

File #6883458 for photo

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Mark – I got interested in Neuroscience and its applications to learning when I read Norman Doidge’s book “The Brain that Changes itself”. I was reading the book on our family vacation last year and as I read my wife kept on saying that this looked alot like reading for work. I kept on saying that it was just pleasure – one year later and she was proven right.

Linda – *What is your story? Why did you jump into this presentation*

Mark – so here I presenting with Linda who I met for the first time on Monday.

## Survey

- Background
- Motivation

Time Limit: 1 min per person

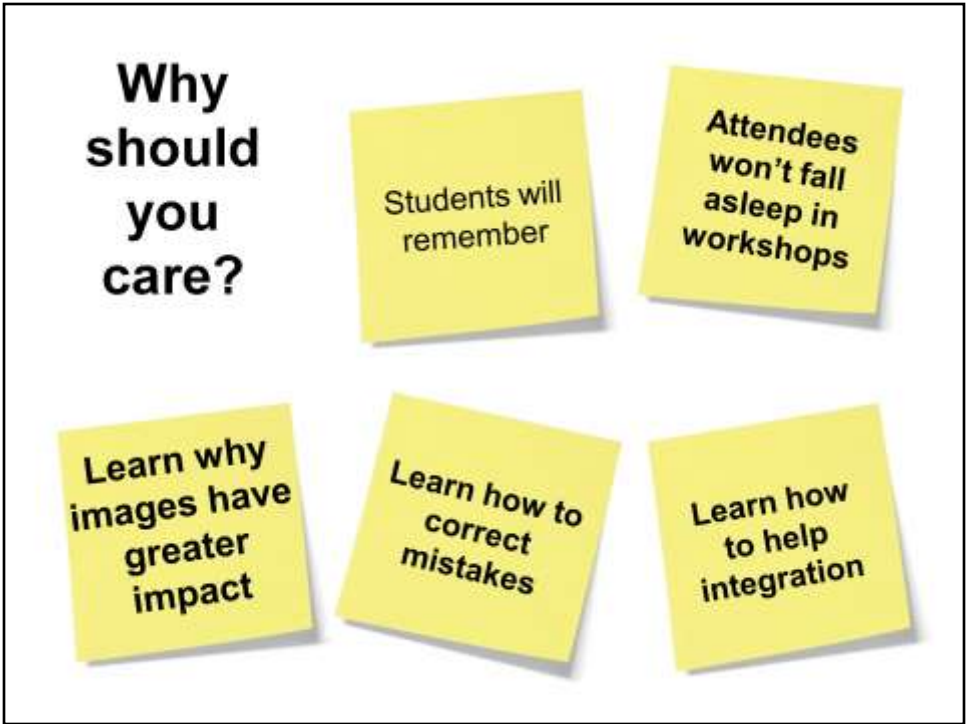
Use tick marks on flip to note passage of time (one per 15 secs) aka Lightning talks

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Mark - We're going to do a quick general sampling survey. The expectation is that after 5-6 people we will have found a representative sample of our audience. We will record key points on a flip chart. Our focus is to find a little a bit about who you are and why you're interested in this talk – to make sure our talk will meet your needs.

After each volunteer – we ask for another who is different from the ones so far

Linda: Tick Marks



## Outline

- Neuroscience Background – 15 min
- 3 Topic Areas (of a possible 5) 15 min each
  - Topic Area Presented
  - Discussion After Each Topic
- Your Plays
- Wrapup

Mark – just a quick run through



<http://www.sxc.hu/photo/990137> - image

We talk about the play we ask them to create. Explain to them that it relates to: "Test Learning by asking the learner to provide analogies p204"

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Mark - One of the ways that we can integrate what we've learned and make it our is to restate in our own words. To that end we're inviting you to create a short play at the end of the session – at most two minutes. The play might illustrate one aspect that stands out for you or several aspects. At the end of every section we present you will have five minutes to discuss what you've learned and prepare your play. Even if you're uncomfortable with performing you will still gain some of the benefit by participating in the discussion.

Linda: Give them example – a concrete example of what the play would be.

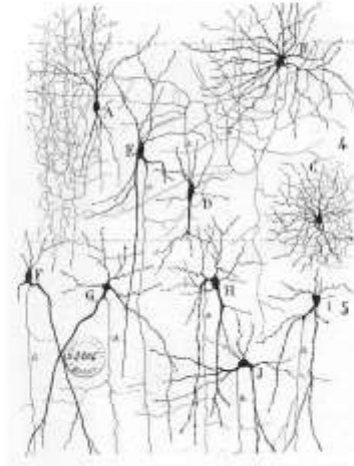


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Mark

- Lead with the Abstract
- Not Grounded in the Listeners experience
- Passive students – i.e. Those just listening and taking notes, aren't using all of the brain. They retain knowledge but don't really understand it.
- Habituation – Your audience falls of the wagon because they hear the same voice droning on and on. It can happen to the most dynamic speaker. It takes only a few minutes
- Bad Food – fructose as an example – all these desserts are tasty but they contain alot of extra fructose in the form of high fructose corn syrup. Unfortunately it appears that this will interfere with your hippocampus as it attempts to lay down long term memories from this session.

# Introduction to Neuroscience

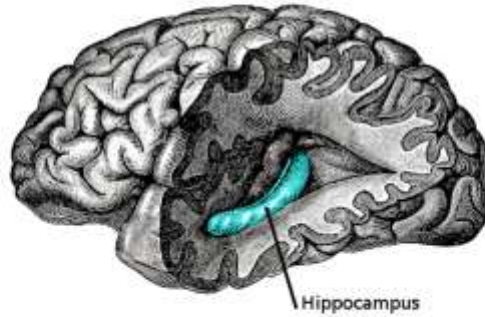


- Neuroplasticity
- Neural Networks
- What are memories/things we learn?
- Role of Hippocampus

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Mark - Only Twenty years ago most people in the world of neuroscience believed that your connections in your brain were fixed by the time you were a teenager (or even younger). Now we understand that our wiring continues to change (even new neurons can grow) even as we grow older. This is called Neuroplasticity, the discoveries around it are what make this presentation possible. All of our knowledge, all of our memories and all of our ideas are just stored in neural networks – in other words everything inside our brain is just encoded as the connections between a neurons. Neuroplasticity just says that we're able to make changes to those connections.

# Hippocampus



Linda - The hippocampus is the gatekeeper to laying down long term memory and apparently also to integration. It appears that its required to integrate images, patterns, faces, sounds, ... into episodic memory. Zull p80-82

## Choose 3 of 5

- Prior Knowledge
- Mistakes
- Emotion
- Images
- Integration

Remind them that we're going to working on our plays.

5 Flip Charts with short definitions, Dot Voting 3 dots person. Limit 2-3 minutes. *Tell them 2 minutes and give them 3.*

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Mark - 90 minutes isn't long enough to present all of this material and we want to put our audience in control – the importance of emotion. So we will cover 3 of the 5 sections and its up to you to choose.

The sections are:

*Need short pithy descriptions here and repeat them on the flip charts*

Along the walls you will find paper with short descriptions for each section. Take the three dots you've been given and vote for the sections you want.

## Prior Knowledge

“The single most important factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly.”

David Ausubel

Can't create new networks out of thin air. We can't understand something that isn't connected to something we already know.

(p94)

The best approach for a teacher is to build on existing neuronal networks (p101)

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Mark - Knowledge as we know is just represented in the brain as neural networks and these neural networks don't just spring out of thin air. So to create new neural networks and new knowledge we have to find existing networks to hook onto.

Linda current practice

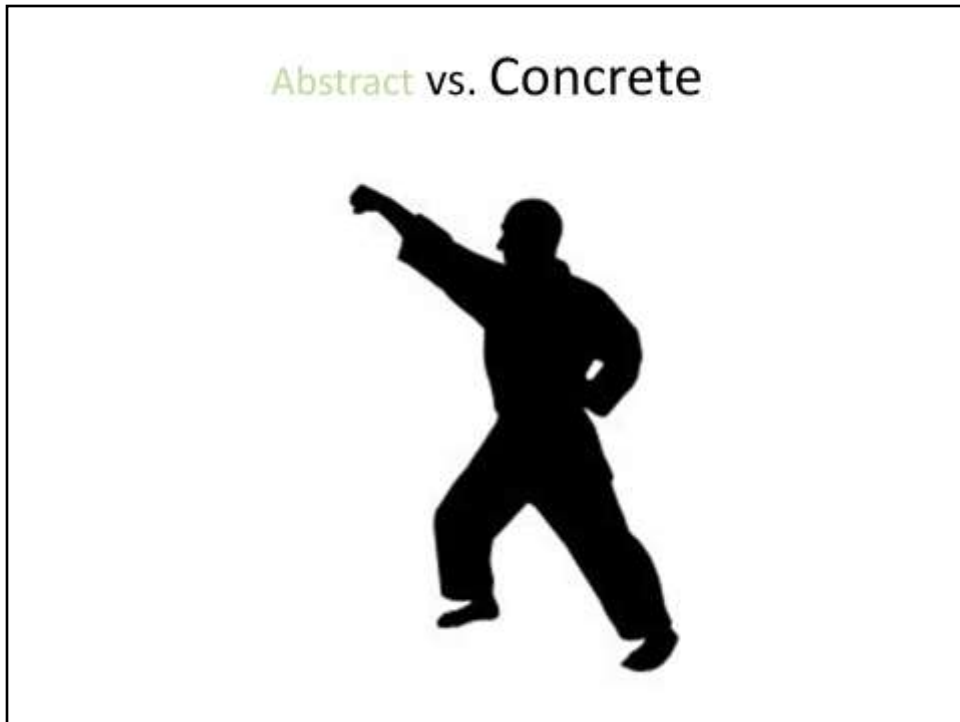
## How to Discover?



Picture: <http://www.sxc.hu/photo/375169>

Mark: Questions like: “What does this make you think of?” or “Is there some part of this that rings a bell for you?” or “What is the first thing you thought of when we began this topic?” - help discover the students prior knowledge. P120 In addition help involve the learners peers.

Linda will provide a story



Picture: <http://www.sxc.hu/photo/1129314>

Mark - Begin with concrete examples. The abstract and theoretical have less meaning if no neural networks are associated with the concrete experience of the learner. So how do we teach a new skill that is completely foreign to someone? We start with concrete examples, when we teach any sport – for example Karate, we don't start with the abstract elements. We start with simple concrete actions. *If we're doing well on time I will teach someone a very simple skill 1-2 minutes.* Notice in doing this we focused on actions and movements, we didn't name anything. Once we have the basic skill down, then we can discuss where it fits in to the world.

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Example of doing it the wrong way: Linda's talking about Math + Computing Science teaching in College system

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Point out that the discussion breaks are a form of integration and test by analogy – turning information into knowledge. We circulate and provide support.

*Remind*



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## Mistakes



Picture: <http://www.istockphoto.com/stock-photo-5066615-the-important-part.php>

Errors are neural networks too. Focus on the errors will just reinforce them. Instead ignore what it is wrong and focus on what is right.

A teacher can't remove existing networks nor reduce them. Networks disappear or weaken when they're not used. P101. In addition neural networks are easily reinforced. Focusing on the mistake will help reinforce it, ...

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Mark - Just like any other kind of knowledge mistakes are neural networks, the more we focus on them the more we reinforce them. So instead of focusing on the mistake we should focus on what is right. My five year old daughter consistently skips the number sixteen when she is counting. For the longest time we focused on the problem, just reinforcing the error.

## Good Examples



Picture: [http://www.istockphoto.com/file\\_closeup.php?id=5422719](http://www.istockphoto.com/file_closeup.php?id=5422719)

Teachers provide support by showing examples and good answers. (p147)

Linda's


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Mark - Now instead when she's counting we prompt her at the right moment getting her to add in the number sixteen. We talk about the number sixteen and how lonely it feels and we look for natural occurrences to reinforce the correct behaviour.

Teachers provide support by showing examples and good answers. (p147)

Linda - example of developmental handicapped child teaching and appreciate inquiry.

## Discussion Break



Remember you're preparing  
your play



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Picture: <http://www.sxc.hu/photo/841690>

Fear inhibits learning p53 – fear distorts, what we learn from neuroscience is that the fear bypasses hippocampus the goes into ancient Limbic reptilian system.

Sources of Fear:

-Boss sent the Learner and the Learner doesn't want to be there

-... Other examples

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Mark – The amygdalae a tiny region in your brain (part of the Limbic Reptilian system) is invoked when you feel fear i.e. fight or flight. When the amygdalae kicks in information bypasses hippocampus. What are some of these sources of fear:

-Boss sent the Learner and the Learner doesn't want to be there

-Bullied by the teacher: I don't want stupid questions

- Glenn's example

-... Other examples

Linda – tell's a story



Image a bright version of: <http://www.sxc.hu/photo/841690>

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Mark – So how do we Combat Fear engage the learner in a Cognitive task. Put the learner in control. (p52), this talk is an example of that, we allowed you to make a decision about what topics we would cover.

Linda – tells a story.

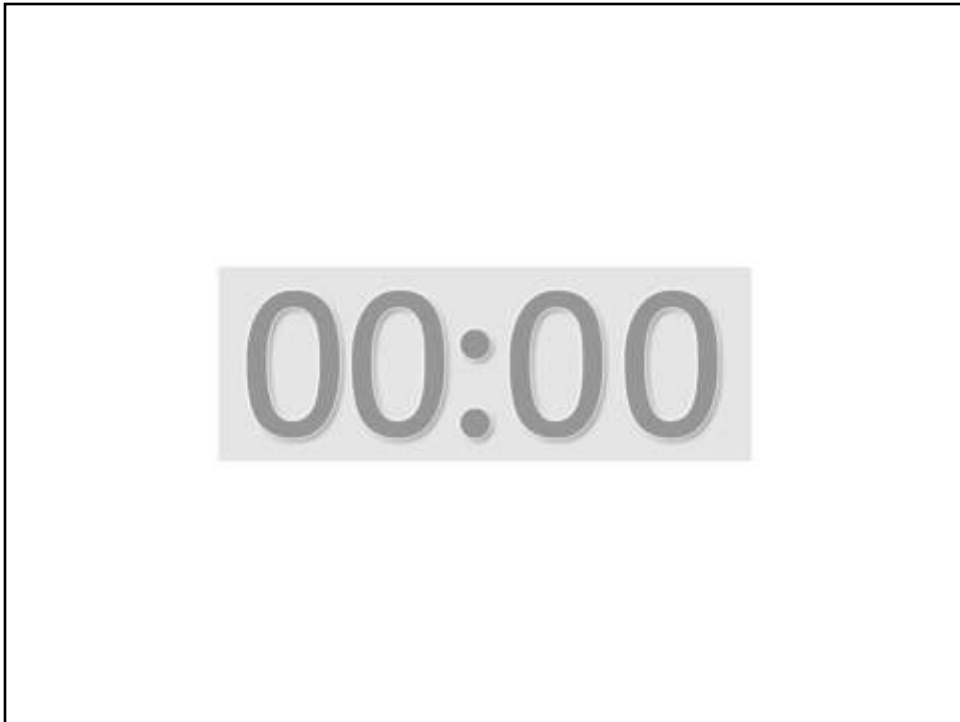
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Image the opposite of the previous fear image

## Discussion Break

A graphic of red curtains with a scalloped top edge, framing a white central area. The curtains are drawn back to reveal the white space.

Remember you're preparing  
your play

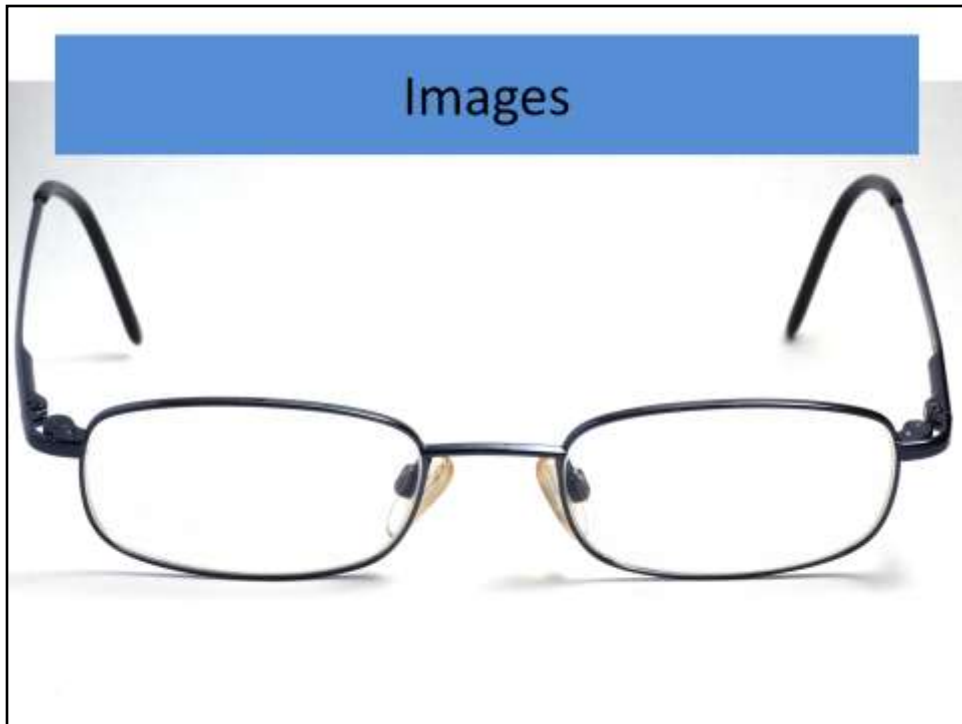


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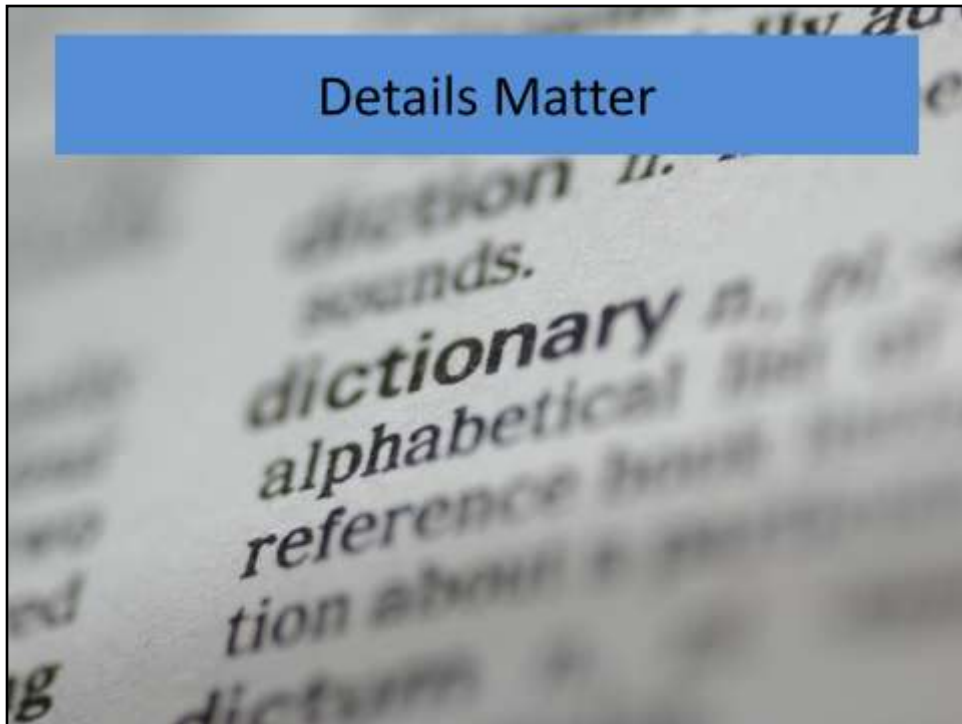
<http://www.sxc.hu/photo/538137>

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Linda - Importance of Images – some details from Medina & Some from the start of Zull's chapter. Vision Trumps Other Senses – Medina.

Mark - Notice how Linda and I have been presenting – full of images and few words, stimulates the senses. Using ideas from Garr Reynolds (Presentation Zen). Images are like google for the brain. They're easily remembered, provide fast lookup service and can provoke strong emotional reactions.

Mark - While not as strong as images, sound plays a similar role. At Agile 2007 I attended - Jean Tabaka's presentation "Why I don't like Monday's" (<http://www.infoq.com/presentations/tabaka-dont-like-mondays>). Jean used the Boomtown Rats song as a background/intro to her presentation. 2 yrs later and its one of two presentations that I can remember any detail from.



Picture <http://www.sxc.hu/photo/532561>

Examples: Mark's Karate, Linda's Chimp story

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Mark – When an expert sees something new in their field they can quickly tell what is important and what isn't when a novice sees something new all details seem of equal importance. Its up to the teacher to emphasize the details that matter. When I see something new in Karate, I know to study first the feet, then the hand movements, finally the pace and sense of flow. As a beginner the same movement is just an overwhelming mass of detail, so the Sensei has to choose what they want to emphasize. Be aware of details – even if your not thinking about it your students won't pick the ones that matter.

Linda's Chimp story



<http://www.sxc.hu/photo/771656>

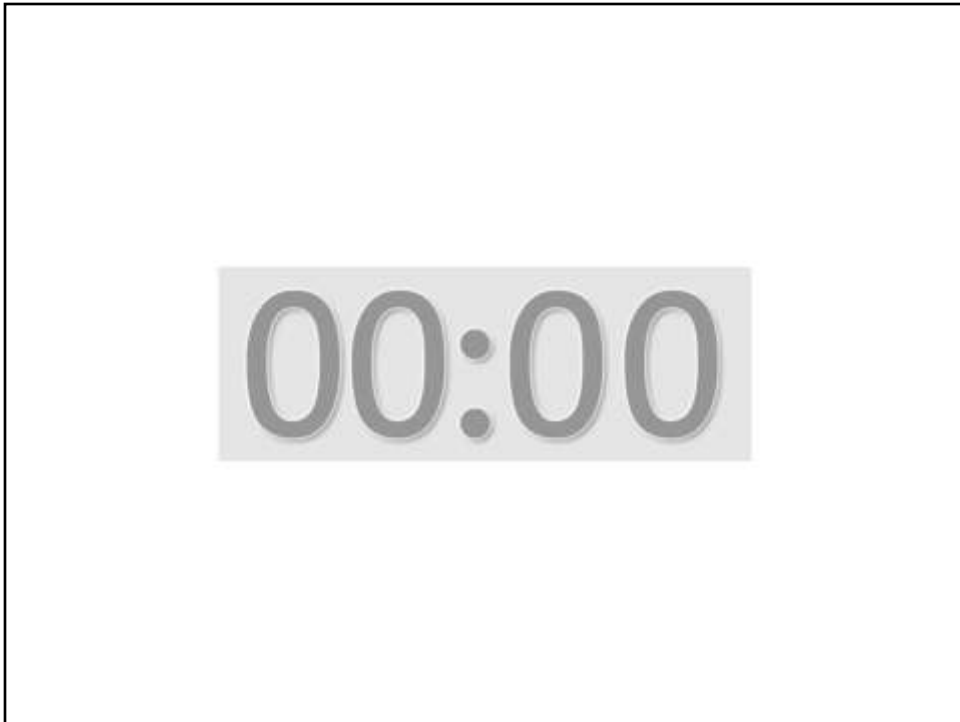
*Perspective Matters - Talk about the study that shows the value of different perspectives (i.e. Standing in front of a picture vs. looking at it from different angles), Can't pay attention to a single focal point. (p142). Brain evolved for scanning. Give people different perspectives. Ask them to see things from different perspectives*

Mark – Are brains didn't evolve to stand in one place staring at the same thing for any length of time, yet none the less that's often how we study topics. The human brain evolved for scanning – when we look at picture like the one of the screen we don't see it all at once, our eyes flit about the scene jumping from element to element. After a while we can no longer focus on the image, it becomes blurred in our minds and our attention wanders. Yet when we ask people to pay attention and focus we expect them to be physically still and focus on one thing. Studies have shown that when we study the same picture from different angles we remember more than if we just stand in front of it.

Give people different perspectives on the same idea, but also ask students to share their ideas and images.



*It would be clever to give all the action taking slides the same format different from the rest.*



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Illustration - <http://www.sxc.hu/photo/24508>

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Mark give students assignments and problems that require them to use the different parts of the brain. As an example assignments that ask them about spatial issues, both the big picture and the details. One approach you might ask students to describe Agile from 30,000 ft and then also describe the daily standup from ground level. The key here is to involve as many parts of the brain as you can:

- Sounds
- Repeption
- Draw a picture
- Language – i.e. Rephrase in your own language
- Movement – motor systems – i.e. The plays you will be performing
- Smells – where applicable

(p160) – *Requires to hint at different parts of the brain and give assignment ideas.*

Linda: I can tell a story about the framework play

## Analogies



Test Learning by asking the learner to provide analogies


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Comparing Apples and Oranges

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Just talk about what where doing with the play. Use this presentation as analogy because it works on both the macro and micro.

## Discussion Break



Remember you're preparing  
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If there are too many tables ask tables to pair up and present their plays to each other.



BENEFITS YOU WILL DERIVE

# CALL<sub>TO</sub> ACTION



Think of how you mentor, coach or teach

Search for: **“Abstract”, “Listeners Experience”, “Passive Students”, or “Habituation”?**

Create an **ACTION PLAN** for updating your slide decks and the way you mentor

Watch the people you train/mentor - listen to them, learn from them

Mark talks

## Follow-up Paper

- InfoQ

## References

- [The Art of Changing the Brain \(Amazon.ca\)](#) - James Zull
- [Brain Rules \(Amazon.ca\)](#) - John Medina
- [The Brain that Changes Itself \(Amazon.ca\)](#) - Norman Doidge
- [Presentation Zen \(Amazon.ca\)](#) - Garr Reynolds

Thanks

**Linda Rising, Mark Levison**

# Kolb's Learning Cycle



[http://www.ldu.leeds.ac.uk/ldu/sddu\\_multimedia/kolb/static\\_version.php](http://www.ldu.leeds.ac.uk/ldu/sddu_multimedia/kolb/static_version.php)

## We Didn't Cover

- Habituation
- Rewards don't work
- Seeing images for only a few seconds enough to remember them
- Can scan 50,000 images per sec in long term. No upper limit on memory capacity./think of this as google for your brain?/
- Sound like images but not as strong
- Exercise important - but rarely controlled by the educator
- Repetition