THE BRAIN AND TECHNOLOGY

Brain science in interface design

LESSON 4. RECOGNITION

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RECOGNITION

These images are the same pixels – just rotated!

We "Form" Images.

PART 1. RECOGNITION IS CORTICAL

Visual data goes to:

- The **visual cortex** for object recognition

- The **hind brain** by an older subcortical pathway for spatial location and motor responses

  - See "Imaging implicit perception: promise and pitfalls". Deborah E. Hannula, Daniel J. Simons & Neal J. Cohen. **Nature Reviews Neuroscience** 6, 247-255 (March 2005)

Object recognition and spatial movement triggers for motor responses are entirely different visual functions, with their own sensory inputs.

Recognition identifies the object to decide:

- Friend or foe?

- Useful or not?

- Action or not?

In other words, **what it means cognitively**
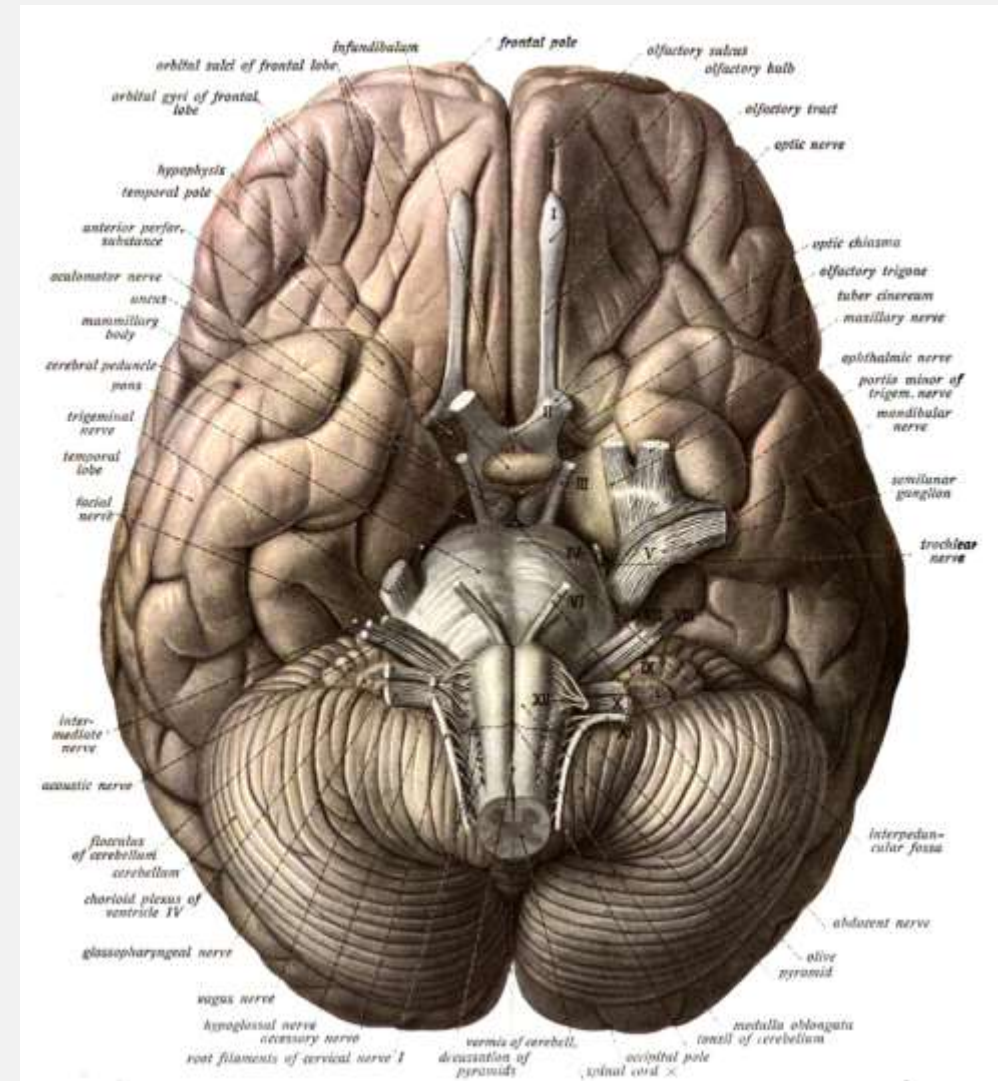
Human Brain from Below

RECOGNITION REQUIRES CHOICES

Vision is about processing choices - it isn't **data determined.**

* Do you see:
    * A young girl?
    * An old lady?
    * It depends on how your brain processes the data.
* *The spinning ballerina*
    * Some see it clockwise, others anti-clockwise.
        * See: http://thoughtslot.blogspot.co.nz/2008/02/spinning-nude-lady.html
    * Visual data is **equivocal**, so processing must make **choices.**
* Human vision is based on **evolutionary heuristics.**


Young or old woman?

Spinning ballerina illusion

THE BLIND SPOT

- *The eye has a cabling problem*.
  - It must send data to the brain.
  - The optic nerve has no light receptors.
- Each of us has a visual field "hole"—
  - About the size of a ten-cent piece
  - Why don't we see it?
- To see what is really "out there", the brain has to *filter out the "noise"*.
  - **Floaters**: close your eyes to see;
    - Spots, specks and strings, which are impurities in the vitreous humour that reflect on the retina.
    - Again the brain filters these out

Optic nerve
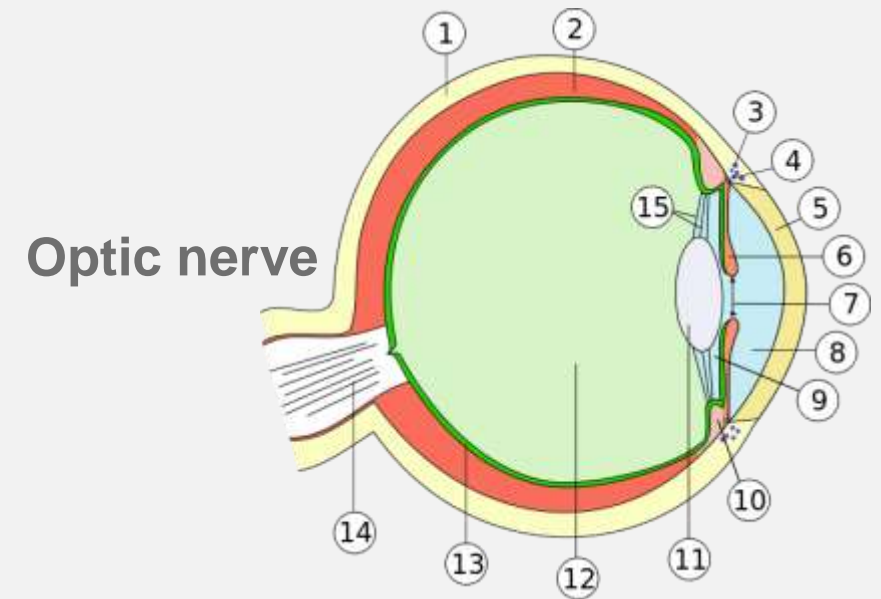
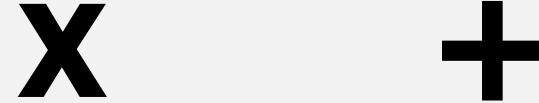**Eye "floaters"**

TRY FOR YOURSELF

Prove there really is a gap in your vision.

1. Take off your glasses.
2. Cover your right eye.
3. With the left eye, focus on the dot (**cross outside**).
4. **Slowly**, move your head closer or further from the screen.

When the cross disappears from view, it is the blind spot.

Or, print the page and do it.

For the red cross, the brain fills in the line!

X   +

—X——   +

PART 2. THE VISUAL HIERARCHY

Equivocal data can be processed in more than one way.

- **The brain has** to make decisions about how to process visual data**.**

- **Object recognition** involves **resolving** these **ambiguities in sequence**:

  1. **Border** ambiguity

  2. **Figure-ground** ambiguity

  3. **Framing** ambiguity

  4. **Composition** ambiguity

  5. **Feature** ambiguity

  6. **Classification** ambiguity

The six steps of object recognition

"*A picture is worth a thousand words*" because the processing amount is the same.

Each step:

- Increases the degree of **abstraction** (or encoding)

- Reduces the amount of **actual data** handled

In this **data processing cascade**, small initial difference can have big final effects.

Reality is equivocal

AMBIGUOUS INPUT

- Sensory input can be processed in more than one way.
- The brain's processing hierarchy :
  1. Identifies signal **changes** (e.g., boundaries)
  2. **Eliminates** noise, e.g., brightness, distance, angle
  3. Forms likely **hypotheses** of:
     a. Background (peripheral)
     b. Foreground (for recognition)
     c. Object frames and forms
     d. **Then smooths and enhances** the result!
- Vision is about usefulness, not correctness, and prediction, not realism.
  - The eye isn't a camera; the retina isn't a film, and we aren't an observer watching a movie.
  - Realism is wasted on vision.
  - Illusions are **business as usual** for vision.
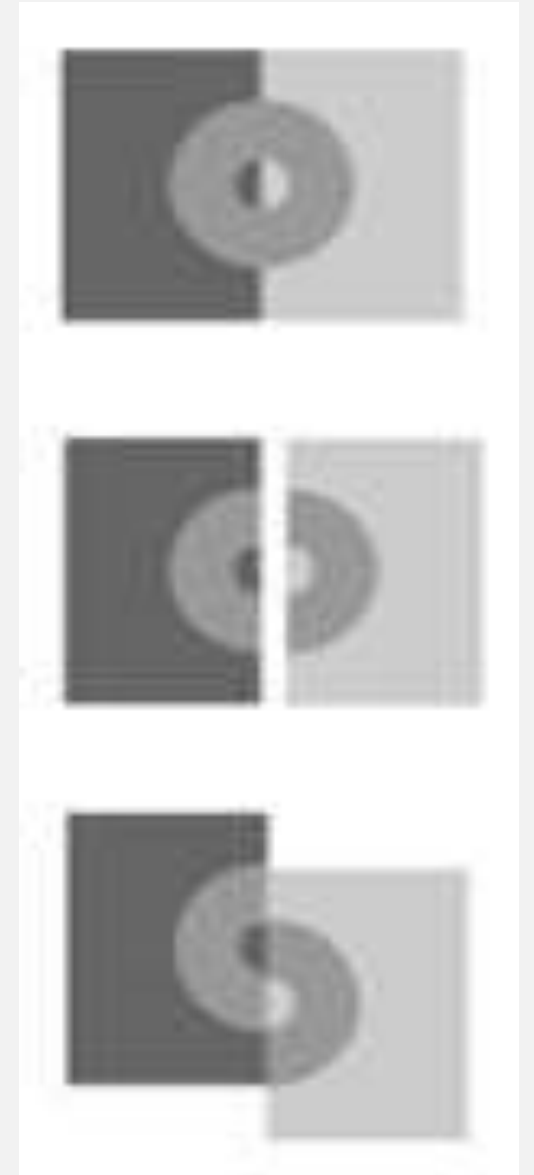
Koffka ring illusion

PERCEPTION IS CHOICE

Perception **isn't** an undistorted window.

- There is no "red" in the electromagnetic spectrum!
- Retina is 2D information about a 3D world.
- Every view is a **best fit model** of the input data.
- Every perception makes assumptions.
  - Each is a set of processing choices.

The same applies to **concepts.**

- People **cherry-pick** Internet "facts".
  - Selecting facts is **bias**, not science.
- Each generation sees the world differently.
  - **Silent generation** (1925-45) Repair/save everything
  - **Baby boomers** *(*1946-1964) Repair/save many things
  - **Gen-X** (1960s-1980s) Chuck it and buy another
  - **Millennials** (1990-2000) What's **repair**?
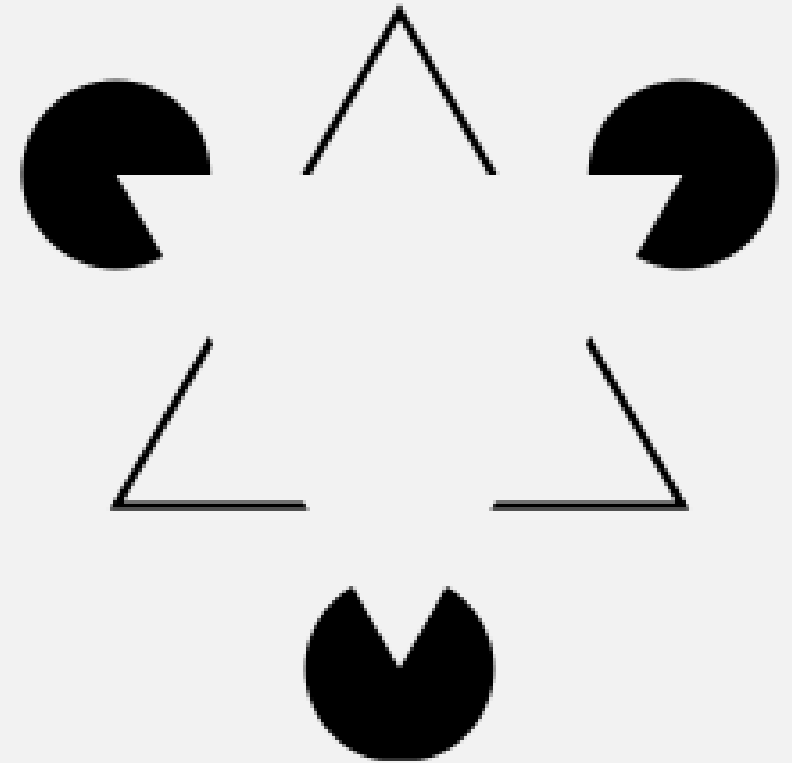

An illusion!

Four generations

PART 2. BORDER AMBIGUITY

Kanizsa's triangle has a border that mostly **isn't there!**

- Low-level visual processing

    - **Rejects** the idea that many lines terminate abruptly

    - **Deduces** that a triangle edge is there

    - **Other processing** then supports this

- Knowing it's an illusion doesn't alter what the brain sees.

    - The brain does the best it can with the data it has.

    - Perception is a **best guess** of what is "out there".

Kanizsa's triangle:
We see an edge that mostly isn't there!

EXPLANATION – BRAIN "RETOUCHING"

Kaniza's illusion occurs as follows:

The brain alters input brightness:

- The triangle seems brighter?
- Outline it and the effect disappears because the enhancing is no longer needed.

Why do we see a triangle?

- Many lines stopping is unlikely.
- An obscuring edge is more likely.
- The visual system deduces a **probable** boundary.
- Then it enhances it!

The brain **retouches perceptions** just as we

- Retouch photos to smooth wrinkles and whiten teeth.

RETOUCH

JENNIFER GARNER
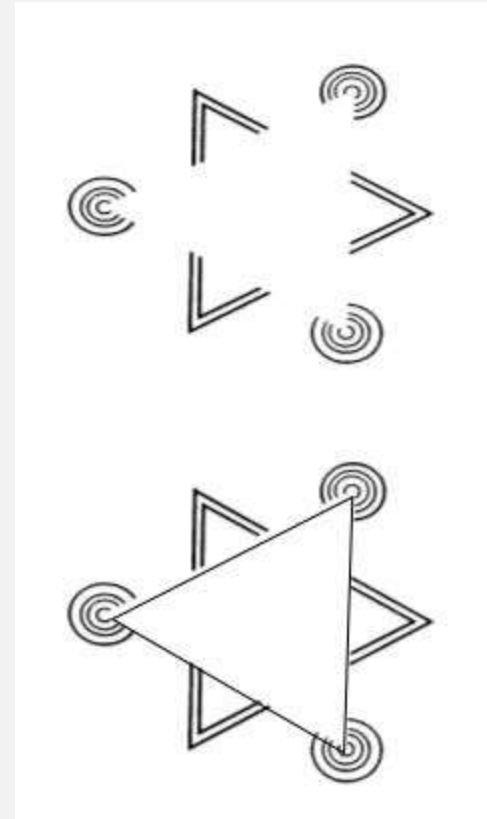
FIGURE/GROUND AMBIGUITY

Do you see?

- A **vase or faces**?
- People or Arrows?

- Either side could be an **object.**

- Processing decides then makes:
  - **Ground**: Continuous, undefined, boundless
  - **Figure**: Hard surface with a clear boundary

- A boundary side is figure or ground.
  - A choice must be made!
  - To be seen, an object must first be a figure.

Vase   People
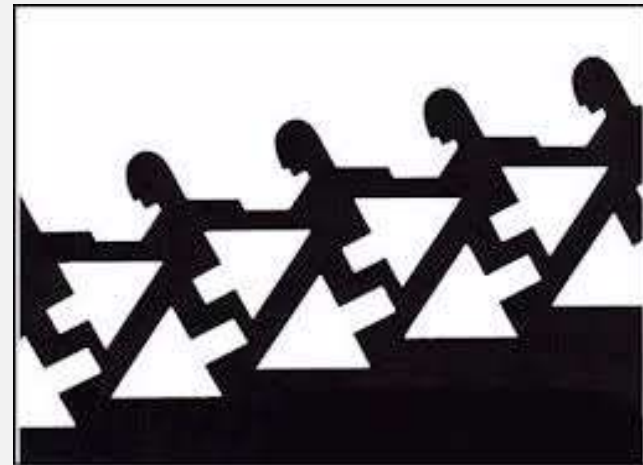
Can you see both ways?

FIGURE

An **object** has a:

- Clear boundary
- Known shape
- Hard shiny surface
- Shadow that is cast

- The brain **has to make a choice**

  - Then **fixes** the result to fit
  - So you get **one** view, not two.

- In **illusions, the brain** gets it wrong

  - Illusions are **business as usual** for the visual system.
  - Biological heuristics don't always work.

Border makes objects stand out!

BACKGROUND

Backgrounds should be:

- Fuzzy or out of focus
- Continuous across the field
- Based on repetitive patterns that favor parallel processing
- Not attracting attention—e.g., not faces, not colorful, not moving, …

- Background is processed apart from the object.
  - People **effortlessly** process textures over the entire visual field.
  - Adding a background doesn't increase information overload.
  - Backgrounds can **repeat tiny shapes.**
    - **Textons***:* Tiny background elements that repeat
  - Backgrounds can add:
    - **Feel:** Silky, smooth …
    - **Space:** Openness, calm, …

Picture of the sky from my backyard

# TEXTURES

Textures are based on **textons** that **repeat**

A **texton** is a simple percept that can be **tiled**.

- All wallpapers are built on **repeated patterns**
- Texture backgrounds can change to give:
  - **Boundaries** (sudden changes)
  - **Gradients (**gradual changes)

Texton recognition is very simple, based only on:

- **Collinearity** – Number of line segments
- **Terminators –** Number of end points

Textures are produced by textons
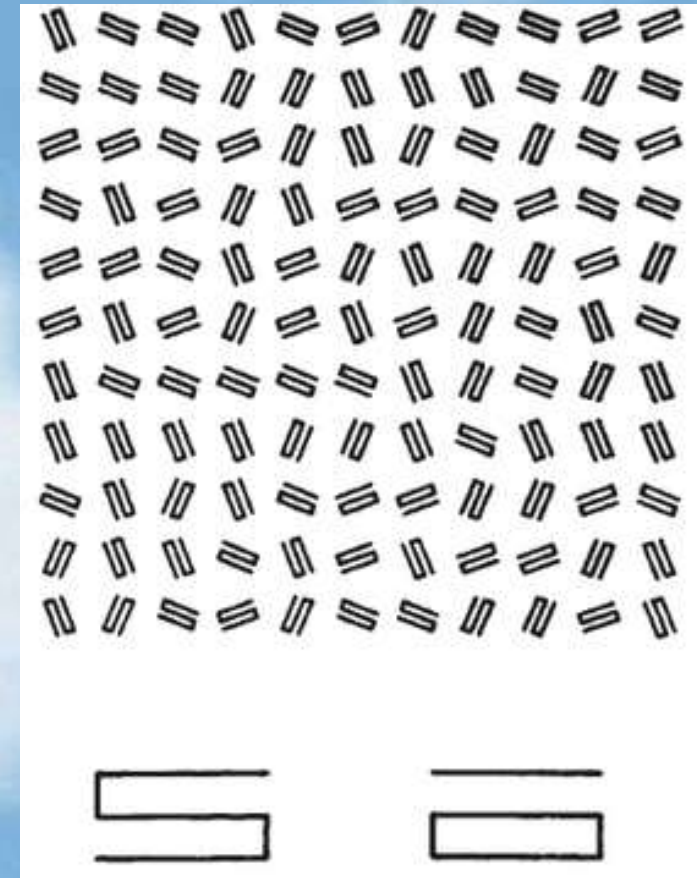
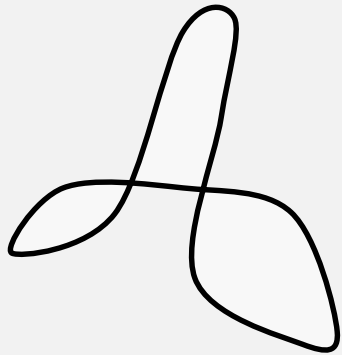Textons with equal terminators are indistinguishable to peripheral vision.

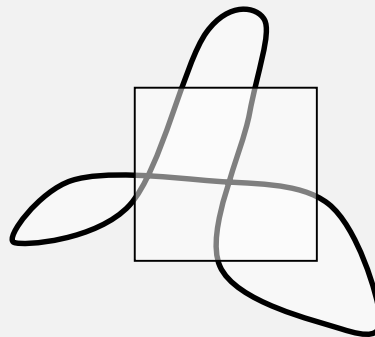# PART 3. FRAMING AMBIGUITY

How to analyze a visual field?

- Which set of pixels?
- Which set of edges
- Which set of lines?

Framing*:* Choose the set of pixels to analyze

Do you see a 4?

Let me frame it for you ...

Fruits become a "man"

THE FRAMING PROBLEM

In a 1,000 x 1,000 pixel field:

- A 10x10 object can be framed in 990 x 990 = **980,100 ways**
- A 20x20 object can be framed in 980 x 980 = **960,400 ways**

- The **frame options** soon become **enormous**!
- Even a supercomputer can't just calculate every option.
    - We need a frame to start object analysis.
    - We need object clues to know the frame.
    - It's a chicken-and-egg problem.
- **Framing**:
    - A huge **processing challenge**
    - The processing area must be **framed** before an object in it can be **formed**.

Can you see the fish?

THERE IT IS

With framing, you see the fish.

- Now look at the non-framed picture again and the fish is **obvious**.

Speech framing

- **Turn to page 54** - Sorry what page?

- **OK everyone**! (gets attention) **Turn to page 54**
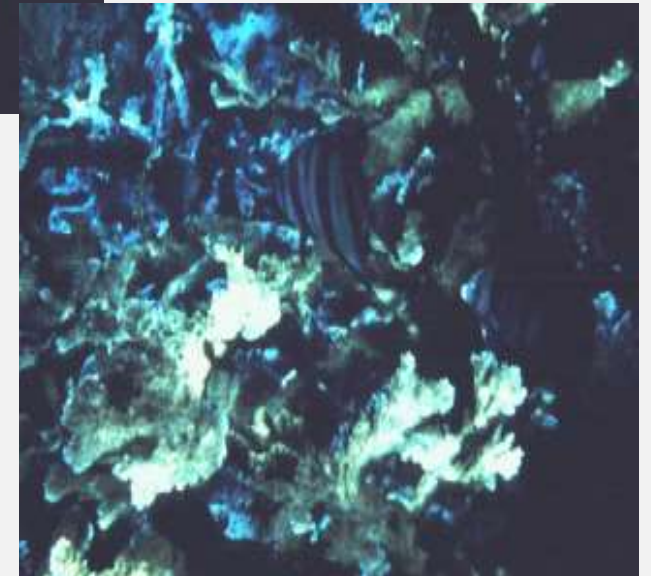
Idea framing

- **Words** that describe can be in bold or italics.

- **A picture** can emphasize an idea.

- **Symbols** can represent an idea.

Visual framing

- Framing important words, pictures and symbols simplifies brain processing **a lot**.

Let me frame it for you.

Now it is "obvious"

FRAMING HELPS

Framing helps
- **Outline** object **boundaries**
- **Crop** images to frame better
  - **Easier** brain processing
  - **Less** data storage
  - **Faster** download times
- **Frame** the important:
  - If it isn't framed, it isn't important.
- **Let visitors frame things.**
  - **Highlighter**: Physical framing device
  - **Web annotators**
    - People share comments.
  - **Web highlighting** is easier.
    - People share highlights.

Cropping and highlighting

FRAMING EXAMPLES

No framing of text or picture

Note the changes

From psychedelic to calm

Obvious main menu

Shows are clickable

Host picture gone – how sad
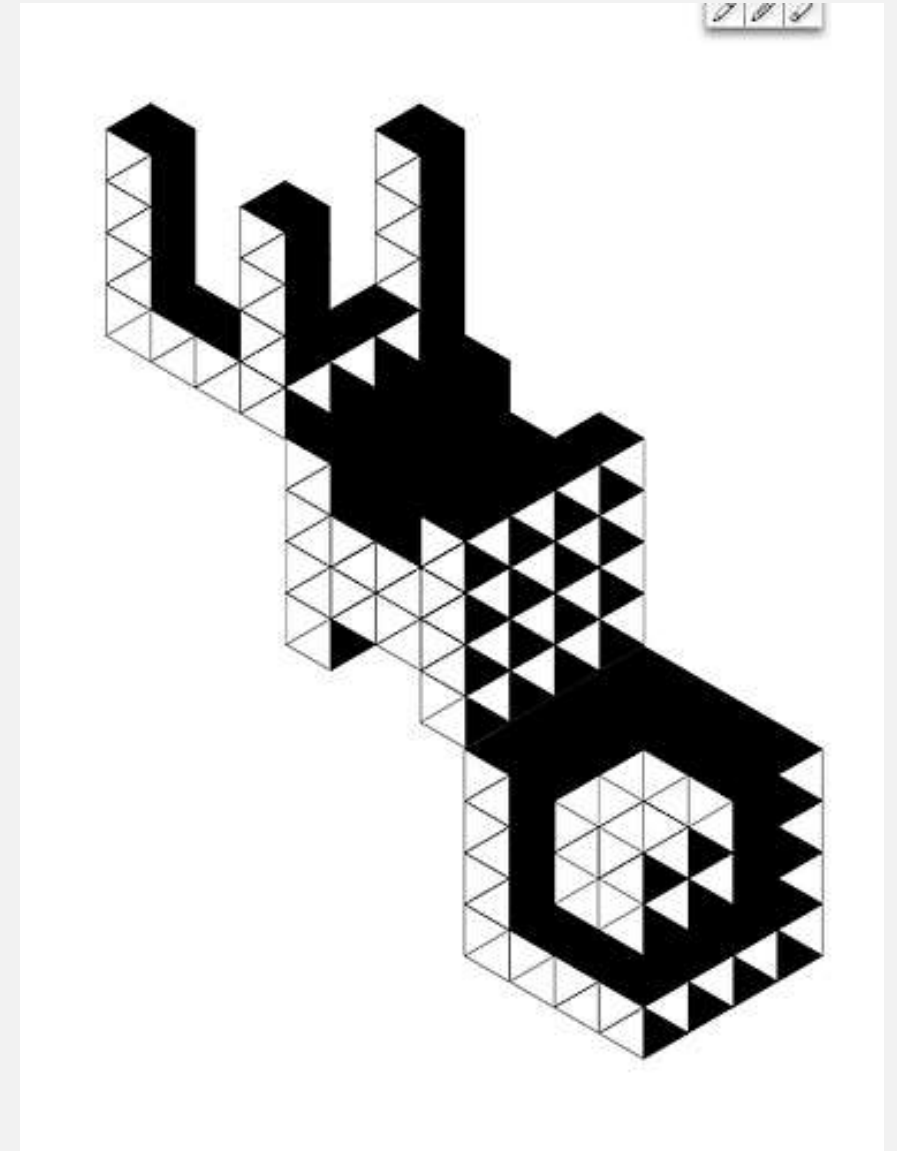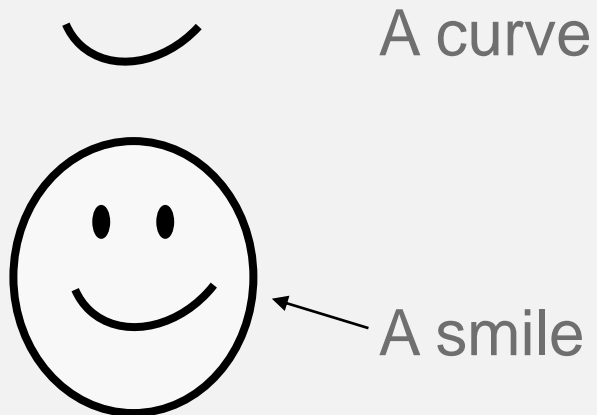
Less contrast, no 3D, less exciting

Same site redone

PART 4. COMPOSITION AMBIGUITY

How do elements **form** a figure?

Gestalt theory:

- Parts **interact** to create a **whole** that alters the **parts**.
- So, the whole **gestalt** is more than the sum of its parts.
- **The whole = the parts + interactions**

A curve

A smile

What do you see?

THE FRANKENSTEIN EFFECT

The **Frankenstein effect**:

- **Dr Frankenstein** chose the **best** body parts from a graveyard and sewed them together.
- The result was a monster because he ignored the **part interactions**.
- **Frankenstein** web sites think that good parts make a good whole.

Perception is **holistic**:

- Parts can **harmonize** or clash.
  - Context can contradict content:
    "I AM NOT ANGRY!!"
- One part can change the whole effect.
- **The US cop danger scale**
  - **High**: Male, black, tattoo, hairy, big, motorcycle
  - **Low**: Female, asian, small, glasses, old, bicyclist
   - Perceived danger ≠ actual danger
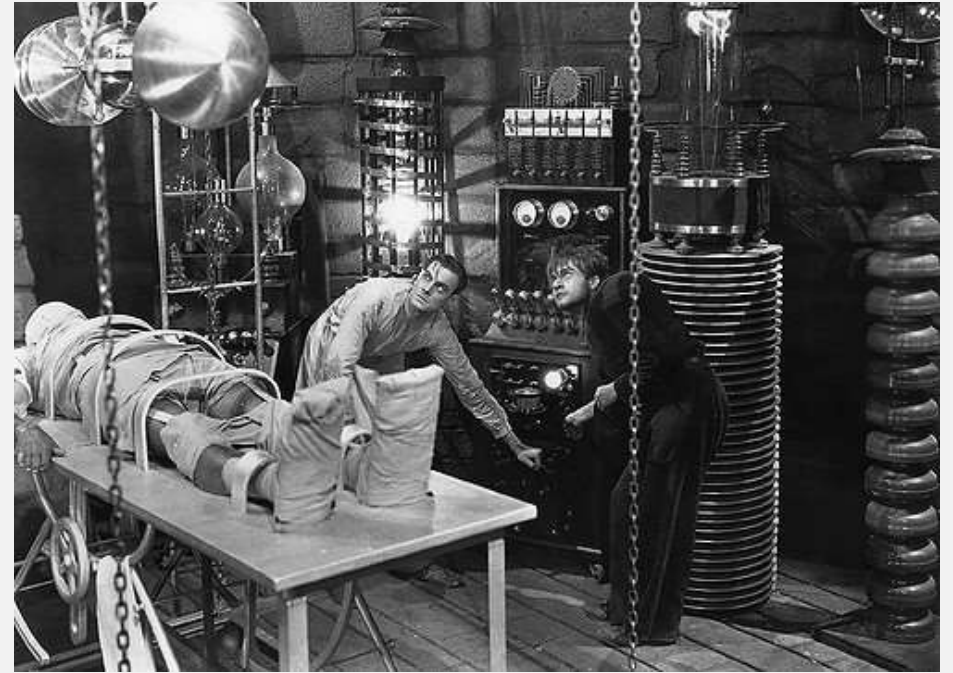
REDUCTIONISM VS. HOLISM

Reductionism: Whole = part1 + part2 + …

- **We can always**:
  - Break a thing down into its parts
  - Understand each part
  - The whole is the sum of the parts.
- This **fails** for the brain.
  - Breaking the brain down into neurons doesn't explain the brain—see Jeff Hawkins' TED talk.
  - **We can't** go from neurons to **knowing**, and **knowing that we know.**

Holism: Whole = ΣParts + **Interactions**

- **Interactions** increase geometrically and so become more important than the parts in complex systems.
- The **performance** of modern societies is mainly based on **synergies such as trade.**
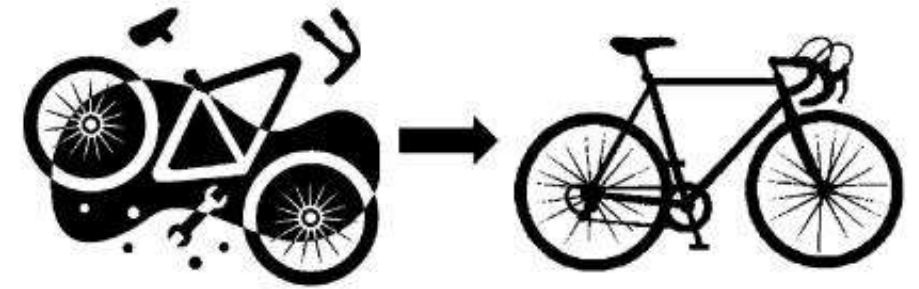
Sum of the parts equals the whole
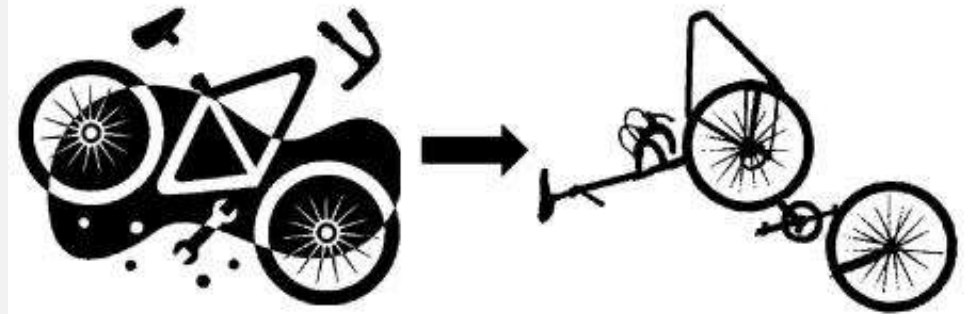
Can't reduce the parts and retain the meaning of the whole

$$f\left(\bigcup_i x_i\right) \geq \sum_i f(x_i)$$

THE RULES OF COMPOSITION

Visual processing evolved perceptions to be **useful, not correct.**

- **Likely** reality interpretations

The **Gestalt** rules of how parts form a whole shape are still used by artists and designers today.

- **Proximity***: Things close together are together.

- **Continuity**: Single objects continue.

- **Similarity**: Things that look the same are the same.

- **Closure***: We form shapes despite missing parts.

- **Simplicity***: We always prefer the simplest option.

Simplicity is the law behind all the other laws.

Evolutionary directive:

- **Reduce the information but not the perception**
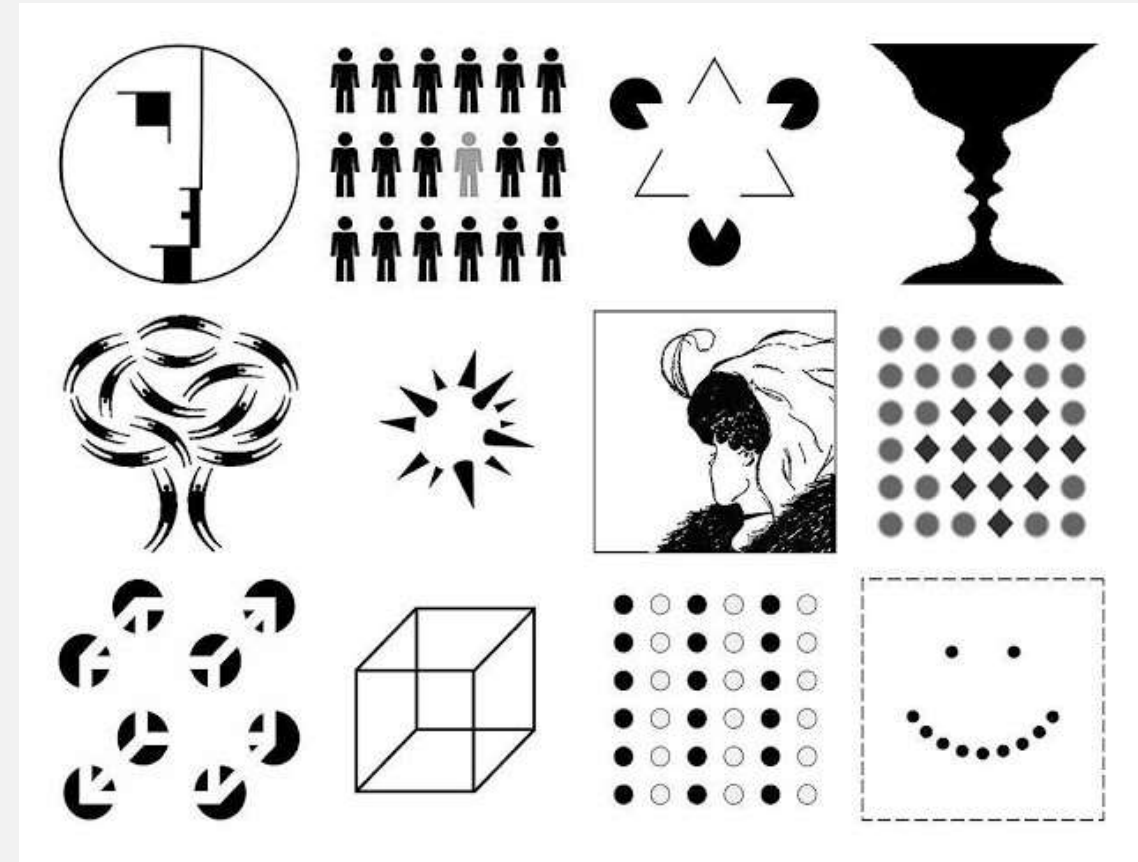
PROXIMITY

Things close together are together.

- E.g., dots form into a line.
- Dotted lines are **equivalent** to solid lines.
- **Put like things together** (in same place).
- **Location** is as important as content.
- What goes with what?
- Put same **purposes together**
  - **Group visitor options**:
    - About **you**, places you might want to see
    - **Our services**: About **us**, the hotel
  - Muddle them in a random list, and people don't read it.

Phone: 122345   *Fax*: 322345
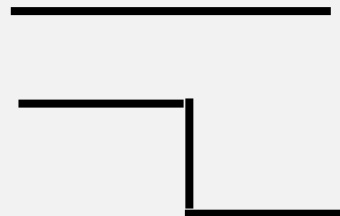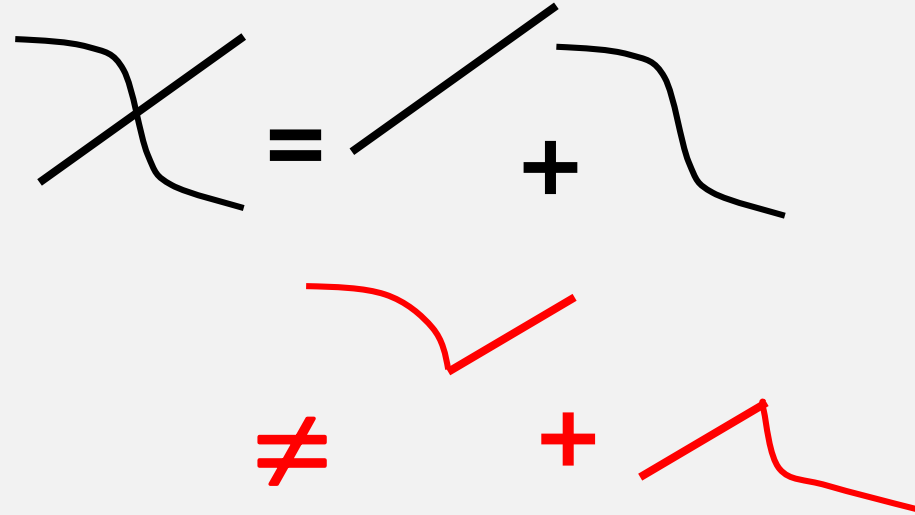*Email*. me@gmail.com   *Web*: Myplace.com

Phone: 122345   *Email*. me@gmail.com
Fax: 322345   *Web*: Myplace.com

home page	category	sub-category
new york city	going out	clubs
		bars
		hotels
		restaurants
	sightseeing	tours
		parks
		shopping

CONTINUITY

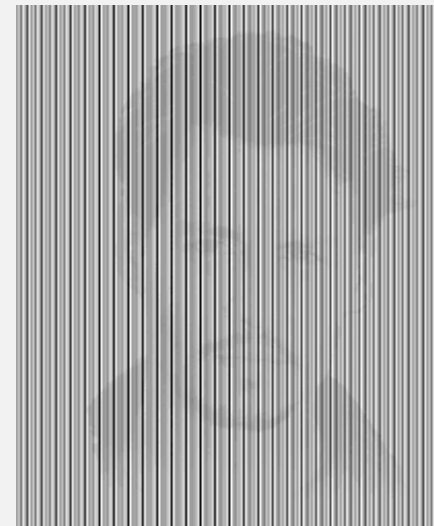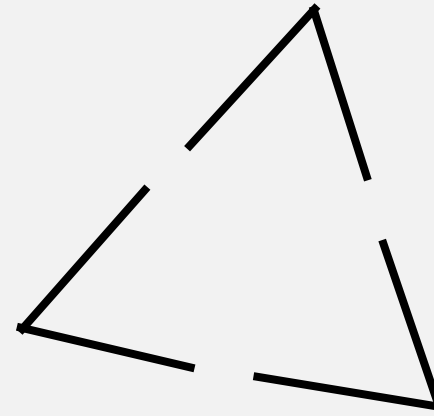**Single objects continue**

- This shape is seen as:
  - A straight line plus a curved

  - Not these segments

- Use continuous not bent screen lines.

CLOSURE

We form shapes despite their missing parts.

- This is seen as a triangle, not three **V**s.

  - Missing parts are assumed to be accidental or covered.

- So:

  - Don't worry about realistic perfection.

  - Get the whole right, not the parts.

  - A background is assumed to continue.

  - Let the viewer finish what you start.

    - You don't have to do everything.

    - People are active, not passive.

    - Work with human nature.

SIMILARITY

OXOXOXO
OXOXOXO
OXOXOXO
OXOXOXO
OXOXOXO

Things that look the same are the same.

- We see vertical columns of letters, not OXOXOXO rows.
- Present same-type elements the same way:
  - Colors, fonts, size, structure, texture…
  - Without **reading** anything, we **recognize** the six BBC channels.
  - To recognize one is to know something about all.

Make same parts the same!

- Don't make different parts the same!

SIMPLICITY

The **information reduction** principle includes all the other principles.

- We see the **simplest explanation**
- That gives the biggest **data reduction.**

For example*:*

- A is simpler as a **flat figure**, so we see that.

- B is simpler as a **3D cube**, so we see that.

- Either figure could **logically** be either way!

- Computer **power** finds them **equivocal**, but brain efficiency picks one.

Evolutionary directive: Reduce the **information** but not the **perception**

- Just as data compression like .wav to .mp3 gives the same sound for less bits
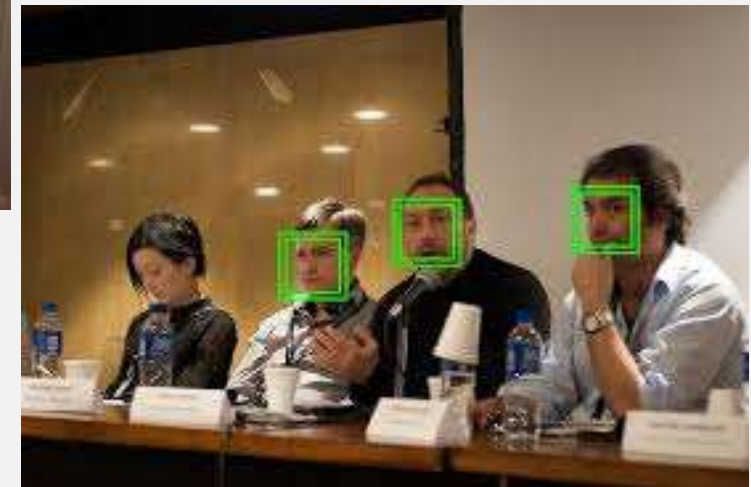
A

B
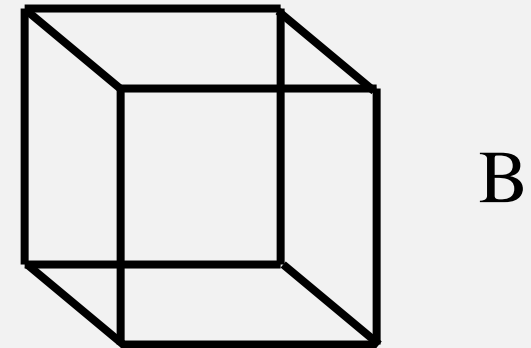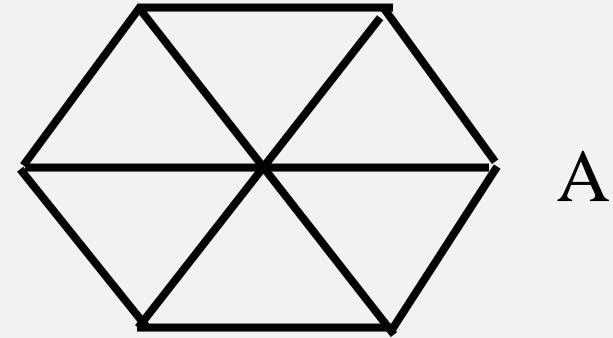
5. FEATURE AMBIGUITY

Feature*:* An object's **aspect** that distinguishes it:

- A **part:** Big smile
- A **relation:** Hip-to-waist ratio
- A **combination***:* face recognition
- Analysis works on **features**.

- **Cartoonists** exaggerate key features.

  - So should you
  - Not all pixels are equal!
  - Small changes can have big effects.
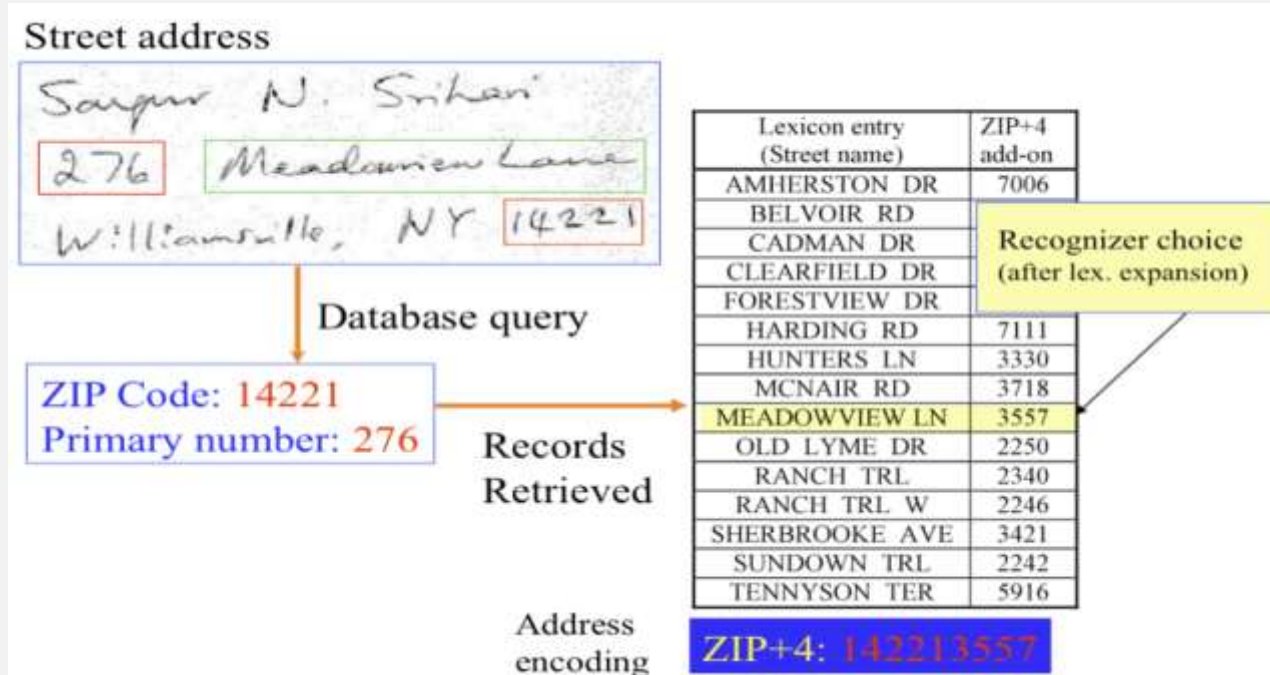
RELATIVE FEATURES

- Handwriting recognition is based on line/curve **relations**.
- 4 becomes 9 by lengthening the upright.
  - The transition from one to the other is continuous.
  - The feature is the line-curve **ratio**
    - Not either element in **itself**.


Street address

Lexicon entry (Street name)	ZIP+4 add-on
AMHERSTON DR	7006
BELVOIR RD	
CADMAN DR	
CLEARFIELD DR	
FORESTVIEW DR	
HARDING RD	7111
HUNTERS LN	3330
MCNAIR RD	3718
MEADOWVIEW LN	3557
OLD LYME DR	2250
RANCH TRL	2340
RANCH TRL W	2246
SHERBROOKE AVE	3421
SUNDOWN TRL	2242
TENNYSON TER	5916

Recognizer choice (after lex. expansion)

Database query

ZIP Code: 14221
Primary number: 276

Records Retrieved

Address encoding

ZIP+4: 142213557

TADPOLES

Pre-school children typically draw people as **tadpoles** i.e., they **attach the limbs to the head.**
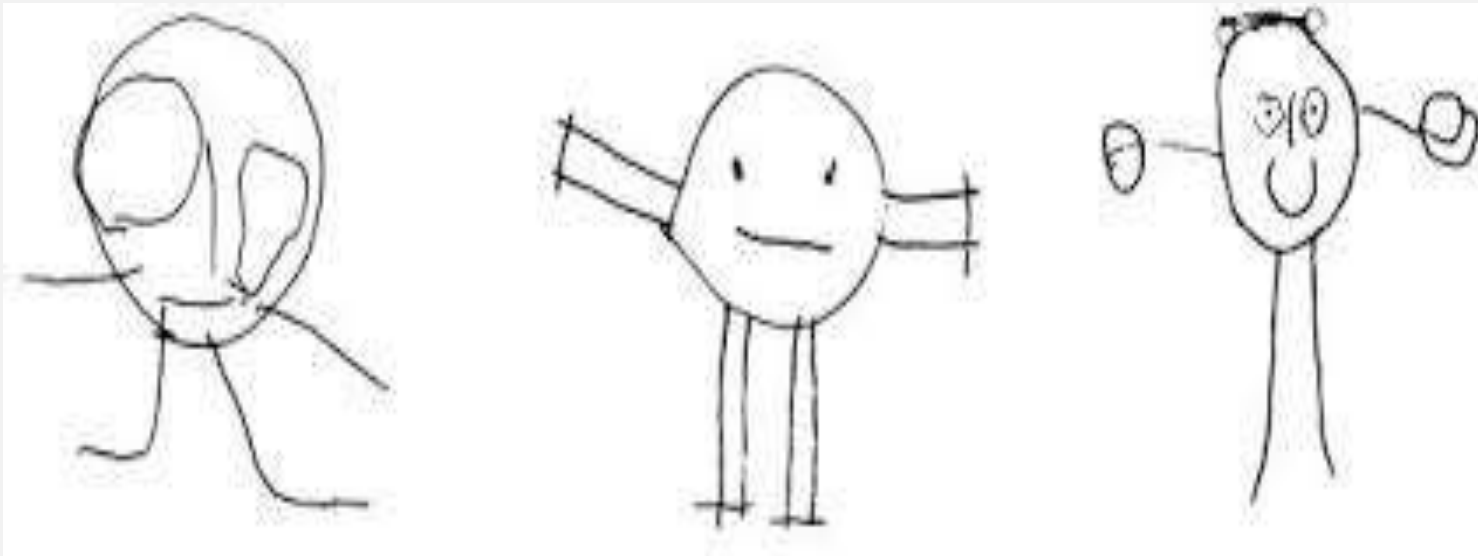
Only later do they add in a **body**.

They draw what their brain sees as important.

ANCHORING

- People **anchor** on **end points.**
- Children draw tadpoles because*:*
  - The face and limbs are **end points** – although the body is larger!
  - Anchoring makes end points **key features**.
  - Children draw key features **first** and **larger**
    - i.e., face first, then arms and legs from the face.
  - Only **years** later is it done correctly.
- **Anchoring** on **end points is a good processing strategy.**
- Exaggerating end points makes vision easier.
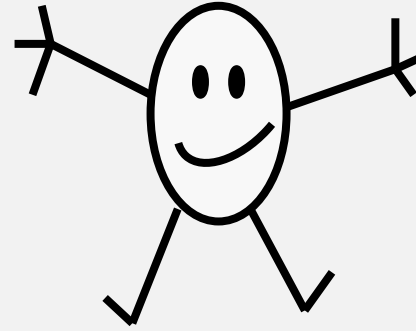
SOUTH PARK

- Cartoons such as **South Park** succeed because they understand **key features**:
  - Not realistic
  - No noses (inessential)
  - Big eyes
  - Head bigger than body!
  - Legs minimal to body
  - Simple contours
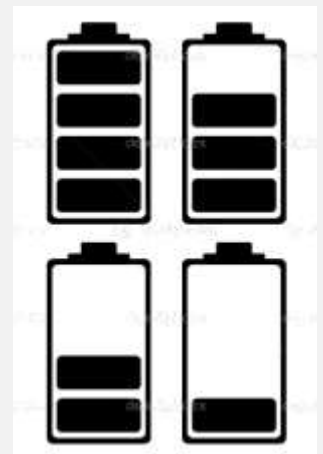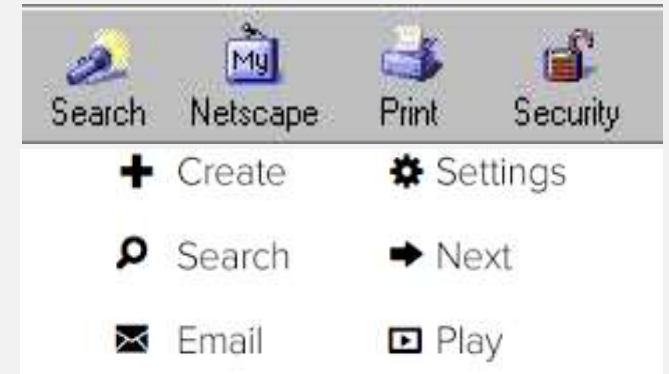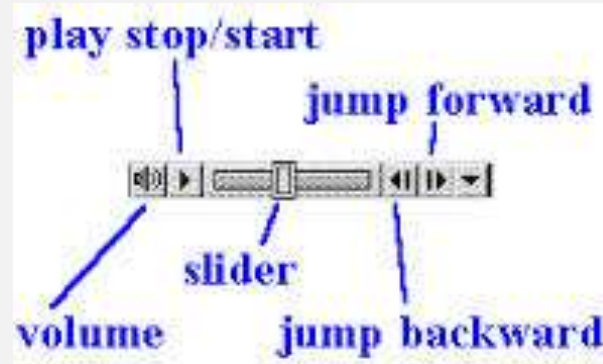 - A few bright colors
  - Appealing & popular

ICONS

Key features are critical for **icons**.

- Add key features as necessary.
- **Omit** non-key features.
- **Exaggerate** or enhance key features.
- **Improve** key feature contrast.
- **Use color** to focus key features.

Use icons **with key features** for*:*
- **Notifications and warnings**
- **Navigation**
  - **Home***:* Return to a fixed point
  - **Forward/Back***:*
  - **Refresh***:*
  - **Stop***:*

PART 6. CLASSIFICATION

- Based on its key features, an image is **classified**: i.e., **recognized.**
    - Prior **knowledge** of that class then applies.
    - Warn your children about?
        - **Sharks**? Kill about 1 per year in the US
        - **Cars!** Kill about 33,000/year in the US
- A **class construct** can:
    - **Expand**: All animals bite.
    - **Contract**: Only aggressive dogs bite.
    - **Form sub-classes**:
        - Little dogs attack more often but just nip.
        - Big dogs attack less often but really hurt.
    - **Be inadequate**:
        - Were dinosaurs intelligent?
        - Are mammals intelligent?
- Classification gives **meaning**.

Do you fear sharks or cars?

FORMING CLASSES

- Does the brain classify images using:
  - **Fixed templates** - A dog is like my dog?
  - **Abstract class** - **Dogness** is a **feature set** (no specific dog)?
- What makes a dog **a dog**?
  - Furry?
  - Size?
  - Barks?
  - Friendly?
  - Color?
- Classes are:
  - Learned
  - Vary between people
- What can't be classified is **new**.

Classes of dogs

CLASSIFYING IS WORK

New hurts:

- The young create new classes—e.g., Dropbox, tag.
- The old re-use old classes—e.g., desktop, email.

- People dislike new categories!
  - I joined the Army as a psychologist, under the Education Corps, then moved into computing. A Colonel's wife, on seeing my blue Education Corps belt, said:
    - "*I see you're a '**Chalkie**' (teacher).*"
    - "*I joined as a psychologist.*"
    - "*Oh, a '**Trick Cyclist**'!*"
    - "*No, I work in computing.*" She got angry and walked off.
- Invent new words at your peril:
  - **Defragment** your inbox? vs. **Compact** your inbox?
  - **IBM's expanded** memory (EMS) vs. **extended** memory (XMS)
- Messing with familiar classes is funny/scary.
  - **Voldemort** has no nose.

A man with no nose is scary

COMPUTER RECOGNITION

Computers that:

- Use **fixed templates** and process at the **pixel level** work well with fixed displays—e.g., licence plates
- But struggle with handwritten letters or **faces**.
  - Faces change with different angles, different lighting, different hair, or even a smile!
    - Canada allows only neutral expressions in passport photos.
  - Security cameras are a **deterrent**.
  - London security cameras haven't recognized a single criminal.
  - They are accepted only if used for crime and only if recordings are kept for a certain, limited time.
  - People with better pattern recognition can't watch cameras for hours.
- **HCI option**: Experts set **key features for a** computer search.
  - Computers can **select hits** features for experts to check.


Licence plate recognition is easy

ASSOCIATIONS

- **Associations** carry forward prior class meanings:
  - **Positive**: dogs are friendly.
  - **Negative**: dogs are dangerous.
- Can be:
  - **Appropriate**: Relevant learning transfer
  - **Inappropriate**: False learning transfer
- **Current red flags** include that:
  - Men and women are different
  - Races are different
  - Religions are different
- **Equality in diversity**
  - France's **"Vive la difference!"**
  - Nature isn't equal—but it is fair.
  - Culture as **community learning** can be wrong.
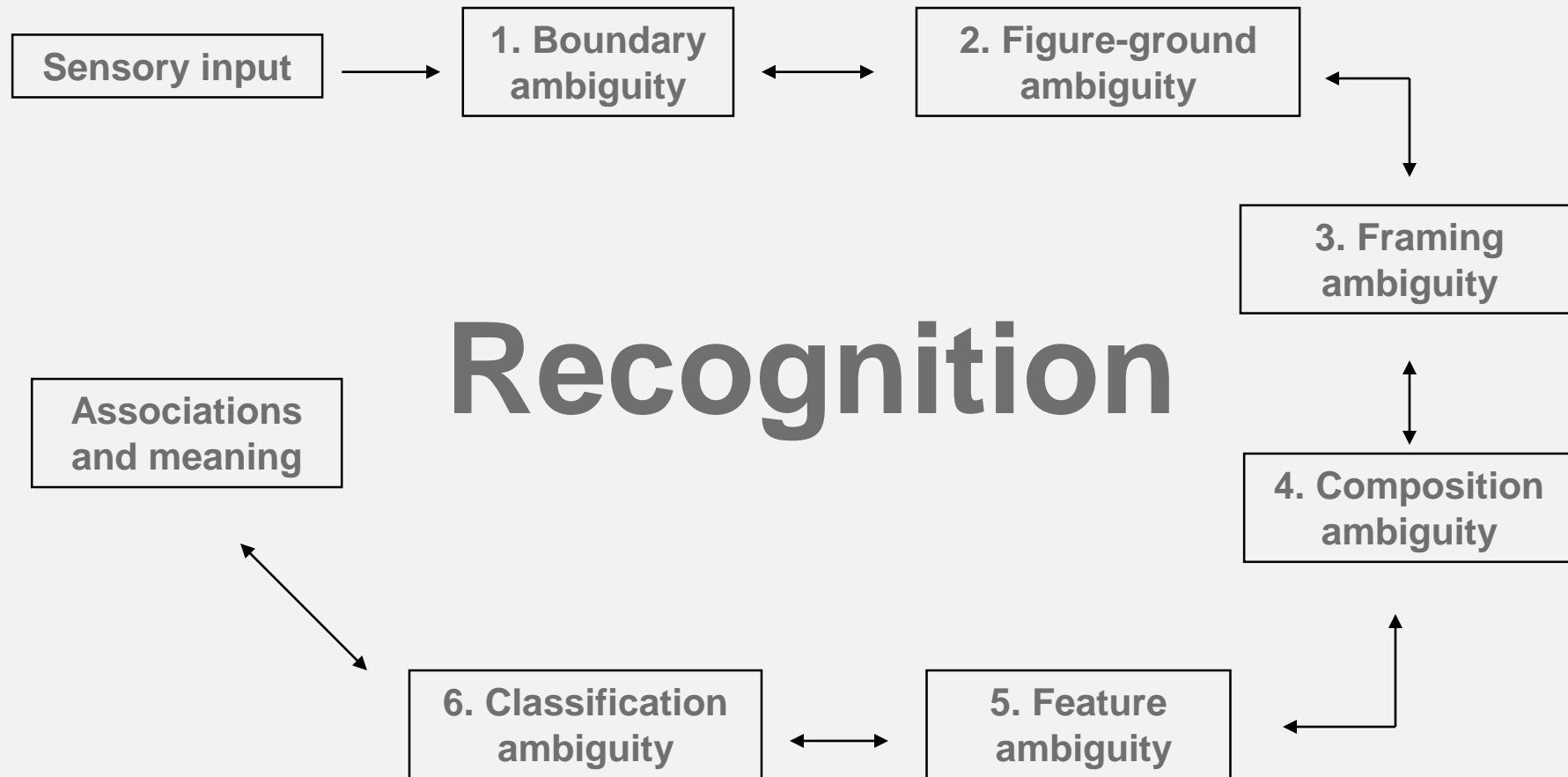
PART 7. FACES

- Babies track faces from birth.
  - We have genetically built-in face analyzers.
  - They form faces in a tenth of a second—i.e., very **quickly**.
  - Recognizing friend from foe was critical to survival.

- High-level features are needed to identify faces because the pixels of a face image change with:
  - Age
  - Background light
  - Angle of view
  - Facial expression
  - Beard, hair, moustache
  - Health

- Left/right facial **symmetry** is when both hemispheres agree.

Facial symmetry is important

WHO IS THIS WOMAN?

Who is this?

- How long did it take you to decide?
- A computer would have to search and compare millions of stored images
- Did you?

THE ANSWER

If you knew right away, as many did, how did you do it?

How long did it take?
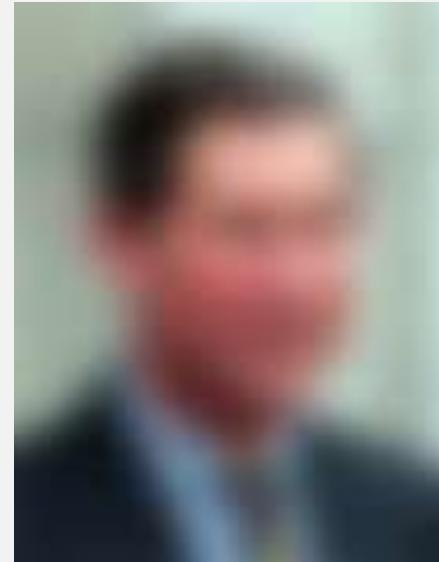

For the picture of Julia Roberts

77.0% Right

22.9% Wrong

Total Votes: 31,708

Results of online poll

Try again – who is this man?
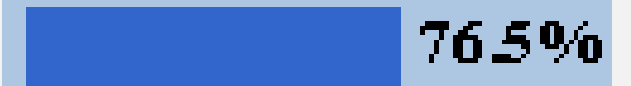
WHO IS THIS MAN?

Did your brain search every face you know?

Obviously, doing such tasks on the **pixel level** wouldn't work.

The brain does it using abstract features of the face.

For the picture of Prince Charles

76.5% Right

23.4% Wrong

Total Votes: 33,029

PART 8. ART

Art is about representing what people see.

- Most of a picture's information is in the **lines**:
  - Visual processing begins by identifying lines.
  - Artists often **begin** paintings with a line drawing.
  - Cave artists used lines.
  - The first step of vision is the first step of art.
  - Without lines, there are no objects.
- **Contour abstraction**: See the lines in a view.
  - Boundary lines underlie vision and art.

Cave art based on lines

ART IS REVERSE VISUAL PROCESSING

IMAGE

Seeing →

← Painting

CONTOUR
ABSTRACTION
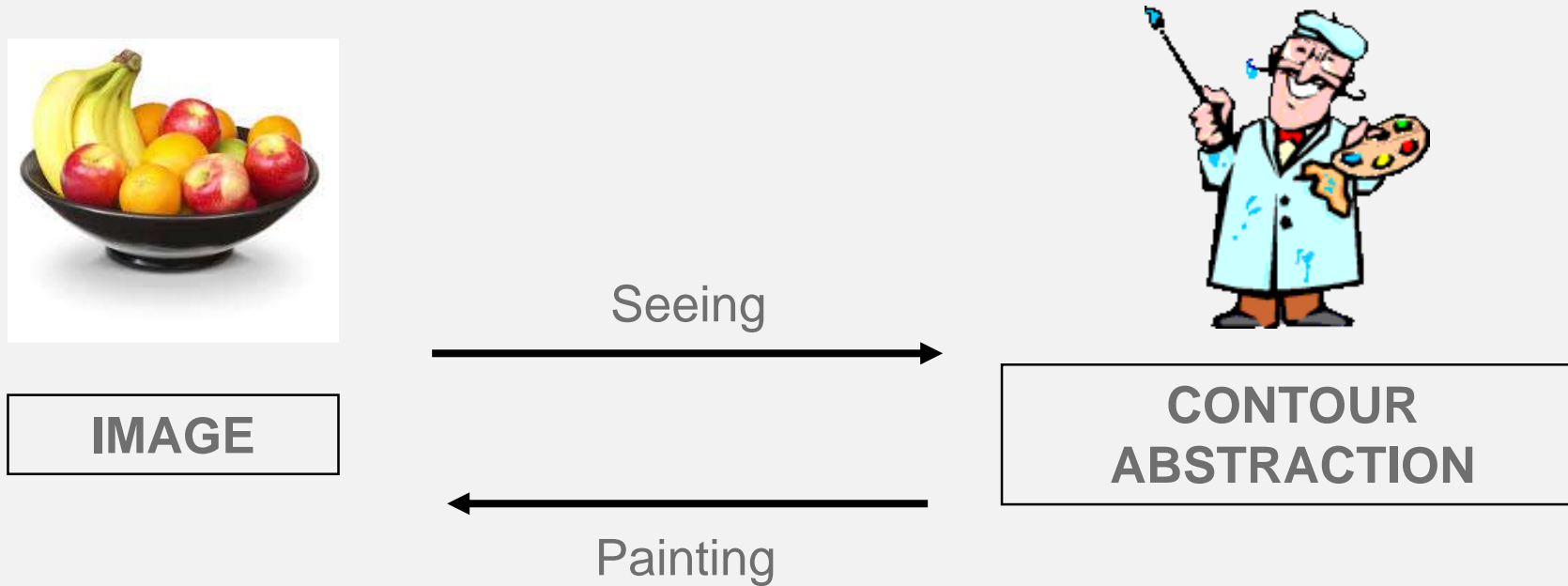
The artist first envisages a scene as a contour abstraction,
then fills in light, shade, texture and color details.

HCI designers can do the same.

MINIMALISM

- **Minimalism**: Using less signal to get more effect
- Small signals have a big effect if:
  - They are consistent
  - Nothing contradicts the effect
  - There is no viable alternative
  - What do you see?
- Drawing is **the art of omission**
  - Eliminate unnecessary data
- A visual image is a processing **abstraction**, anyway.
  - If the end result is the same, nothing is lost by minimalism!

I LOVE SIMPLICITY

LESS IS MORE

Decide:
- Where does attention go?
- What key features are used?
- What sensory modes count?
- What is the background contribution?
- Other channels? – space, movement, …

Take the best and leave the rest.
- Mickey mouse has three fingers and a thumb
- Action can be implied.
- Backgrounds can be fuzzy.

Perceptually simple images are:
- Easier to make
- Smaller to store
- Faster to download

Mickey mouse has three fingers!

UNREALISM

- **Unrealism:** When unrealistic signals create real meanings
- **Realism** isn't necessary for an effect:
  - Art isn't realistic.
  - Cartoons aren't lifelike.
  - Fiction outsells fact.
  - Games aren't real; zombies aren't real; …
- **Feature enhancement**: Works by reaching a **recognition threshold** - completeness isn't necessary.
  - A smiley face with no nose is still a face.
  - Details omitted are **presumed**.
  - The semantic end result is no different.

SMALLER CHUNKS

Computer screens hold **much** less than newspaper pages.

- Kindle is less than a quarter page.

- Mobiles are even less.

- The **usable screen** is still less!

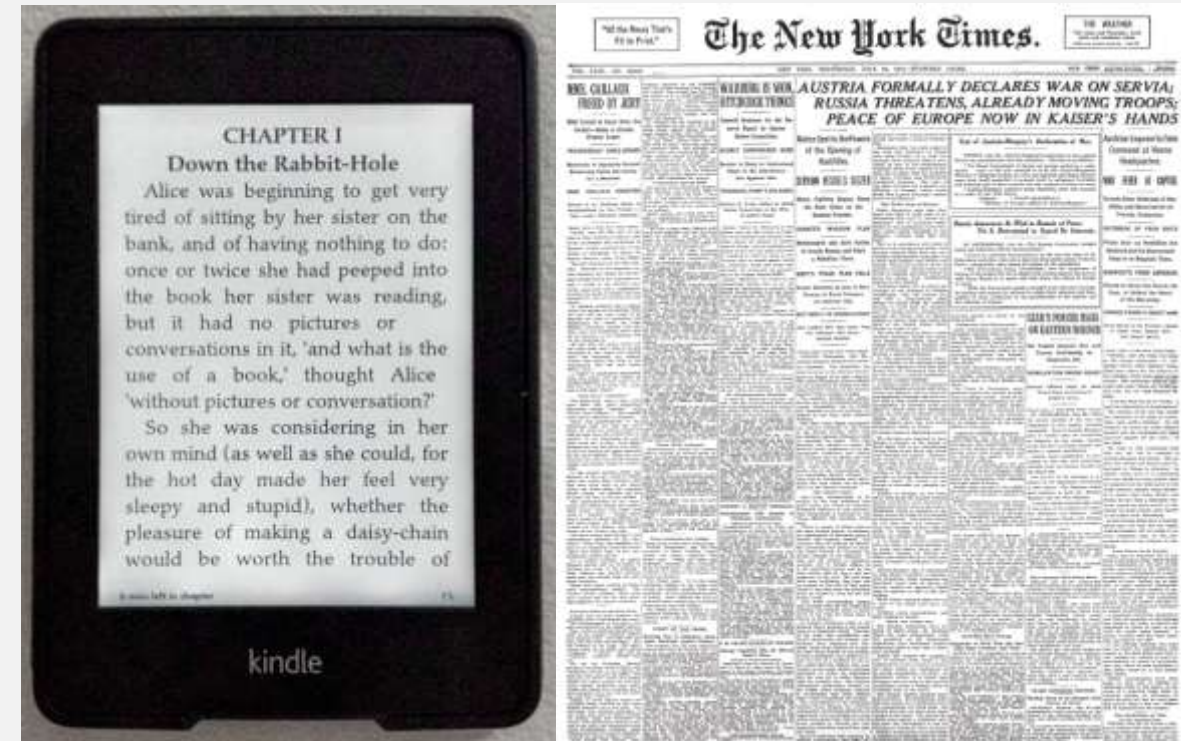- It is harder to skim than a book is.

Smaller chunks mean

- Fewer people give up and **click-on**.

- Faster downloads, less delay.

- On-demand delivery is easier.

Less data reduces cost

- Data roaming costs are high.

  - Especially problematic are huge updates.

People want faster responses.

  - For the foreseeable future, size matters!



Text per page comparison

LET THE BRAIN ACT

The brain exists to process data, and so people **like** to problem solve – and succeed.

- We like to form figures, fill in the gaps and **find patterns**.
  - Connect-the-dots puzzles and jigsaws are popular because they reveal a picture.
  - **Where's Wally?** became an international hit because people like finding a familiar object.
- We like to discover things so don't forget to leave something for the viewer to **figure out**:
  - Find a back door, a secret, a **treasure**
    - Software "Easter eggs" include:
      - The Android lollipop
      - Google secrets
    - There is a long history of hidden meanings in symbols
      - E.g. The Da Vinci code

People like lollipops and Where's Wally?
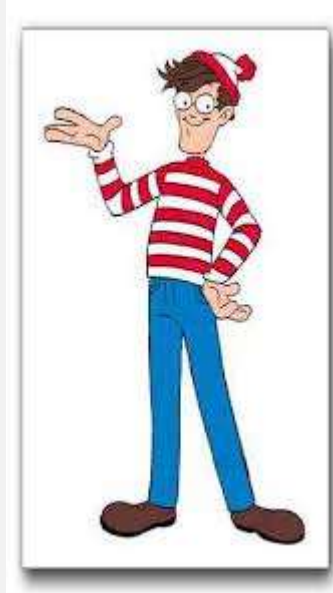
PART 9. DESIGNER NOTES: RECOGNITION

Background

- Choose to support your figure.

Framing

- Crop and frame key graphics, like faces.

Composition

- Proximity, continuity, similarity, closure and simplicity help form figures.

Enhance features.

- People often **anchor** on end-points.

Use class meaning.

- Use known classes unless educating.

Less is more.

- Less storage, less waiting, less processing

Let the brain act.

- Patterns, secrets, implications, Easter eggs, layers of meaning, symbols

Reduce the information but not the perception.

BACKGROUND

We **absorb** the beautiful New Zealand background but **focus** on the text.
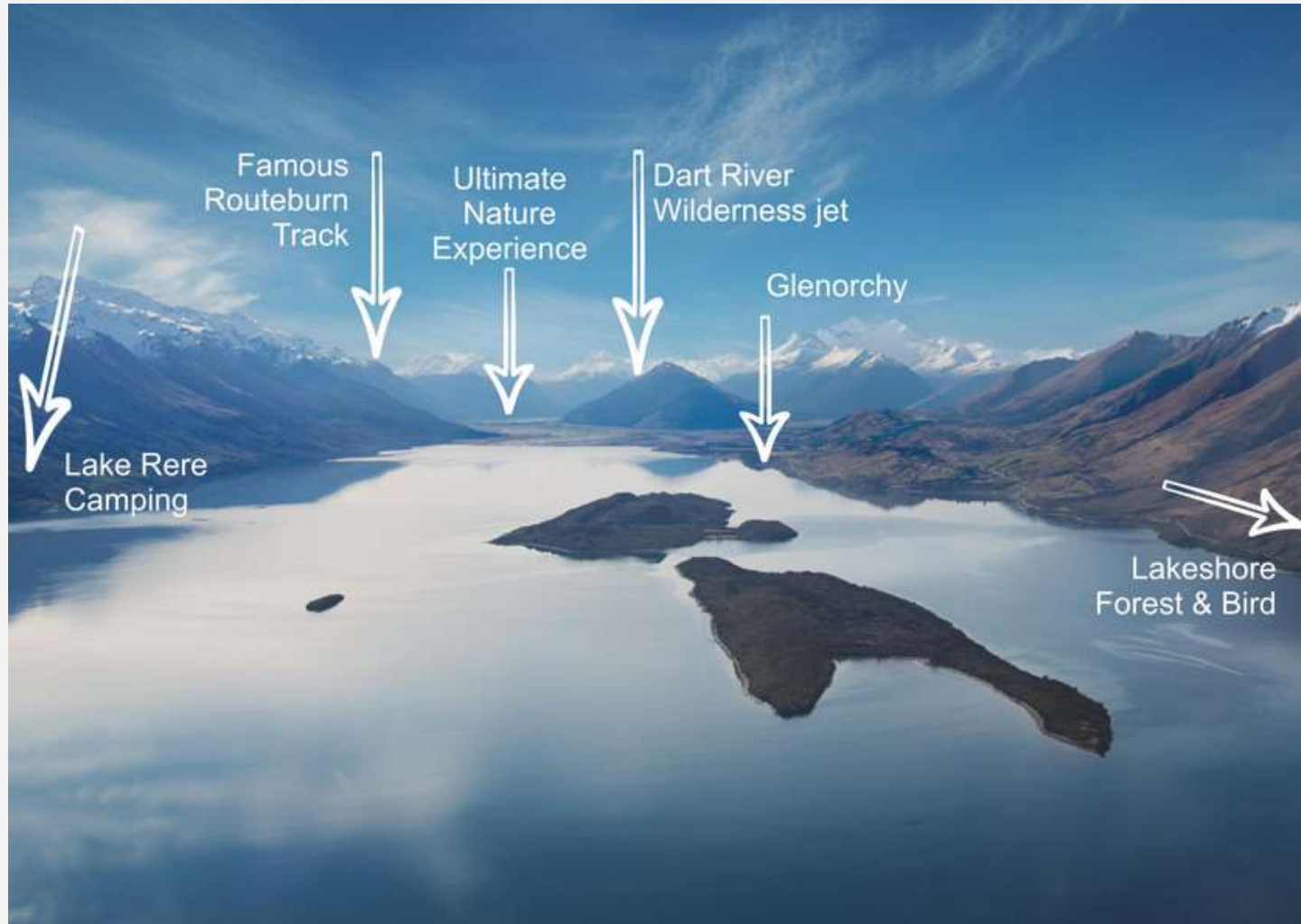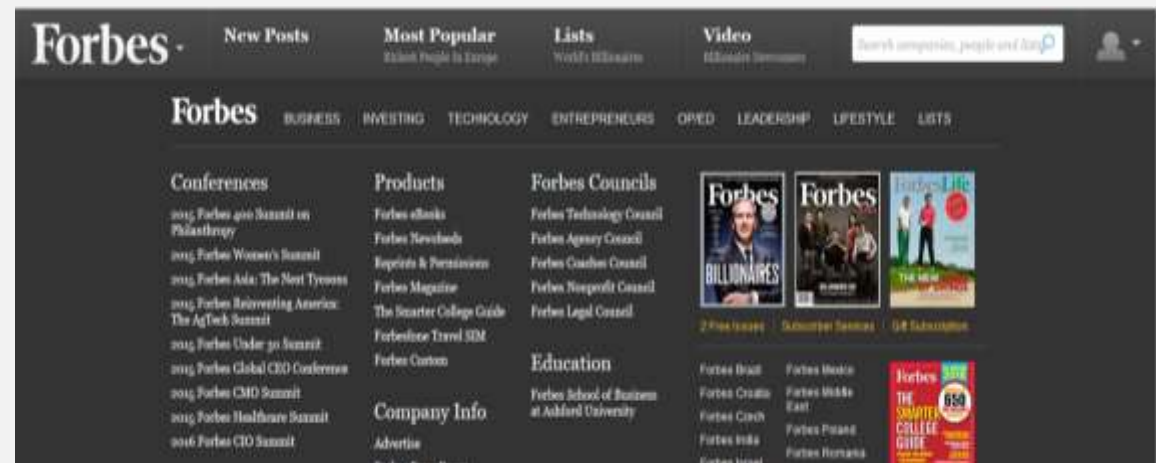
FRAMING

Frame a person among a group of runners to provide a focus.
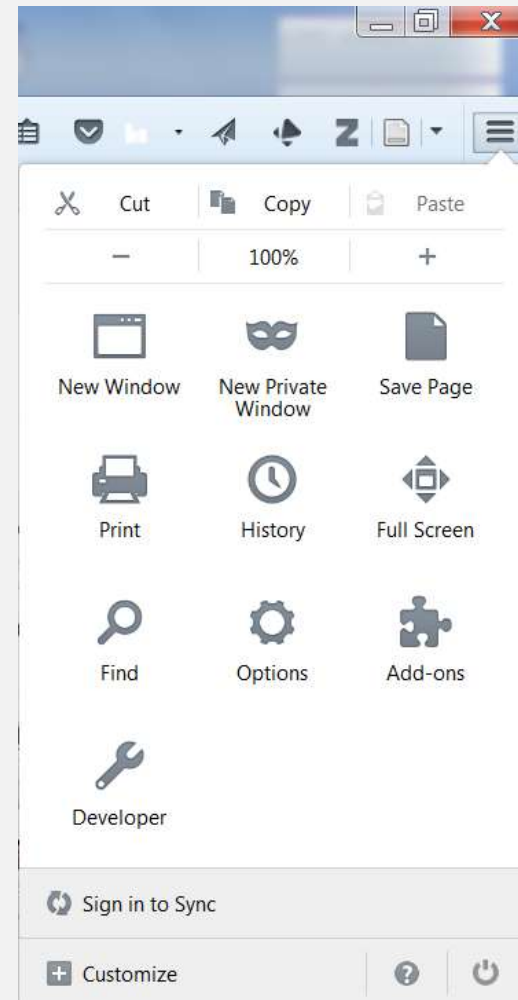
COMPOSITION

- **Proximity**: Pictures or text grouped
- **Continuity**: Title bar
- **Similarity**: Colors, fonts, size, texture…
- **Closure:** Missing picture parts are assumed accidental or covered.
- **Simplicity:** White space is not "nothing".
- **Framing**: White background frames.

Without reading anything, the layout is clear.

ENHANCE ICON FEATURES

Icons are everywhere.
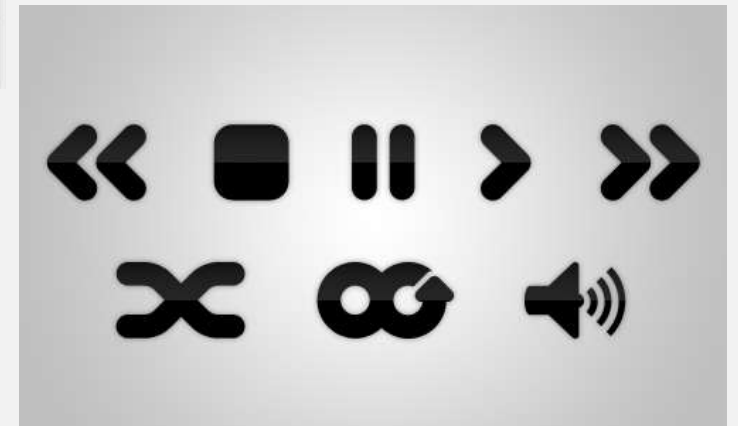
INVOLVE MEANING!

The $25-million New Zealand flag referendum - how **NOT** to introduce a new symbol.

- **Skip design**: The PM's fern scribble on a restaurant napkin was the design phase.

- **Use amateurs**: They invited unpaid public submissions including from schools.

- **Ignore experts**: A panel of supporters with no design experience picked the flag finalists – which just happened to all be ferns.

- **Deny feedback**: The online submit site didn't allow comment, discussion or voting.

- **Get no involvement**: They called public meetings where panellists outnumbered public.

- **No Meaning**: The New flag was sold as a **brand logo** with no meaning or reference to New Zealand's heritage or Maori history.
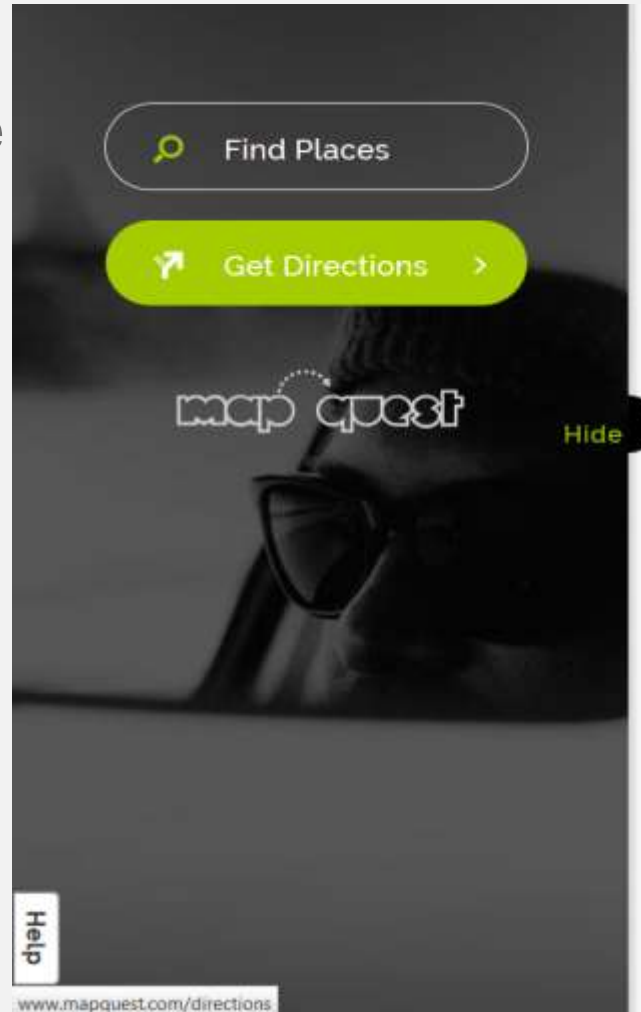
LESS IS MORE

Mouse over highlight

Faces are easy to recognize

Background eyes covered

Background blurred

Driver theme

LET THE BRAIN CREATE YOUR IMAGE