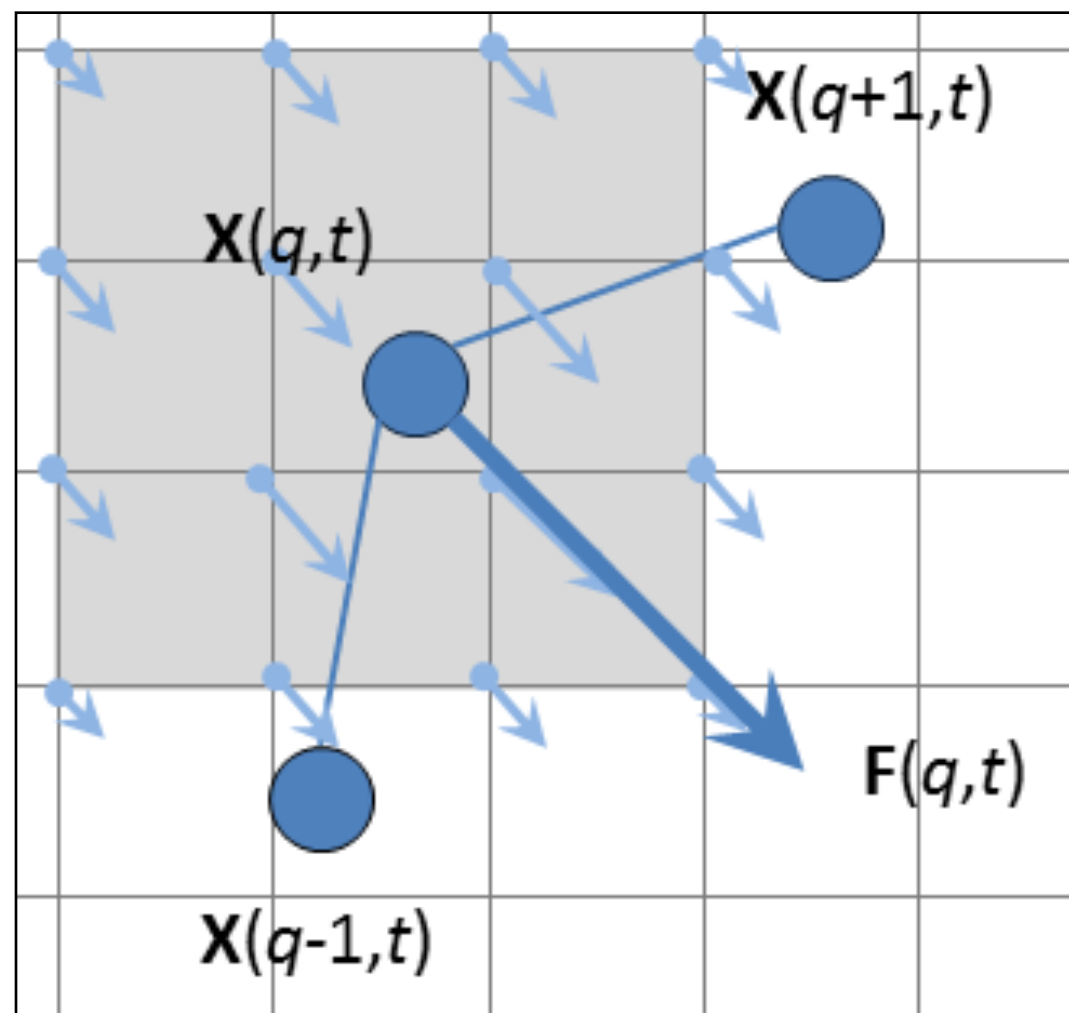
How do you transfer knowledge adequately?

(Bad example.)

Modeling fluid flow with IBM

$$\rho(\mathbf{u}_t(\mathbf{x}, t) + \mathbf{u}(\mathbf{x}, t) \cdot \nabla \mathbf{u}(\mathbf{x}, t)) = -\nabla p(\mathbf{x}, t) + \mu \nabla^2 \mathbf{u}(\mathbf{x}, t) + \mathbf{F}(\mathbf{x}, t)$$

$$\nabla \cdot \mathbf{u}(\mathbf{x}, t) = 0$$



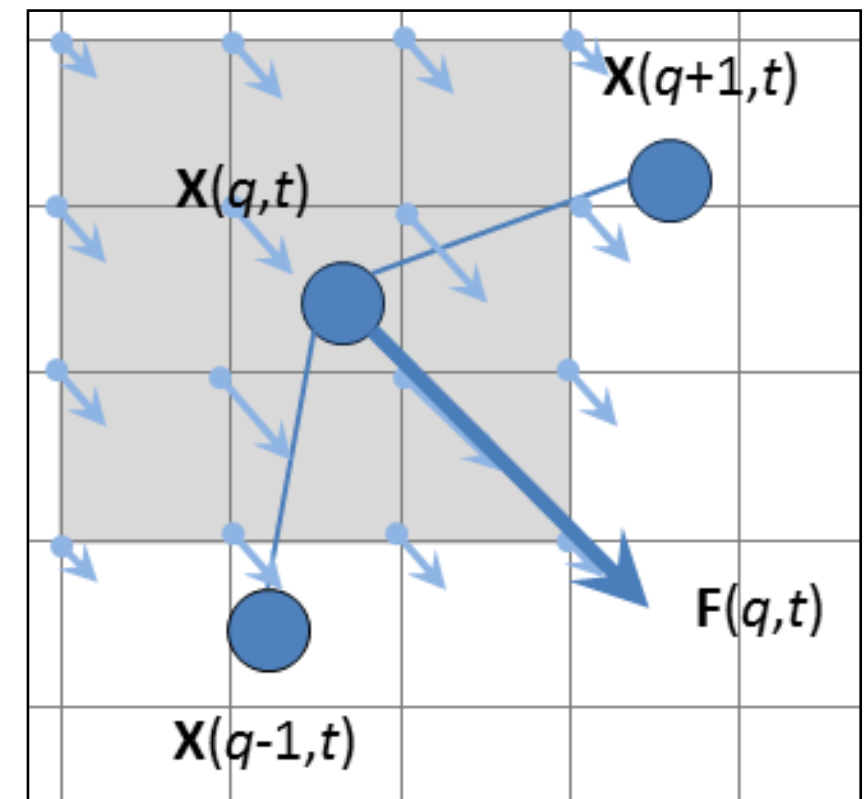
Direct solution of Navier-Stokes equations at all points on the Eulerian grid.

Force of Lagrangian boundary spread to Eulerian grid by Dirac δ -function.

Fully coupled method for simulating fluid-structure interactions.

What was wrong with
that slide?

(What isn't?)



Things you don't understand:

Eulerian grid

Navier-Stokes
equations

Useless diagram

Lagrangian
boundary

Any of the variables
in the equations

δ -function
IBM??

Knowledge Transfer: **FAIL**

How do you transfer knowledge effectively?

Avoid making assumptions!

Make sure your audience can
understand what you're saying



Psychology

The False-Belief Test in Children

~~M&M's~~
(Ribbons)



Ribbons
False belief
or “Curse of Knowledge”

The False-Belief Test in Academics

Presenter



“I use math to solve this fluids problem, therefore anyone can understand what I do.”

Audience member



(Has no experience with modeling fluids, doesn't understand presentation.)

The False-Belief Test in Academics

Presenter



:(

Audience
member



:(

Avoiding the Curse of Knowledge

Presenter



How much should I
assume my audience
knows, and how much
should I explain?

How do you transfer knowledge adequately?

Avoid the “Curse of Knowledge”



Know your audience!



What's the secret to effectively
communicating your data?

Learn how to transfer
knowledge successfully!

How can you avoid the Curse
of Knowledge?

Avoiding the Curse of Knowledge

1. Consider Your Audience

Education

- some college (different courses)
- a Ph.D. in Biology

Experience

- very different educational experiences
- lots of different life experiences
- everyone is intelligent!

Work with?

1. What does everyone have in common?
2. What minimum info do you need to know to understand the story?

Pick a concept and quickly (2-3 mins) present it to class.

Avoiding the Curse of Knowledge

2. Have someone else look at it!!!

The Curse of Knowledge is so *pervasive* that many times, **you cannot avoid it on your own.**

It is critical that you get honest feedback from someone who is naïve to your work!

Honest feedback can prevent most of these problems and make presentations much better.

How to Communicate Data Effectively

What aspects of effective communication did the readings suggest?

- Know your goal



- Know your audience



- Tell a story!

Telling a Story with Data

Humans remember stories better than data or facts.

Presenting Facts:

Radium's similar chemical properties leads to the body replacing calcium with radium after exposure.

Presenting a Story:

What can glowing watch dials in the trenches of WWI teach us about the structure and function of bone?

Telling a Story with Data

Start with a compelling question...

... and then the answer.

**Everything else should serve
either the question or the
answer.**

If it does not, cut it out.

Telling a Story with Data

Do you a learnin':

- Read as much as possible.
- Write as much as possible.
- Visualizations FIRST!
- Listen to Stand-up Comedy!

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- Know your audience
- Tell a story!



Action Items

1. **Complete Assignment 4.1.**