A decorative background consisting of a grid of colored squares in various shades including brown, green, orange, red, blue, yellow, pink, and teal. The squares are arranged in a pattern that frames the central text.

# Use Data to Tell Your Story

Tara Richerson  
WERA Annual Conference  
December 9, 2015



# Back to Basics

A bad visualization is worth 1000 swear words.

—Ross and Bennett

# Elements of Visualization

1

**St**

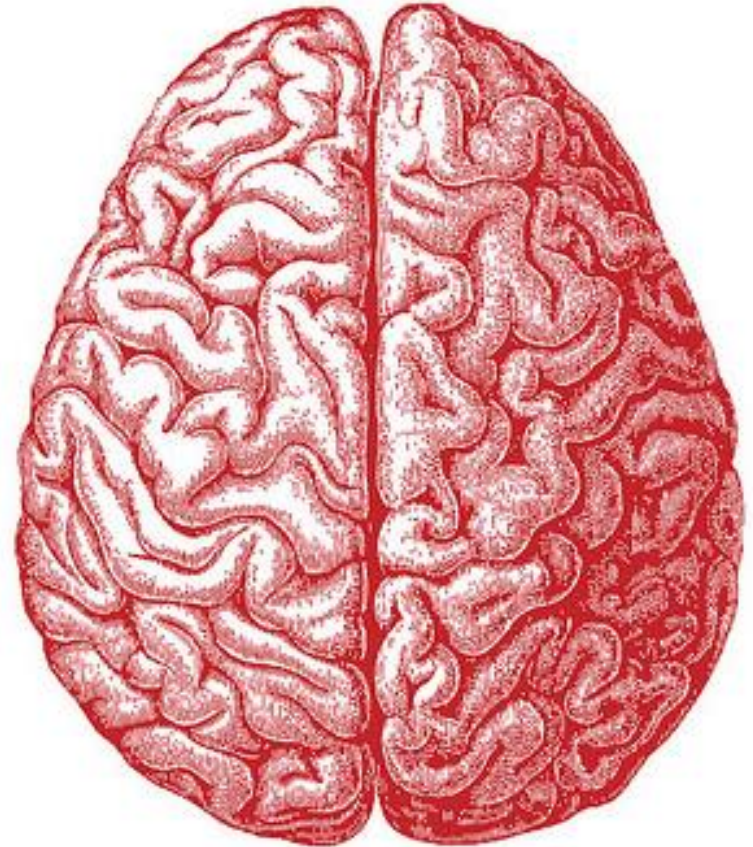
Story

2

**In**

Interactive

# Where the magic happens



# Pre-attentive attributes: Form



Length



Width



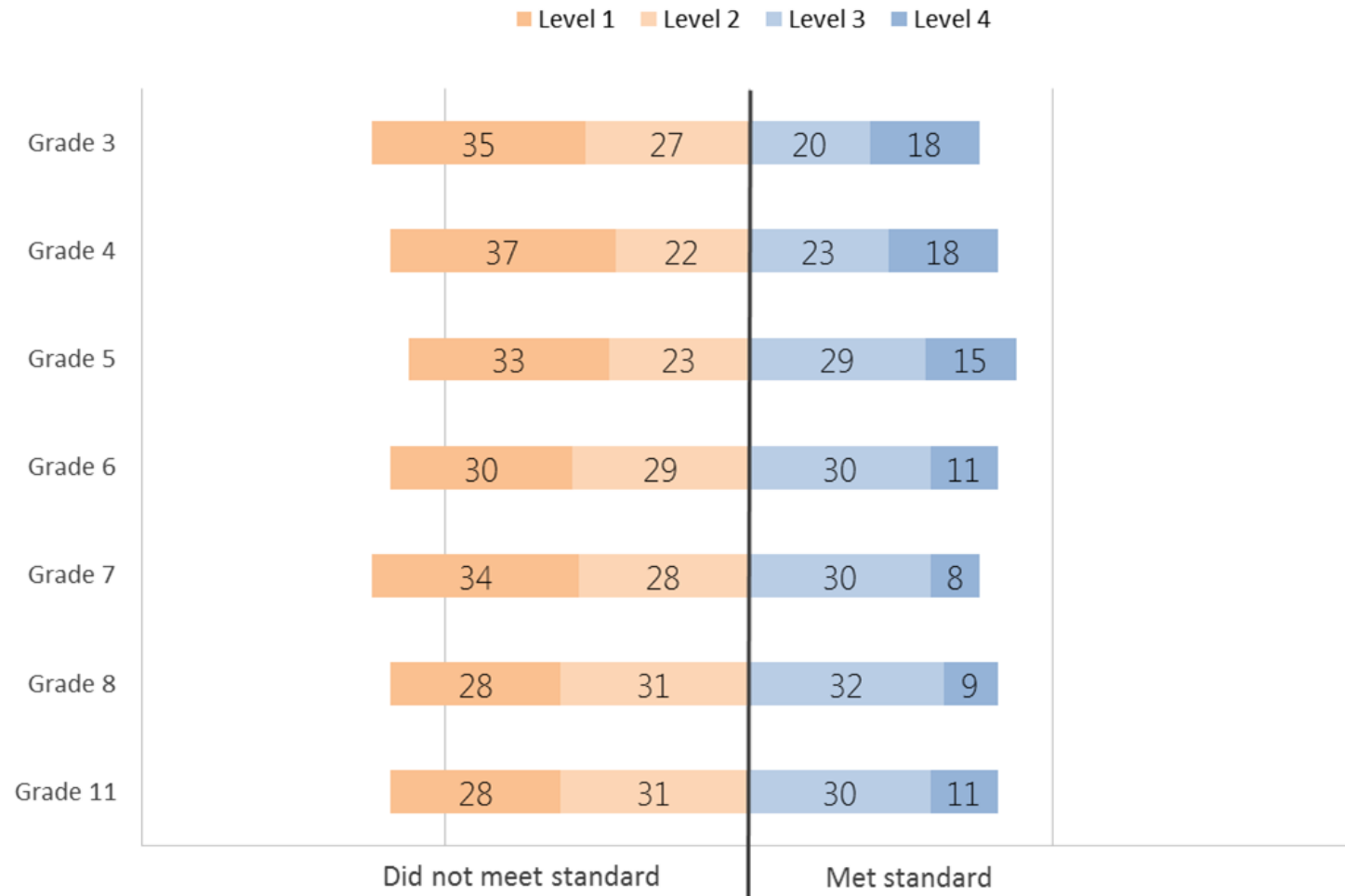
Orientation



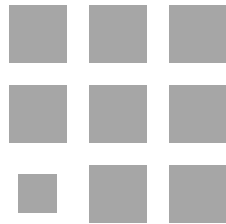
Curvature

# We see length more accurately

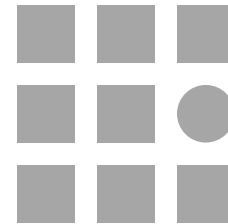
Estimated percentage of students scoring at each achievement level for English language arts



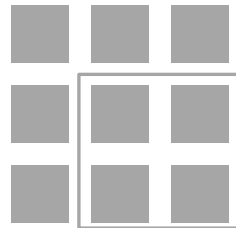
# Pre-attentive attributes: Form



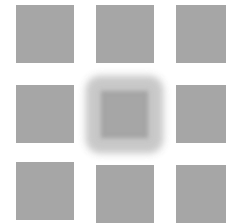
Size



Shape

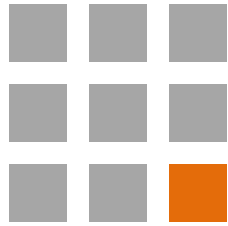


Enclosure

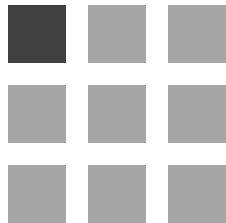


Blur

# Pre-attentive attributes



Hue



Intensity

Color



2D location

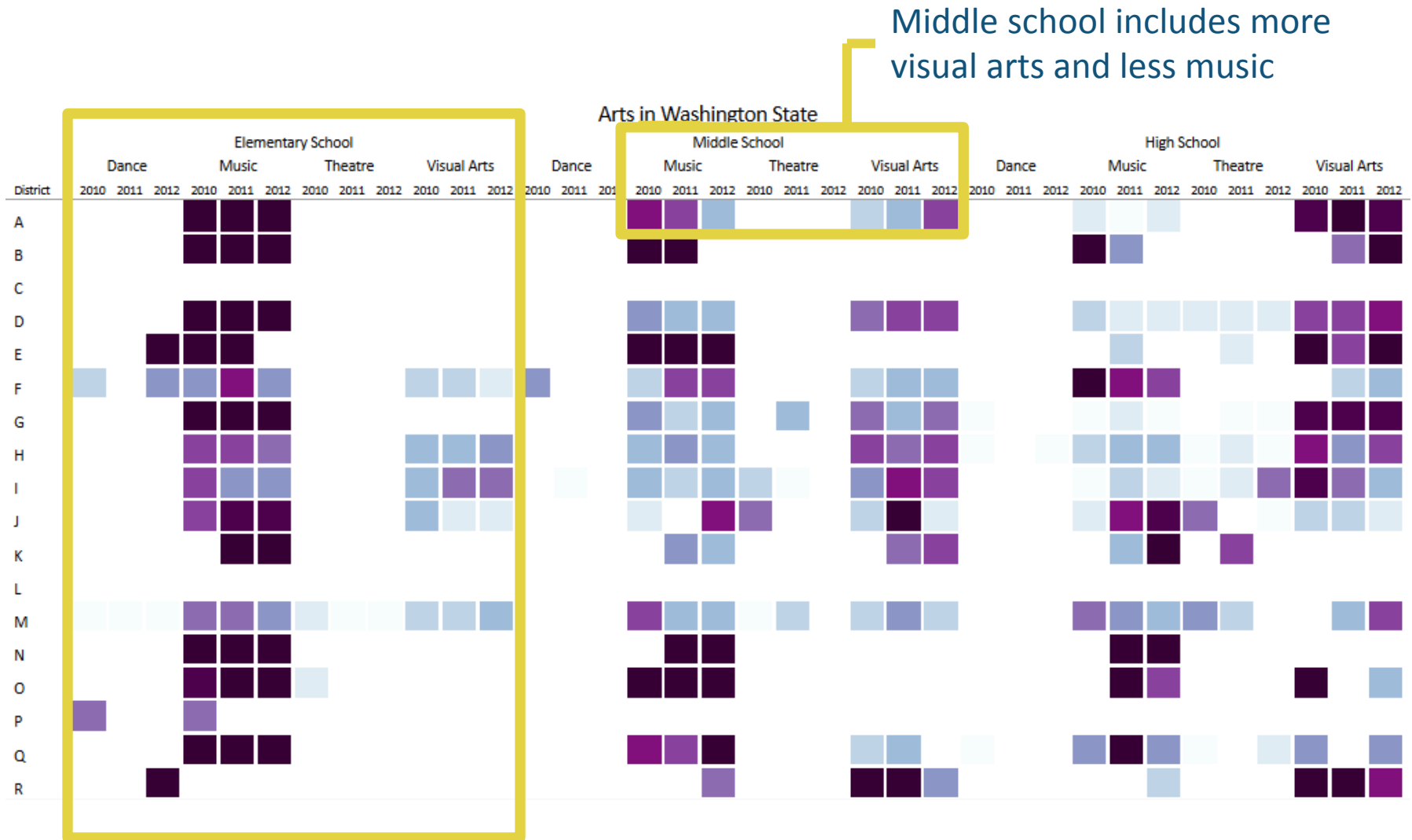


Grouping

Position



# Intensity



Music is popular at the elementary level

Student	Fall	Winter	Spring	
A	Blue	Blue	Blue	2 students continued to meet standard
B	Yellow	Blue	Blue	
C	Blue	Yellow	Blue	7 students improved to meet standard
D	Yellow	Yellow	Blue	
E	Yellow	Yellow	Blue	
F	Orange	Yellow	Blue	
G	Orange	Yellow	Blue	
H	Orange	Yellow	Blue	
I	Orange	Yellow	Blue	
J	Yellow	Blue	Yellow	8 students continued to almost meet the standard, including 1 that was at level 3
K	Yellow	Yellow	Yellow	
L	Yellow	Yellow	Yellow	
M	Orange	Yellow	Yellow	
N	Orange	Yellow	Yellow	
O	Orange	Yellow	Yellow	2 students improved to level 2
P	Yellow	Orange	Yellow	
Q	Orange	Orange	Yellow	3 students have not met standard, including 1 whose performance has decreased
R	Blue	Yellow	Orange	
S	Orange	Orange	Orange	
T	Orange	Orange	Orange	

KNOWLEDGE BUILDERS

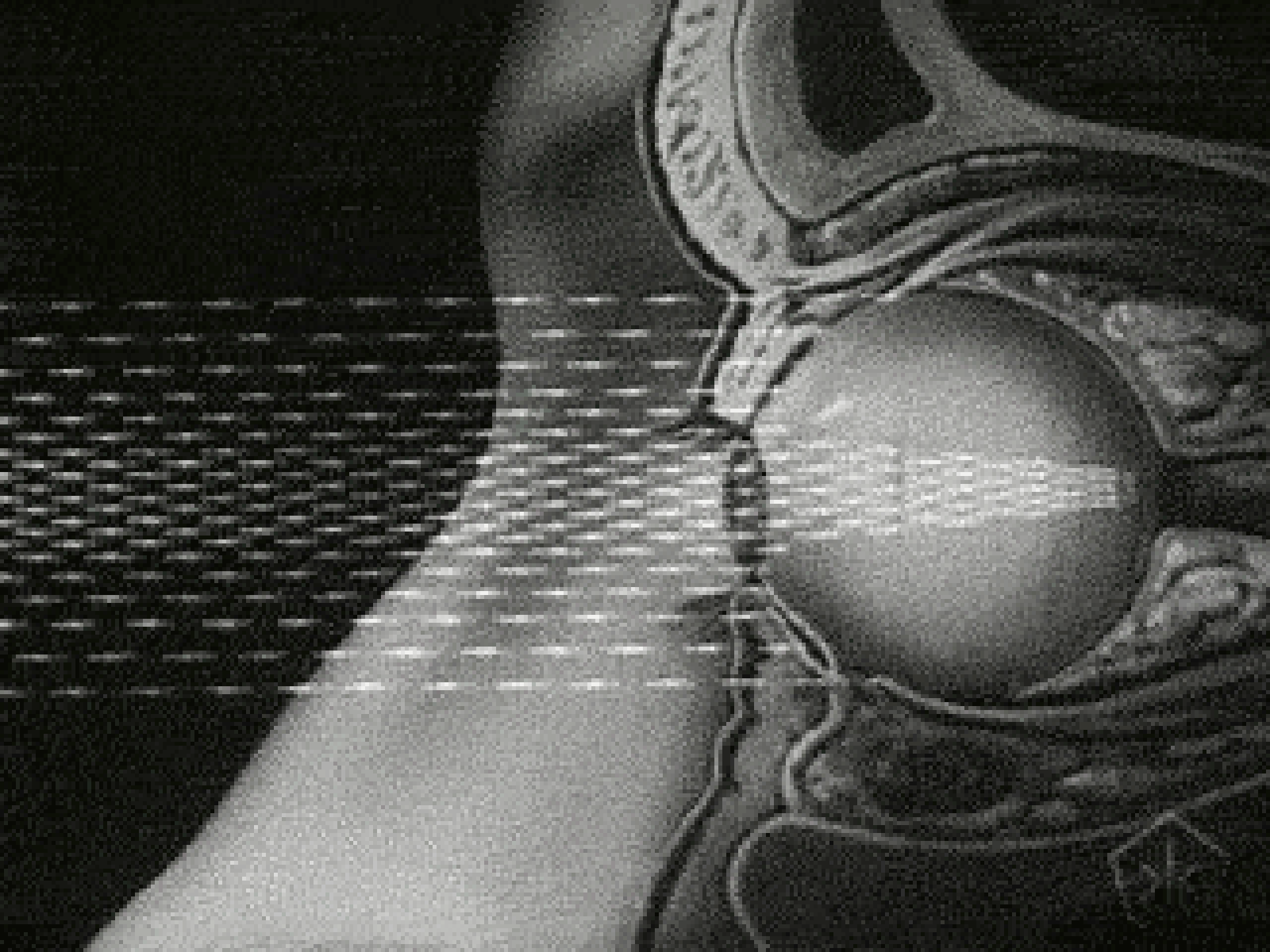
*Presents*

# HOW *the* EYE FUNCTIONS

*A Classroom Film.*

*Copyright MCMXLI ... by K.K. Bosse.*

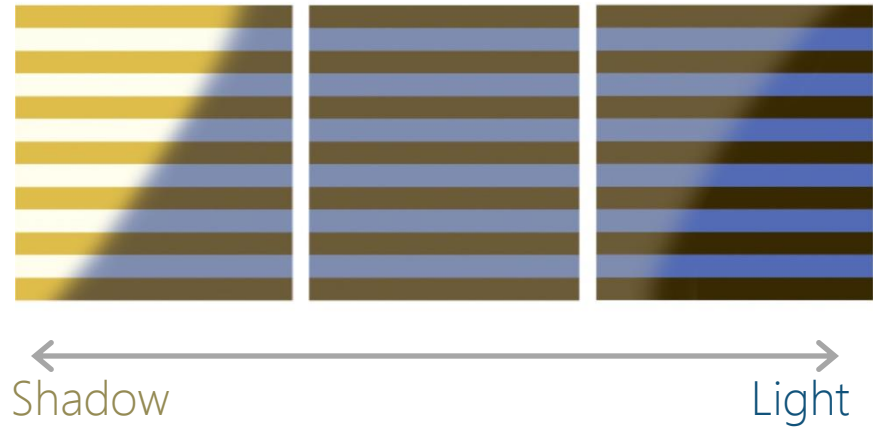




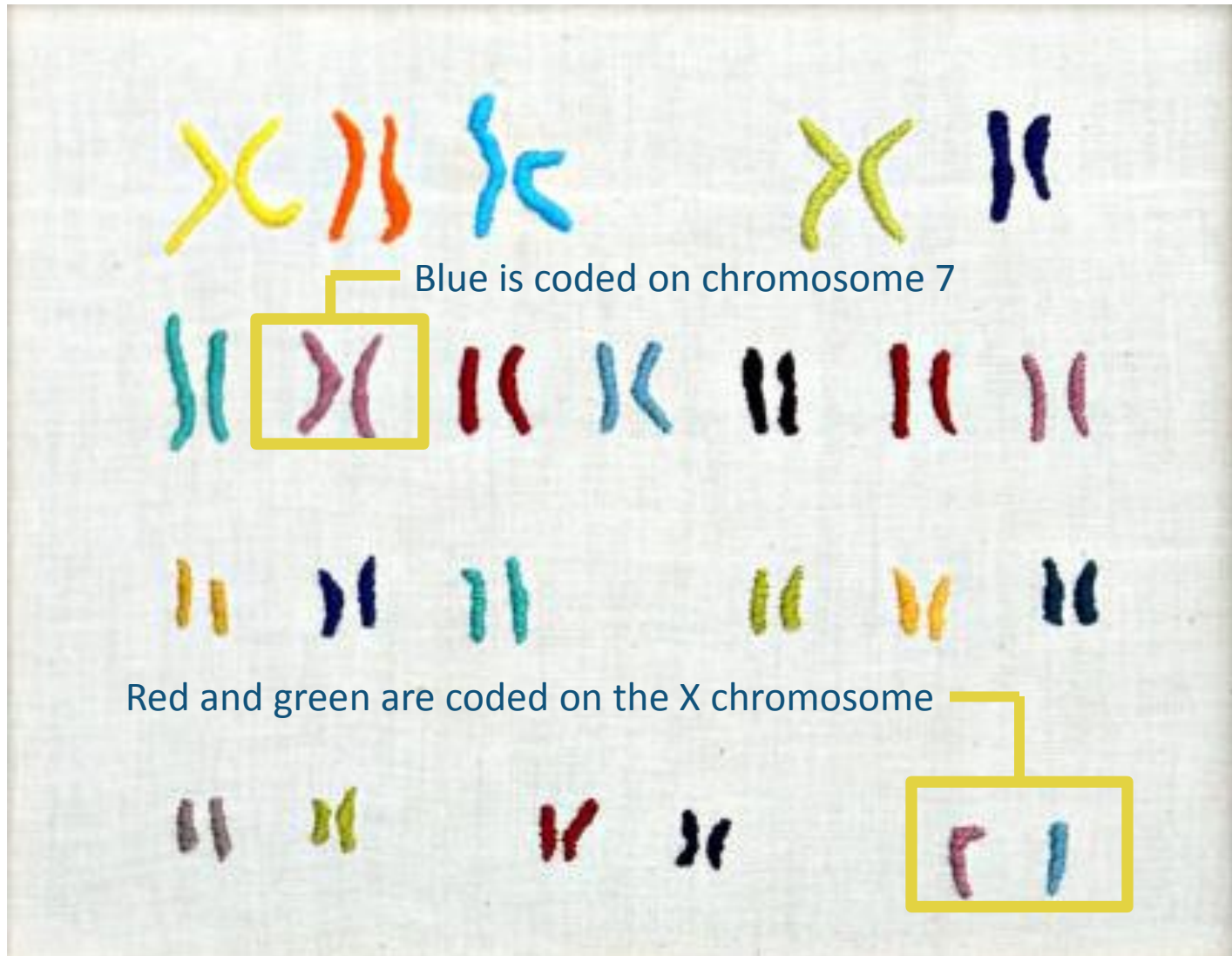
# What colors are this dress?



Our brain uses  
environmental cues



# Color perception starts small





# Was van Gogh color blind?



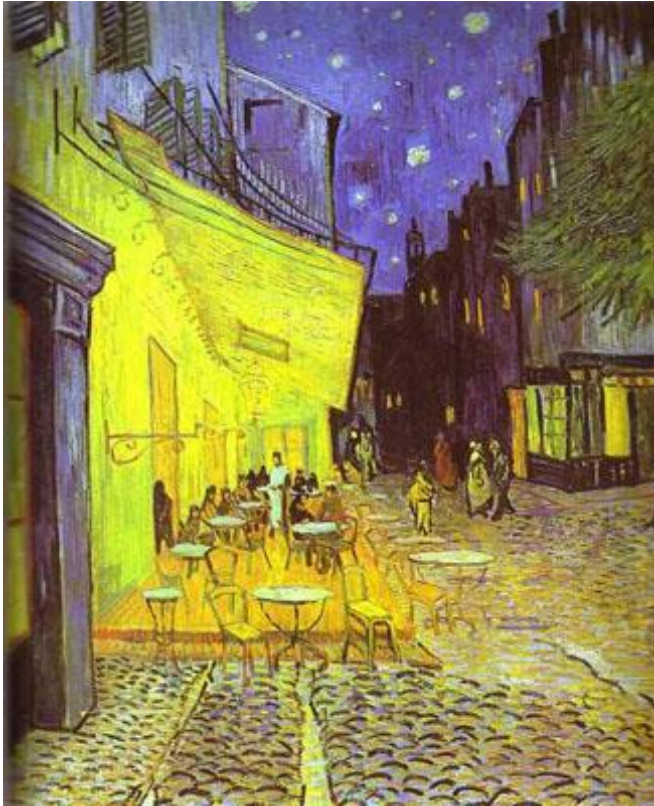
Original



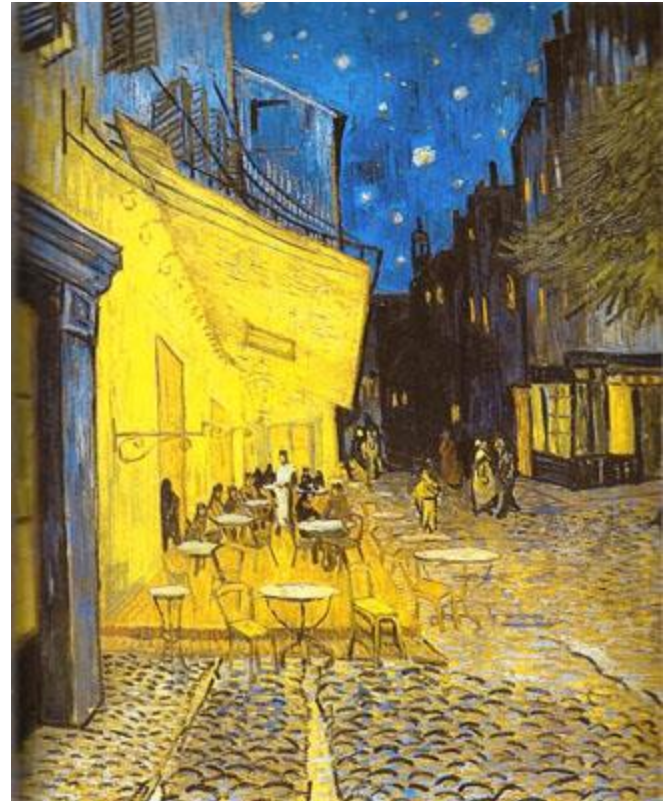
Adjusted

*Wheat Field Behind Saint-Paul Hospital*

# Was van Gogh color blind?



Original



Adjusted

*The Café Terrace at Night*



# Tell us a story

Revise your story, based on ways to **make it more interactive** for the audience, including color and pre-attentive attributes.

# Elements of Visualization

1

**St**

Story

3

**Gl**

Glanceability

2

**In**

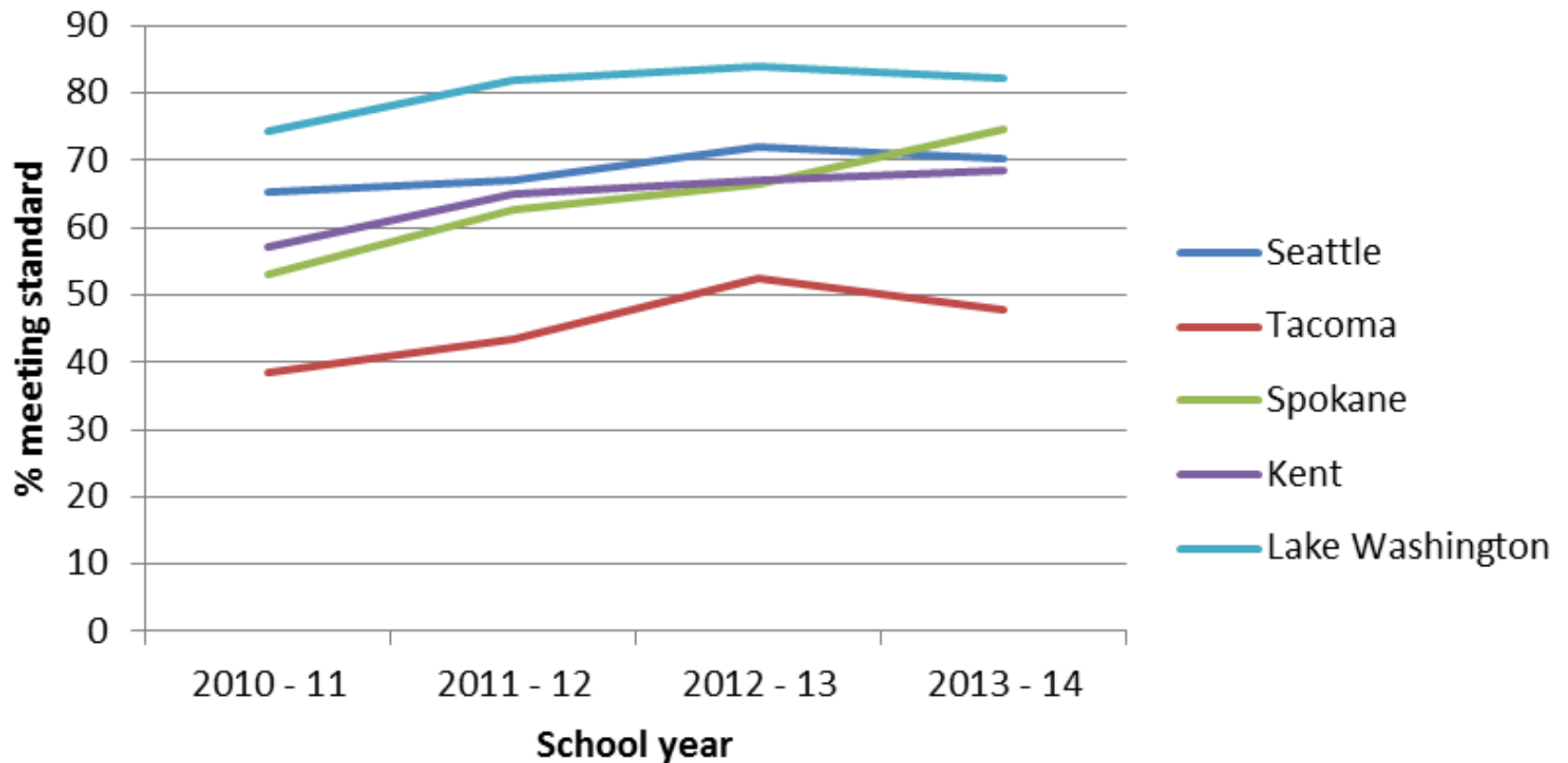
Interactive

Identify the unique cell, then raise your hand



What do you see that you shouldn't?

## Seventh grade math scores for five largest Washington districts



# Visual communication skills

The screenshot shows the Patient.co.uk website. The header includes the Patient logo, navigation links (Home, Wellbeing, Health Information, Medicines, Professional Reference, Forums, Directory, Patient Access), and a search bar. The main content area is titled 'Measles' and features a sub-header '178 Users are discussing this topic'. Below this, there are tabs for 'Article', 'Related', 'Clinical Trials', and 'Discuss'. A sidebar on the left lists 'On this page' with links to 'What is measles?', 'When to see a doctor?', 'What are the symptoms of measles?', 'Measles immunisation', 'How is measles diagnosed?', 'Is measles infectious?', 'What are the possible complications of measles?', 'References', and 'What are the treatments for measles?'. The main content area includes an advertisement for 'Assisted Living Costs' and a 'Daily health' section with a US flag icon. At the bottom, there is a 'Related Patient.co.uk forum groups' section with links to 'Infectious Disease' and 'Comprehensive'.

Welcome to Patient.co.uk [Register](#) | [Sign in](#)

MyHealth | Blogs | Shop | Symptom checker

Search Patient.co.uk

Home Wellbeing **Health Information** Medicines Professional Reference Forums Directory **Patient Access**

Home ► Health Information ► Measles

## Measles

178 Users are discussing this topic

Article Related Clinical Trials Discuss

Print PDF Email Bookmark Notes Listen Translate

### On this page

<a href="#">What is measles?</a>	<a href="#">When to see a doctor?</a>
<a href="#">What are the symptoms of measles?</a>	<a href="#">Measles immunisation</a>
<a href="#">How is measles diagnosed?</a>	<a href="#">Is measles infectious?</a>
<a href="#">What are the possible complications of measles?</a>	<a href="#">References</a>
<a href="#">What are the treatments for measles?</a>	

Measles is an infection that mainly affects children but can occur at any age. It is rare in the UK, due to immunisation. The illness is unpleasant but most children fully recover. However, some children develop serious complications.

### What is measles?

Measles is a highly infectious illness caused by a virus. The virus lives in the mucus of the nose and throat of people with this infection. Physical contact, coughing and sneezing can spread the infection. In addition, infected droplets of mucus can remain active and can be passed on by touching (they are contagious) for around two hours. This means that the virus can live outside the body - for example, on surfaces and door handles.

### What are the symptoms of measles?

Once you are infected with the virus, the virus multiplies in the back of your throat and in your lungs. It then spreads throughout your body. The following are the most common symptoms of measles:

#### Related discussions

Guest 0 replies

Repeat MMR immunisation recommended on 13 month old

#### Advertisement

Assisted Living Costs

Compare Pictures Pricing Options

12 Facilities Near You

Click to See

#### Daily health

Check our homepage to:

- Get the latest health news
- Discuss your health with other people
- See what's trending in your area

Head to our homepage ►

#### Related Patient.co.uk forum groups

178 Infectious Disease

Comprehensive Discussions for nearly every medical condition

The screenshot shows the Dr. Reddy's Pediatric Office on the Web website. The header includes the website name and a navigation bar with links to 'Children's Health', 'Pediatric Resources', 'Fun Sites for Kids', 'HP Palmtops', 'Dr. Reddy's Home Page', 'Feedback', and 'Our Real Office'. The main content area is titled 'Measles and German Measles' and includes a sub-header 'Rubeola ("ordinary" measles)'. The text describes the symptoms of measles and German measles, and provides information on how to prevent and treat the disease. It also includes a section on 'Related Patient.co.uk forum groups' with links to 'Infectious Disease' and 'Comprehensive'.

www.dreddy.com/shots/measles.html

Dr. Reddy's Pediatric Office on the Web™

## Measles and German Measles

Children's Health Pediatric Resources Fun Sites for Kids HP Palmtops Dr. Reddy's Home Page Feedback Our Real Office

There are two 'forms' of measles: rubeola (the 'ordinary' kind), which causes more serious symptoms and can do permanent damage, and rubella ('German' measles), which is very benign if you have it infected early in pregnancy. Aside from some similarity in symptoms, there isn't much in common between the two viruses.

### Rubeola ("ordinary" measles)

Measles is a disease which usually produces [fever](#), [cough](#), [conjunctivitis](#) ('pink eye', but not quite the same as the 'pink eye' seen with colds and earaches), a red, bumpy rash, and a rash ('Koplik spots' well as monkeys and similar species); it does not affect animals.

It takes 1-1/2 to 2 weeks after exposure before someone develops the initial signs of infection, which include fever (which starts low but increases, sometimes to as high as 105 F) followed by cough, run from 1 to 7 days (but usually 2-4 days) after the 'prodrome' (the fever and other initial signs of infection); it usually starts at the patient's hairline, then spreads to the face and neck and from there to the rest of the body. The oldest rash lesions disappearing first. Koplik spots are tiny blue-white spots which appear up to 2 days before or after the rash shows up. Measles infection can also cause loss of appetite, swelling of the lymph nodes.

In some cases (about 1 out of 1,000) patients with measles develop inflammation of the brain tissue, or 'encephalitis'. Very rarely, a persistent rubeola infection can produce SSPE, a disease in which nerve cells are damaged, and the child develops mental retardation, epilepsy, and other serious problems. Now that we vaccinate most children against measles, SSPE is almost never seen. Up to 6% of patients with measles develop pneumonia, which can be either viral (from the measles virus itself) or bacterial (from a secondary infection). Measles pneumonia is a leading cause of death in children with measles. Measles pneumonia is also a leading cause of death in children with measles.

Before the vaccine came along, measles epidemics occurred about every 2 years, usually in winter and early spring when unimmunized children were together in school, and most measles patients were preschool children (kids younger than 15 months who haven't had the vaccine yet, and preschool kids who should have had the vaccine but haven't) and older children -- some in college -- who were *Measles outbreaks in the United States occur only in people -- children or adults -- who were never vaccinated and are still susceptible to measles infection*, or in those people who do not become immune because of this we now give a second dose of vaccine to all children, usually when they start kindergarten. Measles immune globulin is available and can prevent measles in someone who isn't yet immune within 6 days of exposure.

There are no antibiotics available for treatment of measles. Children who are deficient in vitamin A seem to be more likely to have severe measles (and more likely to die from the infection) than are children who are not. UNICEF recommends giving 1 to 3 doses of vitamin A to children older than 6 months who have measles and are hospitalized because of measles or its complications or who are malnourished, have immune deficiencies, or who are in a high-risk area. Since vitamin A can be toxic in excessive doses, the supplement should only be given on the advice of the child's doctor. Antibacterial antibiotics can be used to treat bacterial pneumonia occurring during measles.

### Rubella ("German measles")

Rubella is a pretty benign disease as viral diseases go: your symptoms usually include a red, bumpy rash, swollen lymph nodes (most often around the ears and neck), and a mild fever; some people also have joint aches and pains. Rubella is a much less serious disease than measles, but it can be very dangerous if you have it infected early in pregnancy. It can cause serious birth defects in the developing baby. There have been babies born with rubella, and being immune to one kind of measles does *not* make you immune to the other kind.

Unfortunately, if a woman has rubella during the first 3-4 months of her pregnancy, the virus can induce many different birth defects, some of which are quite severe. Among the defects doctors have seen are 'microphthalmia' (small non-functional eyes), heart problems (defects of the wall between the two sides of the heart, narrowing of the arteries to the lungs, and an open duct bypassing the lungs), ear problems, and neurologic problems (including mental retardation) -- among others. For that reason, obstetricians test every pregnant woman to make sure that she is immune to rubella, and we try to immunize every pregnant woman. We usually give two doses (as the combined measles-mumps-rubella, or 'MMR', vaccine) to be sure that every child is immune. This helps protect non-immune pregnant women too, but it doesn't protect the developing baby: there have been babies born with rubella, and being immune to one kind of measles does *not* make you immune to the other kind.

# Reduce your data-to-ink ratio

Student	Item Number				
Student	1	2	3	4	5
Anderson, Melanie	1	0	0	0	0
Dalton, Craig	1	1	1	0	0
Gallego, Peter	1	1	1	1	1
Herrera, Sylvia	1	1	0	1	0
LaCrosse, Martin	1	1	1	0	0
Peterson, Michelle	1	0	1	1	0
Sanders, Karen	0	0	0	0	0
Walters, Darren	0	1	1	0	0
Wu, Alice	1	1	0	0	0



Overview first, zoom and filter, then details on demand.

—Ben Schneiderman

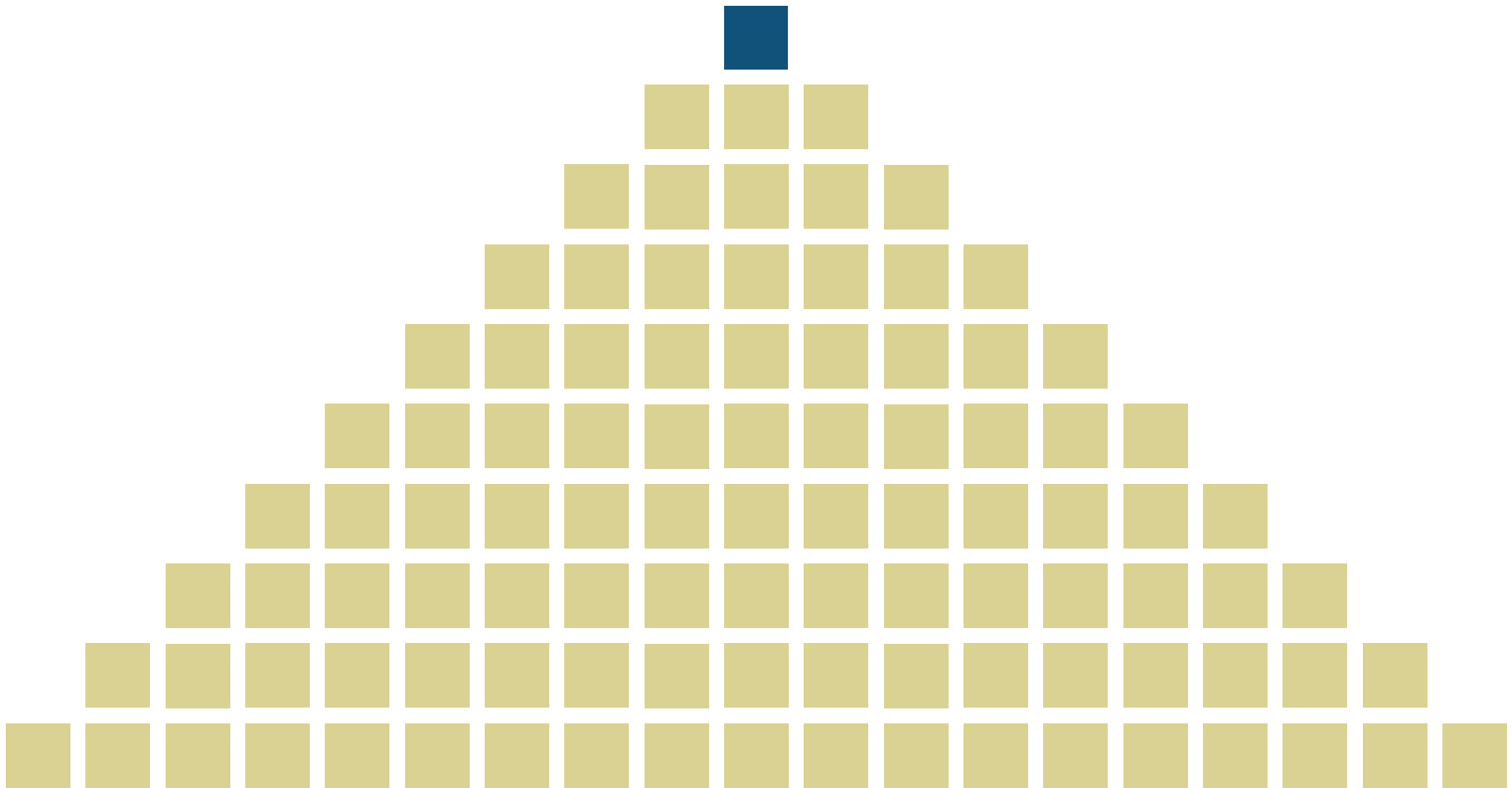






The most **powerful** single modification that enhances achievement is **feedback**.\*

—Hattie, 1992



# Impact of Feedback on Achievement

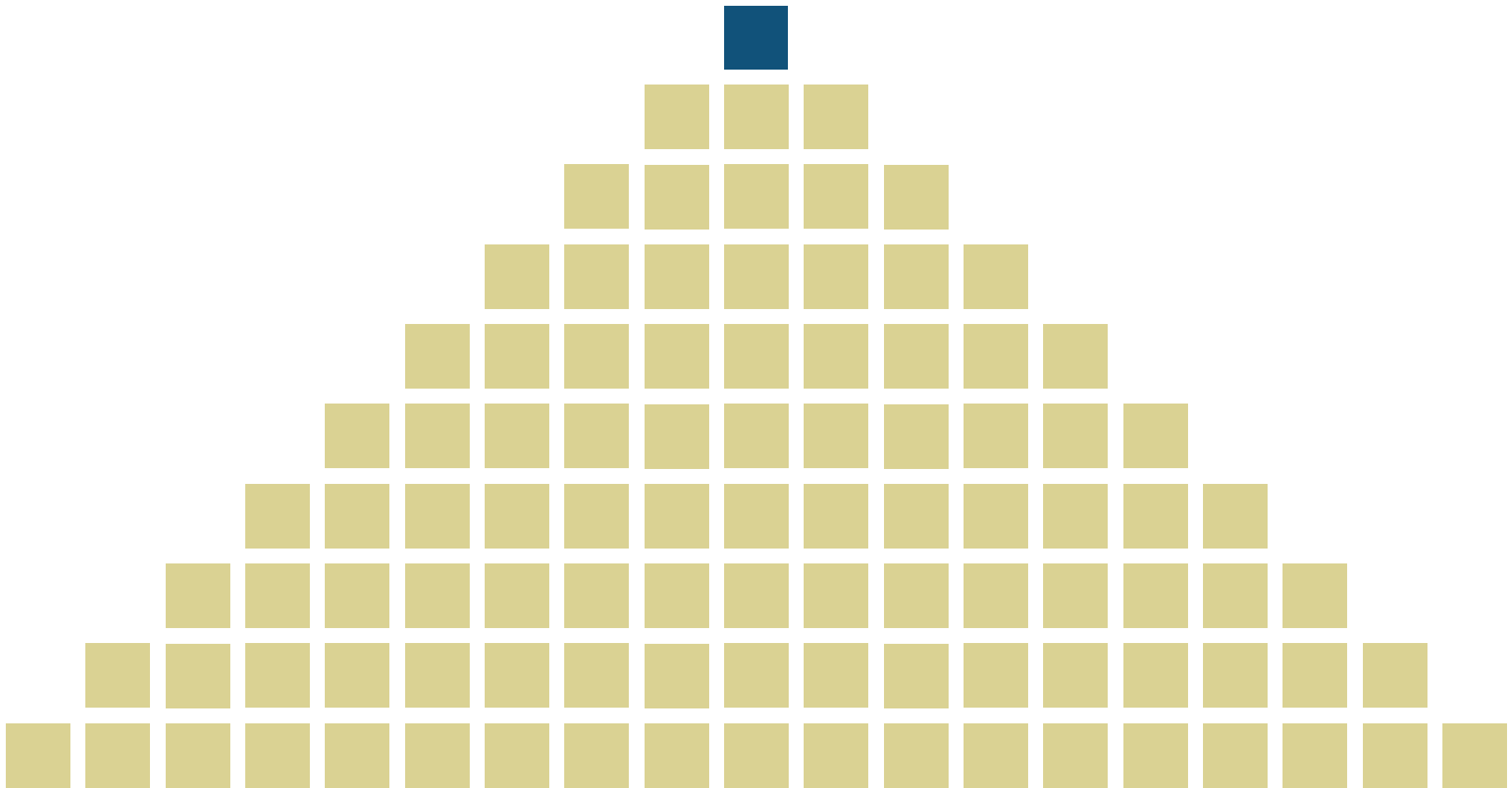
Type of feedback	% Effect
Apply a rule (intervention)	32
Display results graphically	26
Explain correct answer	20
Repeat instruction until students successful	20
Grading criteria understood by students	16
Provide correct answer	8.5
Mark answers wrong	-3

Fuchs and Fuchs, 1986


The most powerful single modification that enhances achievement is feedback.\*

*a goal<sup>^</sup> set by*

—Hattie, 2008



# When does information become a junk chart?



Wizard of Oz (1939)

A movie barcode for 'Wizard of Oz (1939)'. It consists of a dense array of vertical lines in various shades of brown, tan, and dark grey, creating a textured, wood-like appearance.



Amelie (2001)

A movie barcode for 'Amelie (2001)'. It features a dense array of vertical lines in shades of olive green, yellow, and brown, with a dark, textured vertical strip on the right side.

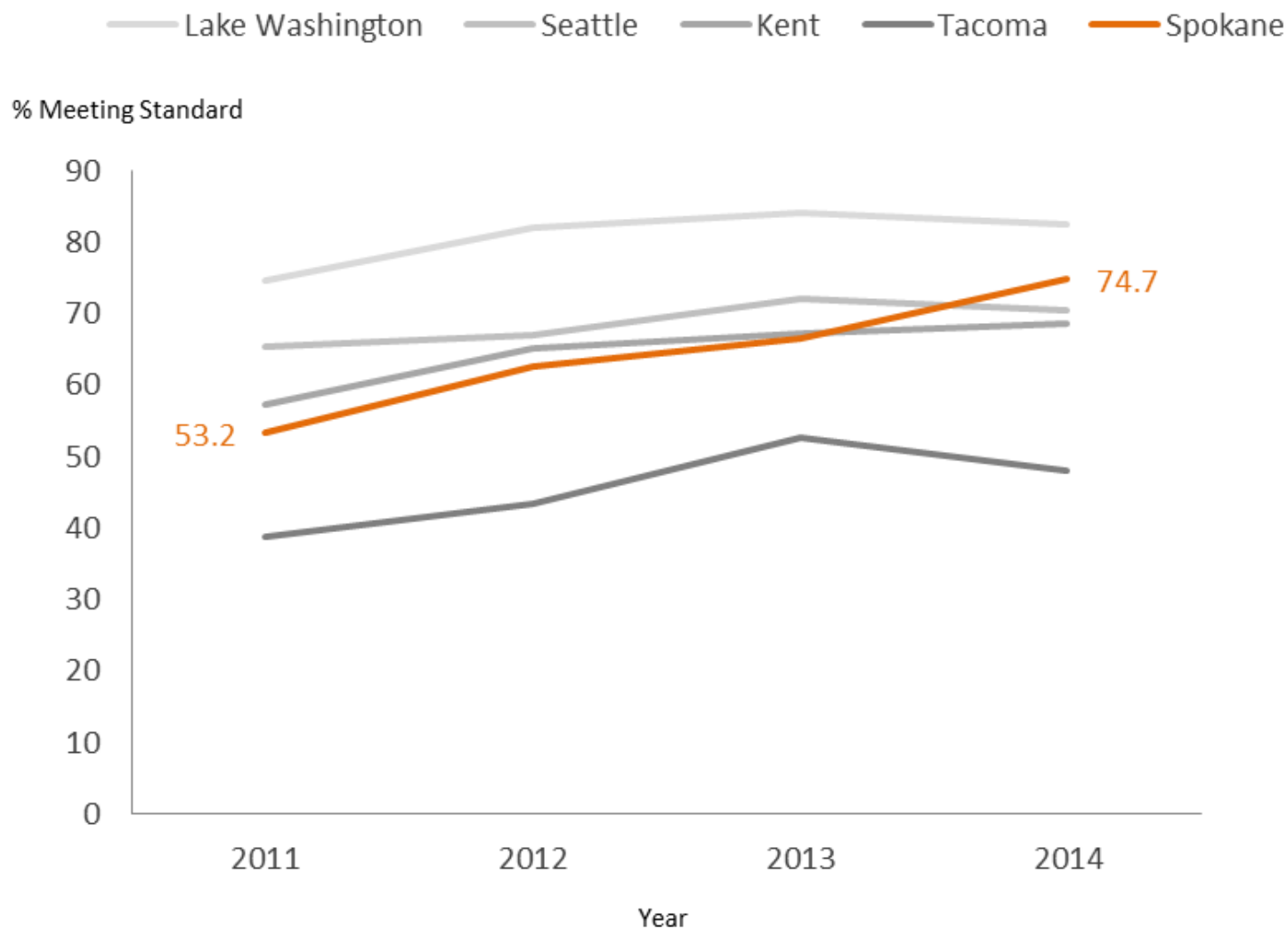


Speed Racer (2008)

A movie barcode for 'Speed Racer (2008)'. It is a dense array of vertical lines in a wide range of colors including blue, red, orange, yellow, and green, creating a vibrant, multi-colored effect.



Since 2011, 7th grade students in **Spokane** have made consistent gains on the Washington state math assessment compared to the other four largest districts.

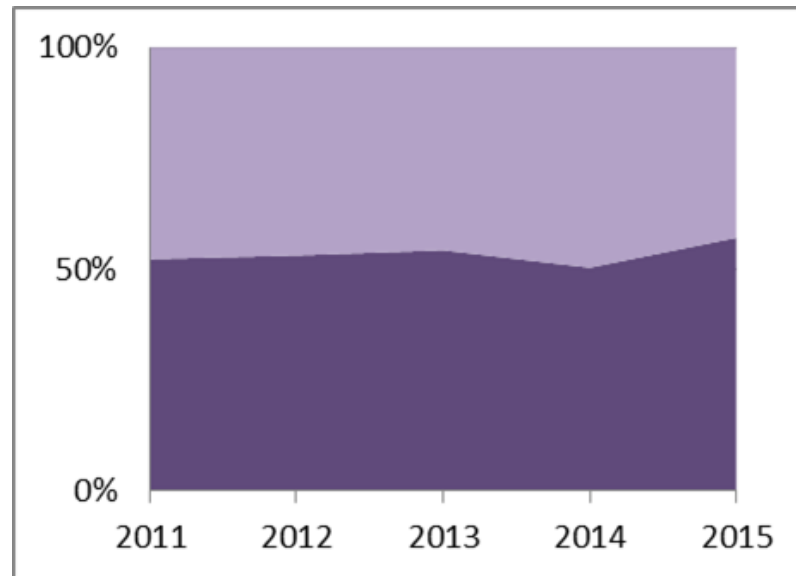
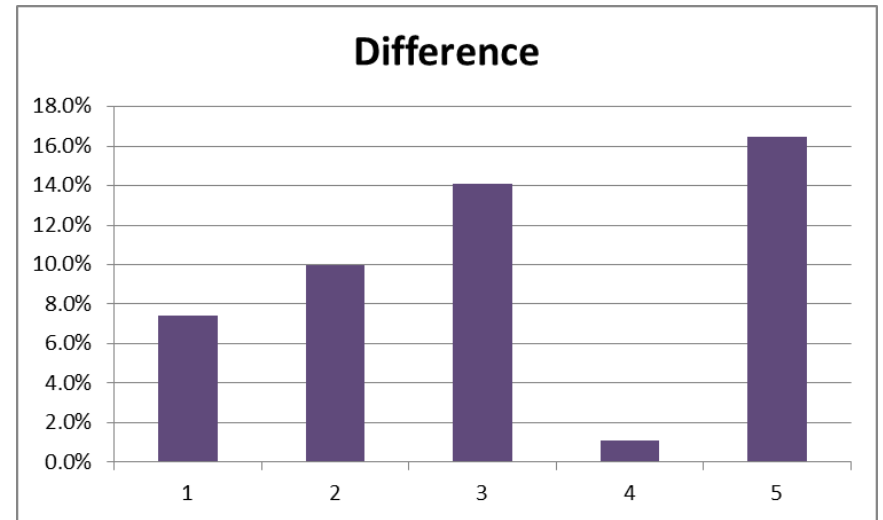
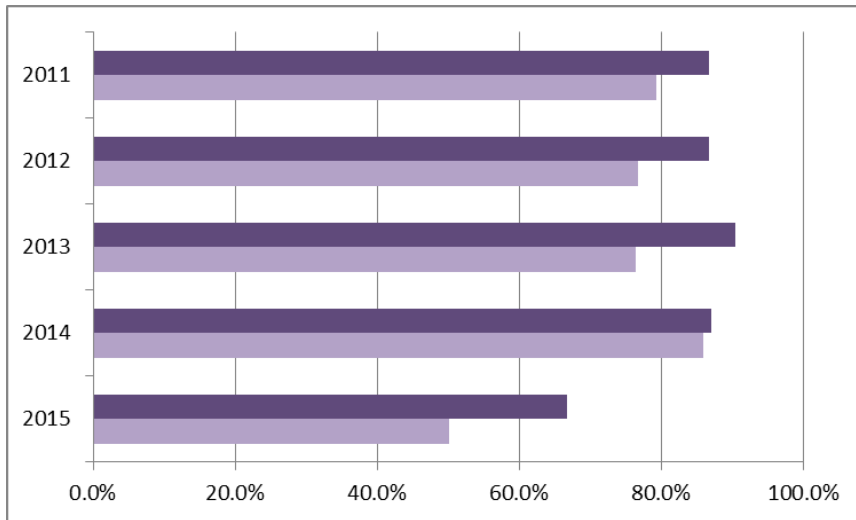


## Tell us a story

Finalize your story, based on ways to **make it more “glanceable”** for the audience.

Be prepared to share your ideas at your table.

# My story



# My story

English Language Arts  
n = 431 | 57.4% met standard



English Language Arts

	Gender		Ethnicity							Program			
	Female	Male	American Indian	Asian	Black	Hispanic	Pacific Islander	Two or more	White	GenEd	SpEd	Low-income	Not Low-income
n	190	241	1	14	3	50	1	48	312	367	54	159	267
%	66.7	50.2	0.0	70.0	33.3	44.0	0.0	50.0	60.9	61.9	24.1	41.9	65.9





When you use data to study people, ask  
*Who gains power with this information?*

If it's not the people  
whose data you are  
using, there's a problem.  
—Hilary Mason

A decorative border of colored squares surrounds the central text. The squares are arranged in a grid-like pattern, with some squares missing to accommodate the text. The colors include various shades of brown, green, orange, red, blue, yellow, and pink.

# Session Goals

- Identify and apply best practices for visual communication.
- Select tools and strategies to tell stories using data.

# Use data to tell your story



Tara Richerson



Tumwater School District  
621 Linwood Avenue SW  
Tumwater WA 98512



360.709.7033



[tara.richerson@tumwater.k12.wa.us](mailto:tara.richerson@tumwater.k12.wa.us)



<http://excelforeducators.blogspot.com>



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view resources for this  
presentation. Or visit  
<http://infovisualization.pbworks.com>