Today I'm talking about

DIGITAL TEXTBOOKS

Niels Joubert
FlashG Winter 2012

and

PINK

FLOYD

TODAY IN 2 PARTS

Education

Digital Textbooks

Today

Why aren’t we all using it yet?

So then what do we need?

Document Authoring and Document Layout

Something

INCREDIBLE

happened

an iPad App

WON AN OSCAR

BY THE WAY

my color scheme:

OLD SCHOOL

Education until the 1800s

INDUSTRIAL REVOLUTION

standardization!

FACTORY MODEL

Education since then: Factory Model

everyone gets to know the same material

multicast teaching

INTELLIGENCES

Linguistic

Logical-Mathematical

Spatial

Bodily-Kinesthetic

Musical

Interpersonal

Intrapersonal

ALL IN ALL YOU'RE
JUST ANOTHER
BRICK IN THE WALL

at least we get good music

THE ISSUE

not modular, interdependent

if it was modular, we could teach to people's learning strengths

New insights into material from new viewpoints

Yes, this is VERY DIFFICULT!

what about students'

MOTIVATION?

JOHN ADAMS

I must study politics and war that my sons may have liberty to study mathematics and politics... in order to give their children the right to study painting, poetry, music, architecture...

“we work to better ourselves”

It's about time we
DISRUPT
EDUCATION

we can do this with

COMPUTER SCIENCE!

DIGITAL COGNITIVE AIDS

Students

Individualized

Educators

Centralize, Customize, Democratize

Publishers

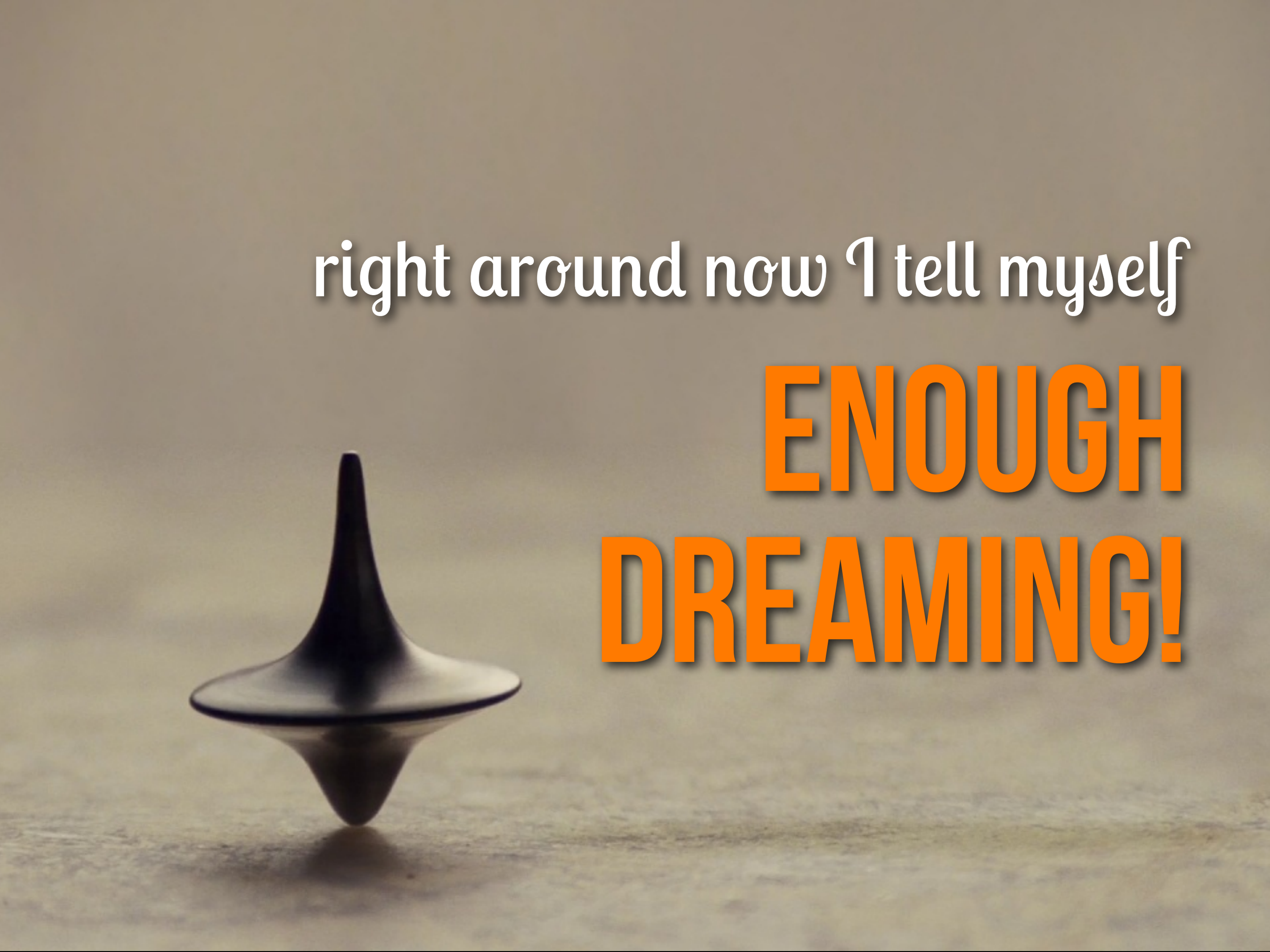
Adapt or Die

we could even realize

MASTERY

LEARNING

enable a variable rate of learning


right around now I tell myself
ENOUGH
DREAMING!

DIGITAL BOOKS TODAY

Worse

PDF Readers

Amazon Kindle, ePub

Digital Textbooks: Inkling, iTunesU

Once-offs: “Our Choice”

Wolfram CDF

Hmm...

THE IMPOSITON AND SUPERIMPOSITION OF DIGITAL READING TECHNOLOGY

“How does digital readers support or break current reading techniques?”

Kindle DX

39 participants

1 year study

Diary study, Interviews

PDF Papers, Kindle books

Thayer et al, CHI’11

THE IMPOSITON AND SUPERIMPOSITION OF DIGITAL READING TECHNOLOGY

Reading Tasks links Reading Techniques

scanning, search, skim, receptive, responsive

eReader academic challenges

creating markup

nonsequential navigating, jumping to references

locating illustrations, assessing content

creating cognitive maps

Thayer et al, CHI'11

“in our study, all students who always markup text

FAILED

to integrate the eReader into their academic practices”

COGNITIVE MAPS

Unconsciously link ideas to locations gets broken. Why?

Fragmentation of ideas

Kills skimming with small sizes and scrolling

No kinesthetic cues

Loss of spatial knowledge

Thayer et al, CHI'11

the literature agrees,
digital books and interactions

CONSIDERED HARMFUL

is there anybody

OUT THERE?

KILL MATH

Proposition 21: Vehicle License Fee for State Parks

The way it is now:

California has 278 state parks, including state beaches and historic parks. The current $400 million budget is insufficient to maintain these parks, and 150 parks will be shut down at least part-time. Most parks charge $12 per vehicle for admission.

What Prop 21 would do:

Proposes to charge car owners an extra $18 on their annual registration bill, to go into the state park fund. Cars that pay the charge would have free park admission.

Analysis:

Suppose that an extra $18 was charged to 100% of California taxpayers. Park admission would be free for those who paid the charge.

This would collect an extra $174 million ($246 million from the tax, minus $72 million lost revenue from admission) for a total state park budget of $574 million. This is not sufficient to maintain the parks, and 19 parks would be shut down at least part-time.

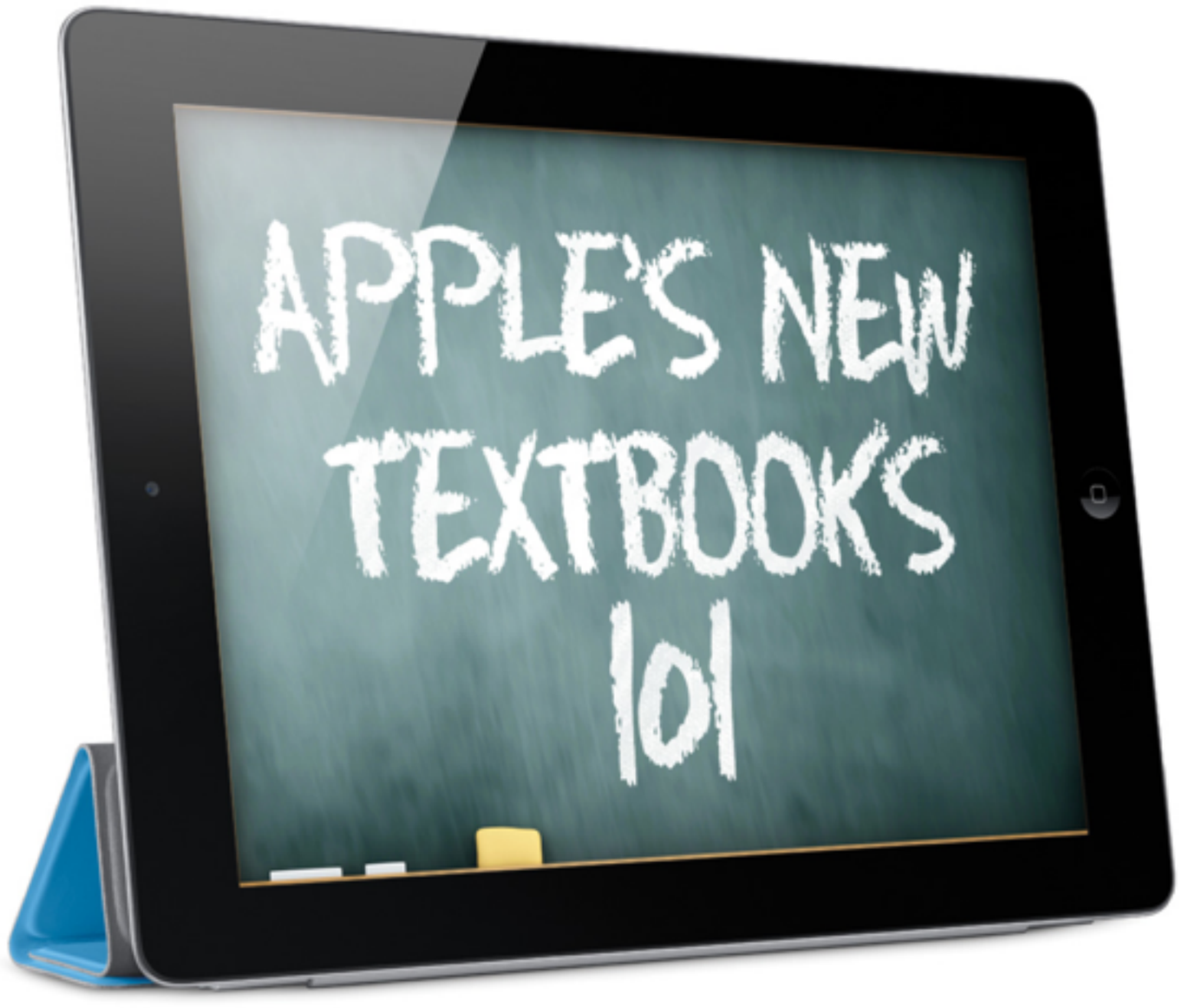
Park attendance would rise by 35%, to 101 million visits each year.

Push Pop Press'

OUR CHOICE

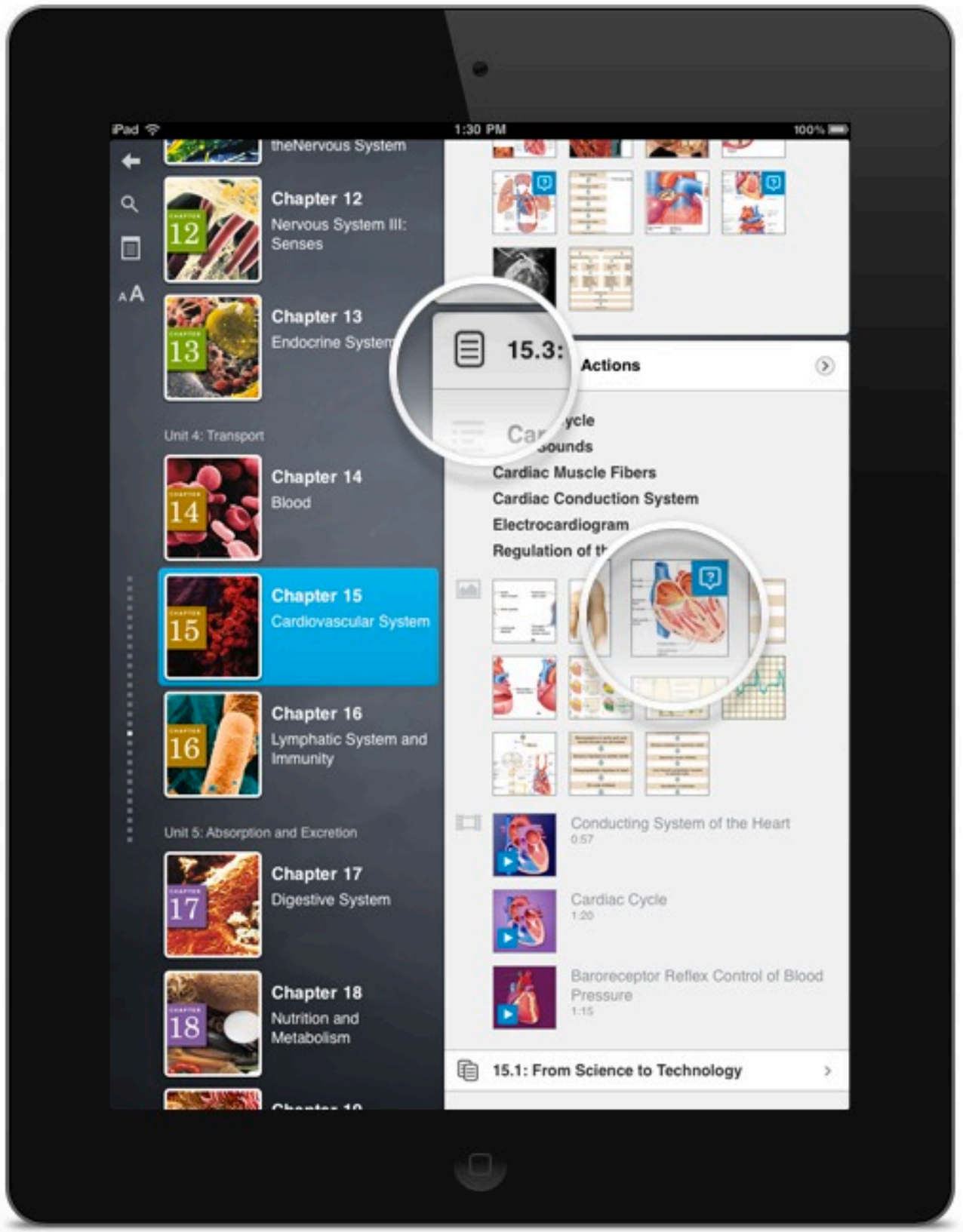
Apple's

ITUNES U



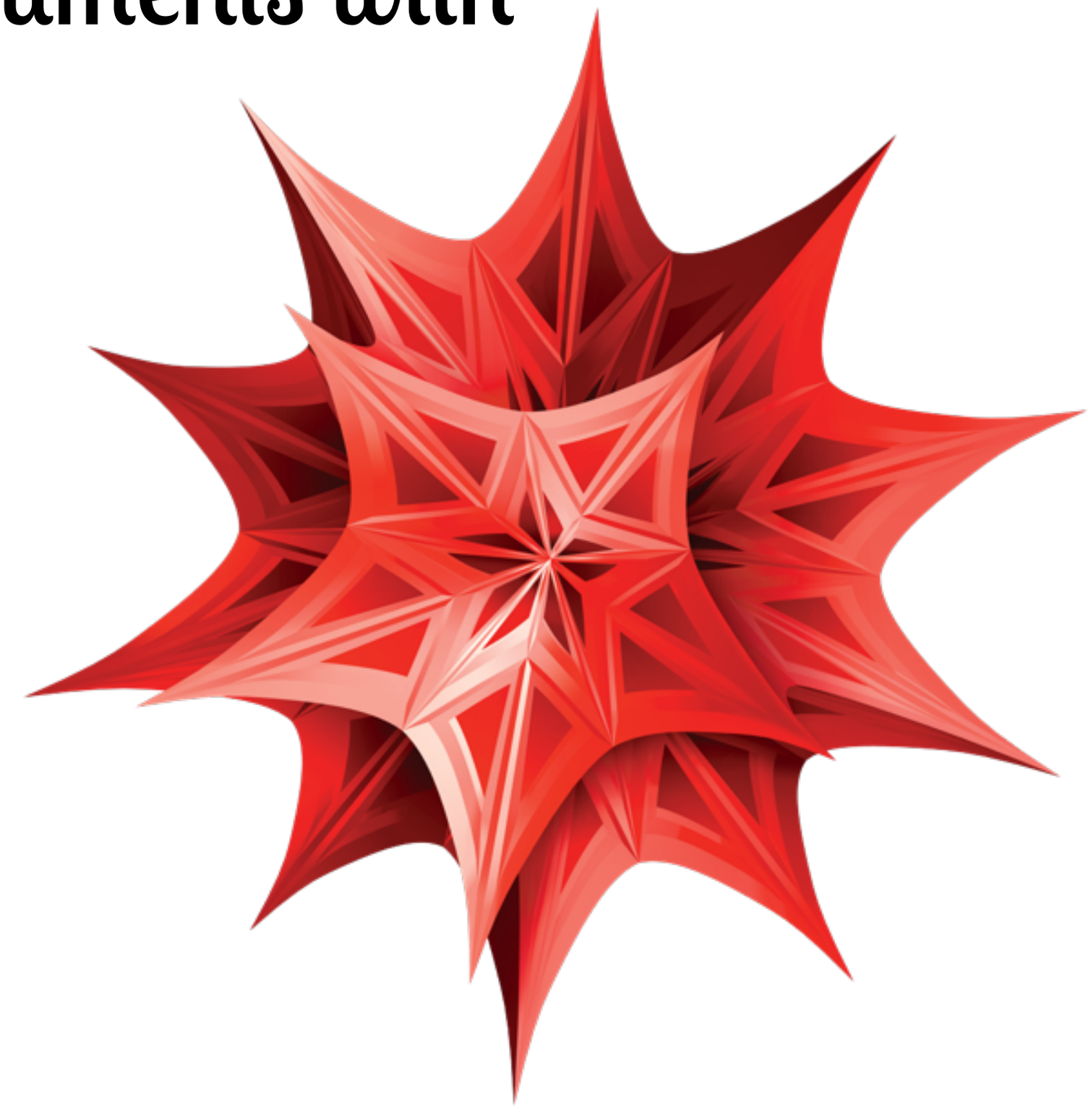
INKLING

- ✓ Video clips
- ✓ Animations
- ✓ Test-yourself
- ✗ Navigation
- ✗ Layout
- ✗ Annotation
- ? Cognitive Maps
- ? Authoring



Reactive documents with

CDF



REQUIREMENTS

(Non)sequential Navigation

Great Layout

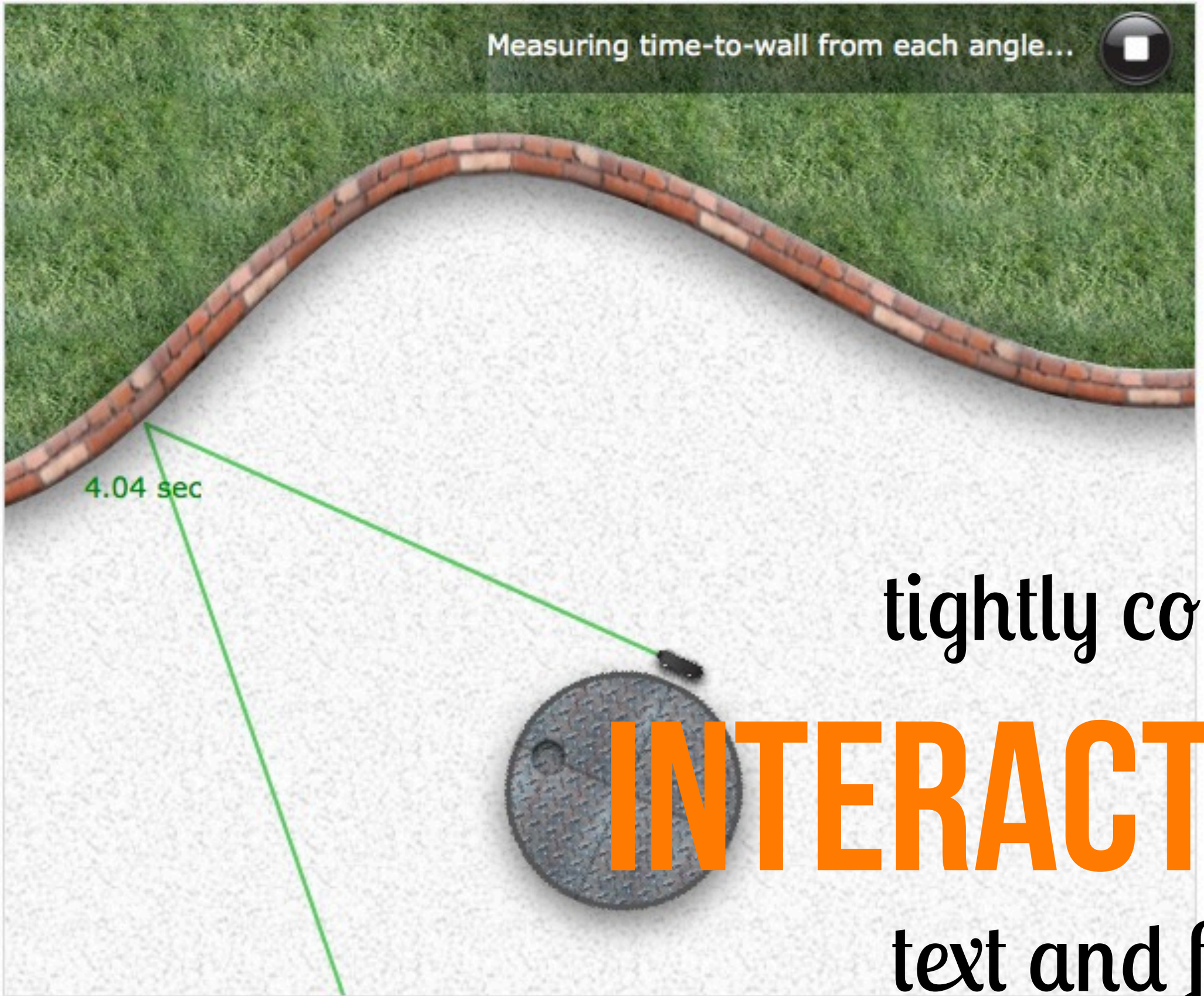
- support Cognitive Maps
- cohesive ideas

Annotation

Authoring

physical metaphors, such as

PAGES

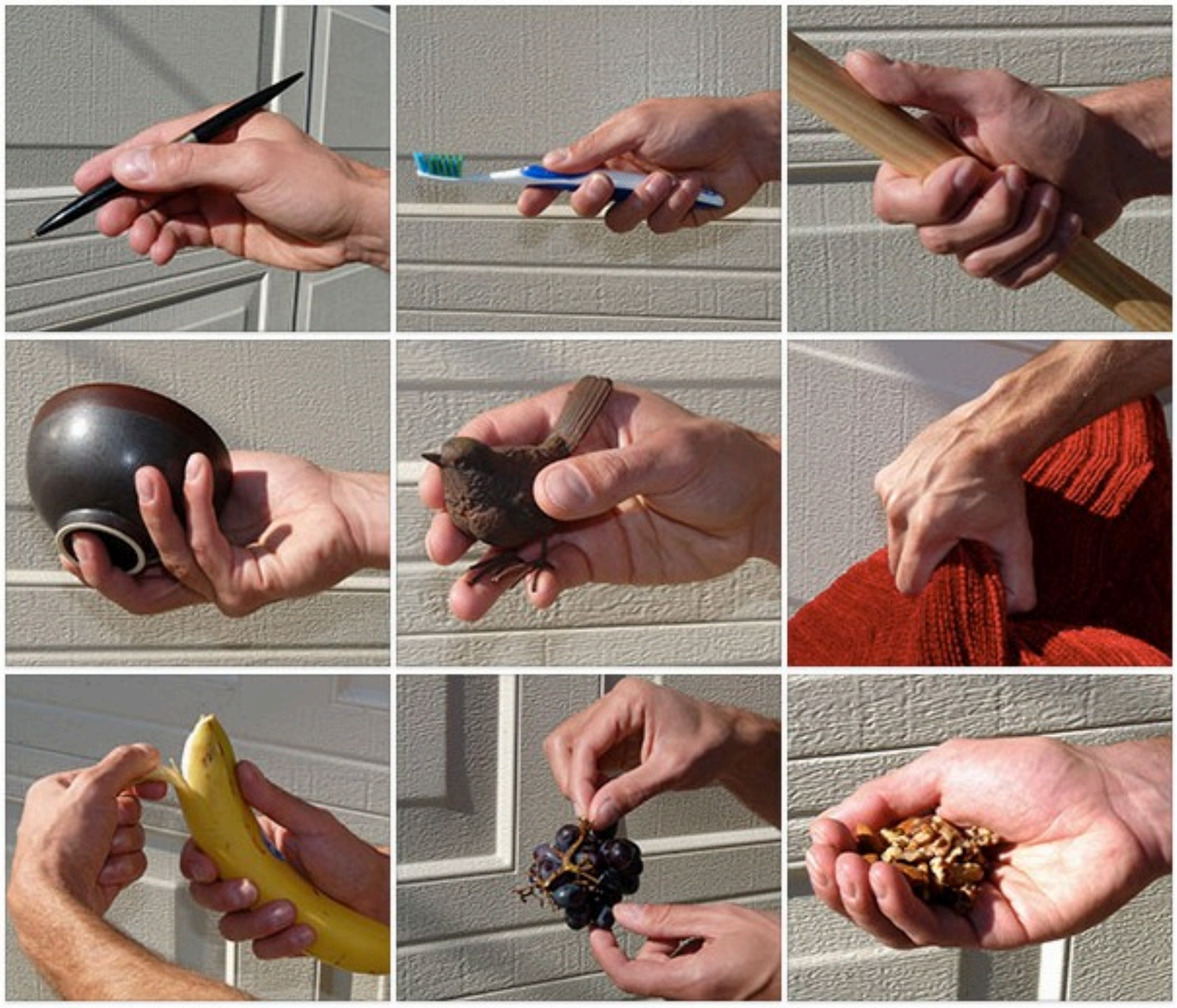


tightly coupled

INTERACTIVE

text and figures

brand new **INTERACTIONS**



seamless

ANNOTATION

support
REMIXING

WHAT TO BUILD

Language to describe document

- Possibly just a DOM later on?

Automatic Layout engine

Rendering Environment

- must support “engines”, interactivity
- must support a variety of devices
  - HTML/CSS/Javascript

AUTOMATED LAYOUT

TeX

VH-Box

Lay out a continuous flow

Knuth-Plass line-breaking algorithm

First-Fit figures after first reference

ADAPTIVE LAYOUT

Jacobs et al, SIGGRAPH 2003

- Create template based on constraints
- Have multiple templates grouped into style
- Write content as separate streams
  - Text, Figures
- Lay out content streams into template boxes
  - calculate “goodness” score
  - pick template with best score

ADAPTIVE LAYOUT

Hand-tuned

http://stephencaver.com/

of course

THERE'S MORE

Hurst et al. “Review of Automatic Document Formatting”

OUR IDEA

Associations

We require closely linked figures and text

Author knows text-figure associations

Encode associations in language

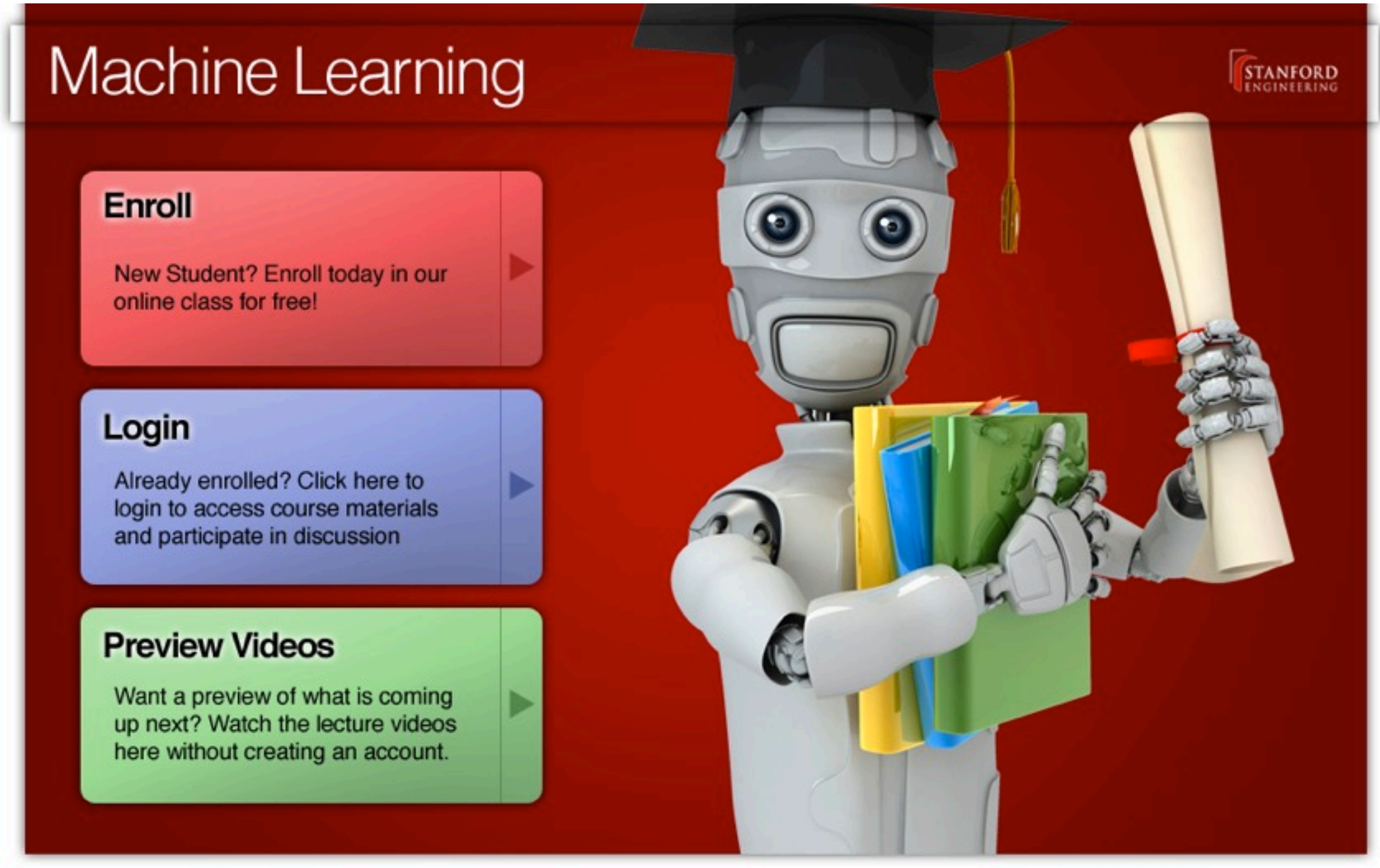
Layout should optimize both

using FGSMRJMCMC*?

*factor graphs, simulated annealing, reversible jump markov chain monte carlo

Just a small slice of the PIE

Right now, BIG opportunity!



Thank YOU

COME AWAY FROM THE WINDOW! YOU DON'T WANT TO BE A CHILD LEFT BEHIND, DO YOU?
TESTS
TESTS
TESTS
The Arts
SCIENCE
P.E.
SOUNDS GOOD TO ME!
ENCORE
HORSEY