Creating Materials
in Sync with the Brain

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Presentation to SEWI-ATD
Given by Phil Ransom
VP Strategic Communication
The CID Group, LLC
[This is a modified handout of the presentation.]

We are pleased to join you today. Thank you for the opportunity & to the team that made today happen. I've respected ATD from a distance for a long time, and now that I'm seeing more of you as an ATD Chapter & up close, my regard is even deeper.

I was taught growing up, and experience has demonstrated, that every job benefits from using the RIGHT tool.

As I understand it, the tools you use to teach & train others include:
- handouts
- job aids
- reference sheets
- manuals
- e-learning techniques

What else do you use…what kind of visual materials?

These materials that you're currently creating and the way you were taught to present information was based on what was known at the time. It was based on:
- tradition
- what people had always done
- observations
- preferences
- sometimes on personal experiences &
- opinions.
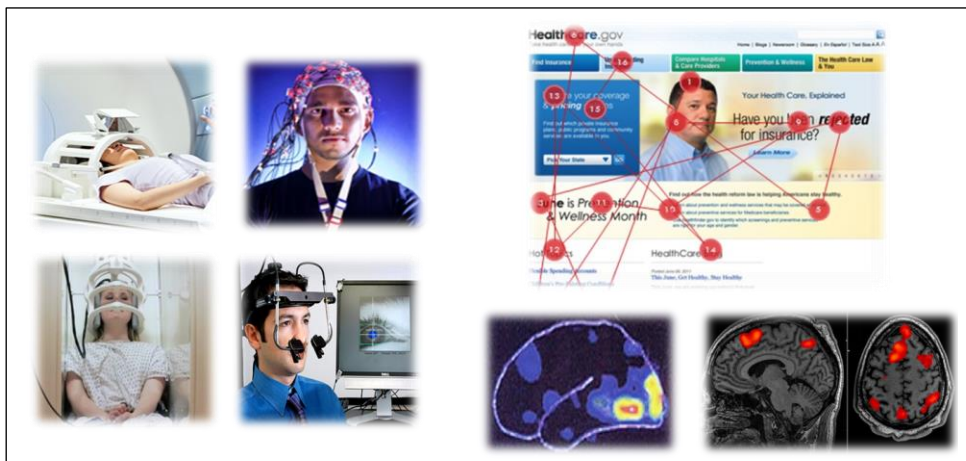
Today, thanks to modern technology & continuing research, we know how the brain actually processes information.
We can follow the path of readers' eyes, learning where they go & how long they stay in each spot. We can observe, thanks to fMRIs & PET scans, where things happen in the brain as we read.

What we have learned indicates that there are better, more effective ways to create visual materials that are in sync with the brain — in sync with how we process information.

These findings have created a new area of study we call cognitive-based information. It looks exclusively at how we process information from visual messages in print & electronic formats.

The tool that is used to create this type of information is called Cognitive-based Information Design or CID. It provides a systematic way of ensuring that visual communication uses what we know about visual processing & cognition thereby creating more effective materials.

CID provides —**for the first time**— the *right* tool to create your learning products & other visual communication materials. Okay. A tool that syncs materials with the brains processing system! Sounds exciting, right? It IS!

But there's more here than just "Here's a new tool, everybody".
CID came about to meet a challenge facing our society but receiving little attention.
You need to be aware of it in your quest to be an effective trainer & manager.

The problem, or challenge as we like to see it, is the current state of adult reading literacy in this country. A few years ago Dr. Tetlan wanted to know
how many adults in this country were proficient in reading literacy.
She found a study by The National Center for Education Statistics entitled
The 2003 National Assessment of Adult Literacy. In that study thousands of adults aged 16-65 were tested. The population was across gender & educational levels as well as socio-economic status.

Literacy was defined as the knowledge & skills needed in life & at work to use information from various platforms such as:
- news stories
- editorials
- manuals
- brochures.

In addition, the study used various formats:
- text-based documents
- maps
- tables
- charts
- forms
- timetables.

The test questions assessed the respondent's ability to:
- retrieve
- compare
- integrate & synthesize information
- make inferences & other skills.

As a professional researcher, Dr Tetlan knew that prior to reading such a dense study she had to focus on what it was she wanted to learn from it. She wanted to know how many adults were proficient at understanding what they read.

This is what she found.
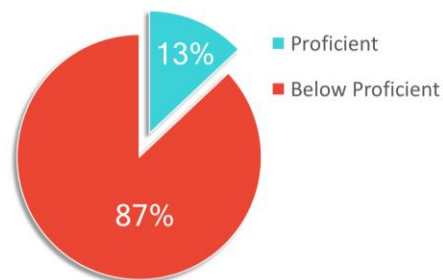
When you go to the study you'll not see it shown this way. The study had subcategories within the 87%: Intermediate, Basic, and Below Basic. The study didn't present or address the 87% figure probably because it was a study for educators, who need to know the variations within the 'not proficient' category in order to better design effective methodologies & pedagogies.

In the working world it is **very** important to fully understand information that is read not just partially understand it. According to this study, most adults in the US do not accurately apply what they have read. This cross section of adults by the way, include the people you work with and the customers you serve. A side note here, for those of you who work internationally...this is not just a US issue… studies show it's global. If you'd like, we can discuss that more later this morning.

What's not addressed in this study is the fact that most of us believe we DO understand correctly – even when we do not. Perhaps that's why we come to accept things as OK that really are not. (Show 'Just OK' TV ads)

We know that there are times when 'Just OK is NOT OK' — It can be catastrophic. Think of an airline pilot who doesn't understand his skillset fully or a line worker in manufacturing who doesn't. The job is either done correctly or there are negative consequences. There is a high price to pay in the real world when adults misinterpret what they read. (Share 4 examples: airline cargo; radioactive storage containers; Paris chateau; DIY projects).

Misunderstanding information can result in a spectrum of negative consequences – from manufacturing mistakes to taking the wrong medication. Everything from minor frustrations *to* major catastrophes.

Why does this happen? Why do we tend to mis-interpret what we read?
There are numerous possible reasons for misunderstanding content that need to be considered:
- reading too fast
- misreading words
- lack of vocabulary
- not fully engaging with the content while you're reading
- a dislike of reading
- cultural influences
- past negative experiences and so forth.

Many of these variables have been studied for some time without solving the problem, but one variable that has received little attention may very well be the kingpin to this whole problem – the actual format itself!

The way we present or format information doesn't coincide with what we know about how the brain actually processes information. Many current formats:
- discourage readers from engaging
- undermine proper understanding of content &
- frustrate recall & retrieval of information.

This happens for a variety of reasons including the fact that current formats often present information in
- disjointed sequences
- have long run-on lines of text &
- use cumbersome fonts, among other things.

We have found that when information is presented using scientific findings or constructs to create formats, readers are more likely to:
- stay engaged with the material
- correctly understand the content &
- be able to recall and/or locate pertinent details easier.

The next obvious question is "What are these findings or constructs?"
We have time this morning to share only a few with you.

So we're clear on the meaning and using the same definition, constructs are – findings or 'truths' discovered through scientific research that are accepted as valid by their peers.

CID incorporates constructs from, but not limited to these fields:
- psychology
- cognitive sciences
- learning sciences
- educational psychology
- neuroEducation
- ophthalmology

Today we'll be sharing 4 constructs with you that will help you:
- choose which fonts to use
- determine length of lines
- package your information (units/chunks)
- learn how much content is too much.

Let's start with what we know about how we process visual information.

Visual information enters through the eye and proceeds across the optic system to the back of our heads to the visual cortex. This is the 1st level of cognitive processing, from the eye to the visual cortex. Upon reaching the visual cortex the brain determines what it's seeing – is it an image? A color? A letter? And so forth. When it is identified as a letter, it is sent to an area called 'the letter box' for further evaluation. There the letter is decoded then recoded. This is the 2nd level of cognitive processing. The recoded images are then sent further into the brain for higher order interpretations. This is the 3rd Level of cognitive processing.

Let's look closer at how the brain handles text.

When you see the word 'eye', for example, the brain recognizes it as text and sends it to the letterbox where it breaks the word into individual letters, taking one letter at a time & sorts the pieces into similar shapes (horizontal lines, vertical lines, curves & so forth). Then it recodes it to its original form for further processing.
Knowing that **Text Deconstruction** exists helps us determine whether we should use serif or sans serif fonts.

Serif fonts have small decorative lines added to the basic form of the letter.
Sans Serif have none. The serif 'T' has 5 lines to decode & then recode –
the sans serif 'T' has only 2.

This sentence "The little red fox turned pink when feeling shy" has 146 lines to decode in the serif font & only 77 in the sans serif font. Logic implies that it takes the brain less effort to decipher sans serif fonts than serif fonts in that 2nd level of cognition when it's deconstructing & reconstructing text.

If we want to encourage people to remain engaged with our materials, perhaps we would do well to consider using fonts that are more efficient to process.

This is the kind of science & thinking that goes into us saying that you should use sans serif instead of serif fonts to help your readers engage with your message.

Is there a place for serif fonts? There is. Serif fonts will get you there, but they're more work. Sans serif fonts are more efficient. And we can talk more about that later if you like.

For now, let's look at a construct called the **Information Processing Model**.
It provides important numbers to remember. Some of you might be familiar with this model from your psychology courses. The Information Processing Model construct shows us what happens cognitively when we see sentences.

When you see text or images the stimuli activates the sensory memory area in our brains. This area can remain activated for up to 3 seconds. That means we need to engage the reader within 3 seconds or we probably will lose them. That's important to remember.

Once interested in the format the reader is more likely to be curious about the content. When the brain begins to focus in on the actual content, working memory kicks into action. During that all-important 3 seconds most people are able to process 3 - 7 units of information. If this content has engaged them, the brain then moves the information into working memory (WM). During WM the brain is trying to make sense out of what it's seeing. "What is this unit –this chunk– of information?"

These individual chunks, symbolized here by bricks, are units of information.
Other units of information can be attached to the original unit thereby building more information. The way you put those bricks –those chunks– together determines what is built. We can build a wall or we can build a house with those bricks. Let's go back to Working Memory and take a closer look.

During WM the brain can process 7-9 chunks within 5-15 seconds. IF it makes sense within those 5 – 15 secs, the information starts to become encoded. The more times the information is repeated the more likely the information is to be encoded in Long Term Memory – which then makes it available for retrieval.

You have little control over how often a person reads your publication. But you can make it easier for them to find or retrieve information within that document by the way you present it. One way is to pay attention to how many bits of information are within a visual group or chunk of content…and the amount of spacing used to separate those chunks. There's more to this aspect of formats that we unfortunately do not have the time to address today.

It is important to appreciate how complex reading is. When we read, there are several areas of cognitive interpretation going on! Phonological, subvocal, word meaning, syntactic meaning & so forth. What we want you to learn from this is that reading text is a complex process! We're not genetically pre-programmed to read…it's NOT innate – we don't even have a brain designed for it! Reading truly is a complex & *unnatural* skill. So be wise. Use text discretely.

Many people lose their place while reading long lines of text. Perhaps it's because our eyes do not read in fluid straight lines. When we read, our eyes scan in short, jerking movements called saccades. Knowing our eyes move in choppy motions, using shorter text lines may decrease how often readers lose their place. This in turn may increase readers' engagement, allowing the building of information. Shortening lines is a construct called **RSVP.**

RSVP stands for Rapid Sequential Visual Presentation. This happens when we:

    stack phrases like pancakes
   to limit eye movement
    & increase efficiency.

For this to be effective we need to break the lines into meaningful phrases, as you see above. Notice the difference when this sentence is broken into *these* phrases?

    stack phrases like
    pancakes to limit eye
    movement & increase
    efficiency.

The key is to break the lines into proper phrases that aid in building of information. And it can TRIPLE reading speed!

Another construct that addresses engagement with formats is referred to as **<u>Cognitive Overload.</u>**

Cognitive Overload occurs when short-term memory cannot process information due to too many different pieces of information being presented together. Examples of this are readily found in infographics.
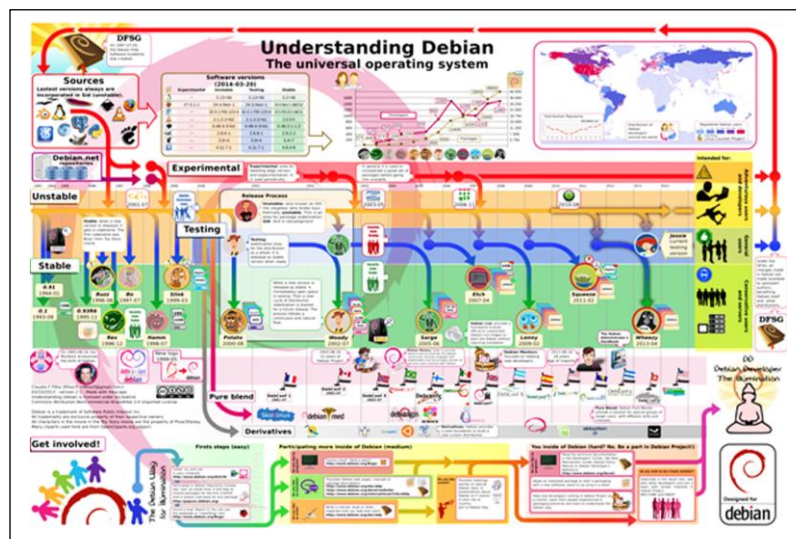
Cognitive Overload discourages engagement. A side note here about infographics...
While prone to cognitive overload, infographics <u>are</u> effective tools in certain situations
- to reinforce prior learning
- when someone is already keenly interested in the subject.

Research on Cognitive Overload indicates that certain steps can help lessen overload. We can lessen cognitive overload if we:

- create tight visual units (2-5 elements)
- provide open spaces
- focus on clarity & brevity
- use focusers & arrows
- & avoid extraneous elements.

Taking these steps can lessen Cognitive Overload & keep your reader engaged.

In summary:

You learned to:	Based on construct:
Use sans serif fonts……...Text Deconstruction	
Limit content………………Info Processing Model & Cognitive Overload	
Shorten lines………………RSVP.	

I read this week an article in Chief Learning Officer magazine entitled *Keeping Talent Development Current: A Moving Target* by Dr. Matthew Painter. In it he said:

> *The key here is to continually transform*
> *and we cannot do that without constant learning…*
> *If our learning and development is not current,*
> *we become less valuable over time…*
> *because our knowledge and skills are not keeping up*
> *with the ever-increasing demands of our work.*

He's describing an ongoing challenge. I don't know about you, but I LIKE what I learned when pursuing my Master's! But we need to keep learning. CID is a perfect example for me. I learned about it only 2 years ago – well after my Master's program.

There are so many reasons to keep learning. Here is one reason why those in the business of training others need to keep learning & improving their industry:

> Ineffective training costs businesses between
> $17 billion and $30 billion dollars a year.

You are now in a position, with the knowledge you gained this morning, to begin to affect a positive change in your industry.

ALL fields can benefit by transforming their communications to CID formats. There are SO many benefits …and those who begin to use Cognitive-based Information Design before their peers will have an advantage. That advantage is what urged me to

learn CID. I wasn't looking for it, but as I began to realize what this would do for me —and for my clients— I knew this was a skill that would become invaluable.

Today you've been introduced to Cognitive-based Information Design.
You now know what it is; why it's important; and some of the science behind it.
We've touched on 4 of the 12 constructs this morning. If you're curious about the other 8 constructs come talk to me – I'd love to share this amazing knowledge with you and your team.

What questions or comments do you have?