

# 100 Things Every Designer Needs to Know about People

<https://www.amazon.com/Things-Designer-People-Voices-Matter/dp/0321767535>

**Author:** Susan Weinschenk, PhD

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## Overview

"Whether you're designing a Web site or a medical device -- or something somewhere in between -- your audience is comprised of the people who will benefit from that design. And the totality of your audience's experience is profoundly impacted by what you know -- or *don't know* -- about them. How do they think? How do they decide? What motivates them to click or purchase or whatever it is you want them to do?"

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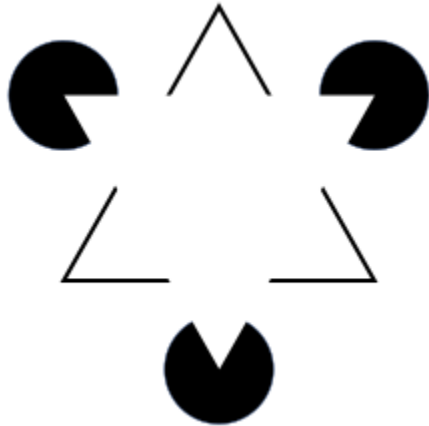
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# How People See

## What you see isn't what your brain gets

For example, the Kanizsa triangle:



Your brain creates shortcuts to quickly make sense of the world around you. Grouping by shapes and colors can draw attention differently

STOP	WAR
PEACE	NOW

STOP	WAR
PEACE	NOW

We see in 2D due to the mechanics of the eye; the visual cortex turns the 2D images into a 3D representation.

## Peripheral vision is used more than central vision to get the gist of what you see

**Central vision** -- look at things directly to see details; object recognition

**Peripheral vision** -- remainder of the visual field; getting the gist of a scene

Blinking/moving elements in our peripheral vision draw our attention

Larson and Loschky studied this:



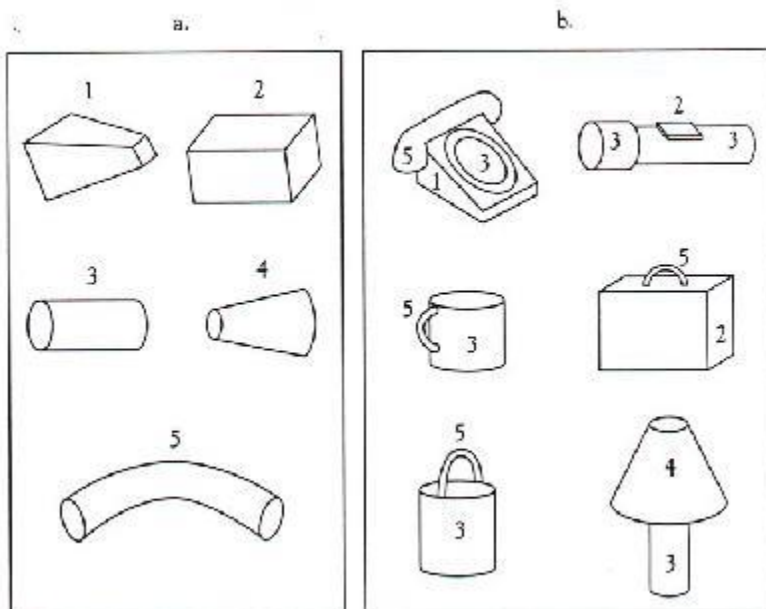
## People identify objects by recognizing patterns

Your eyes and brain want to create patterns (e.g., four sets of two circles, not eight circles)

oo oo oo oo

**Geon (geometric icon) theory of object recognition** -- you recognize basic shapes in what you're viewing, and use these shapes to identify objects (Irving Biederman)

Examples of Geons (Left) and Representative Objects That Can Be Constructed from the Geons (Right). (From Biederman, 1990).



## There's a special part of the brain for just recognizing faces

Outside of the visual cortex is the **fusiform face area (FFA)** that allows faces to bypass the brain's usual interpretive channels.

Direction of the gaze matters as well.



## People imagine objects tilted and at a slight angle above

If you ask people to draw a picture of an object, they tend to draw it from the **canonical perspective** -- slightly above the object looking down, and offset a little to the right or left.



## People scan screens based on past experience and expectations

Most people scan in the way they read. Large images can pull us out of that tendency though.

We usually skip edges.

People have a mental model of where things tend to be on screens.

## People see cues that tell them what to do with an object

**Affordances** -- action possibilities for an object so that you know what to do with it.

Donald Norman (Design of Everyday Things) talks about **perceived affordances** -- you should easily perceive, figure out, and interpret what an object is and what they can and should do with it.



On computer screens, we tend to make actionable things look different (3D buttons stand out because they look like physical buttons).

Modern design has moved away from physical affordance cues:

<https://uxplanet.org/buttons-in-ui-design-the-evolution-of-style-and-best-practices-56536dc5386e>

## People can miss changes in their visual fields

The classic example is the "gorilla video" which demonstrates **inattention blindness**. If you're paying attention to one thing and you don't expect changes to appear, then you can easily miss changes that do occur.



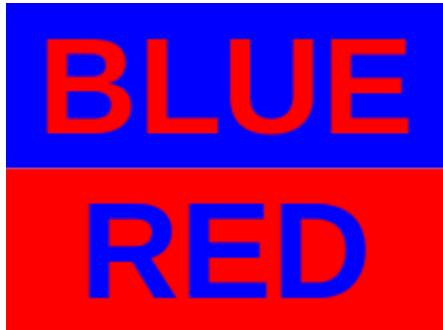
Eye tracking is misleading:

1. Tells you where they looked, but not whether they paid attention
2. Doesn't account for peripheral vision, which is just as important
3. Depends on what questions they were asked when they were looking

People believe that things are close together belong together

Red and blue together are hard on the eyes

This is called **chromostereopsis**.



9% of men and 0.5% of women are color-blind

Have a redundant coding scheme, for example, color and line thickness.

The meanings of colors vary by culture

For example, red = bad, green = good.

Different cultures prescribe varied meanings to color, so consider this if doing something international.

## Takeaways

- What you think people will see may not be what they actually see
- People use peripheral vision to decide what a page/screen is about
- Avoid animation in the peripheral if you want people to focus on something on the screen
- Use grouping and whitespace to create patterns
- Use simple geometric drawings instead of pictures for quick recognition
- Favor 2D elements over 3D, as 3D requires more cognition
- People recognize faces before other objects (unless autistic)
- Faces looking at the user have the greatest emotional impact; eyes are most important
- If a face on the screen looks at another spot, users will follow the gaze (doesn't necessarily mean they pay attention, but they will look at it)
- People recognize drawings/objects/icons more quickly if shown in the canonical perspective
- Put the most important information in the top 1/3 of the screen or in the middle
- Avoid putting anything important in the edges
- Design the screen to allow people to use their normal reading pattern; don't make them bounce around to accomplish a task
- Think about affordance cues -- what can people do with your interface? Would they be able to figure that out? (This is important for interacting with screens via a mouse or touch.)
- Don't assume people will see something on the screen just because it's there
- To highlight change, add additional visual cues
- If you want items to be seen as belonging together, put them in close proximity
- Experiment with spaces to separate elements before using lines to divide them
- Put space between items that don't belong together
- Avoid putting blue and red or green and red near each other
- Use sites like [vischeck.com](http://vischeck.com) and [colorfilter.wickline.org](http://colorfilter.wickline.org) to see how things look to someone who is color-blind
- Have a redundant coding scheme other than just color (e.g., patterns, thickness)
- Consider colors that work for everyone (e.g., yellows and browns) rather than reds, greens, and blues
- Remember that certain colors invoke special meanings
- Check out [InformationIsBeautiful.net](http://InformationIsBeautiful.net) for examples of cultural color meanings

# How People Read

## It's a myth that capital letters are inherently hard to read

There was a theory that capital letters are harder to distinguish; however recent research says that when we read, we recognize and anticipate letters, then based on the letters we recognize the word.

Reading isn't fluid -- our eyes are still as we focus, then move in sharp jumps (**saccades**). During the saccades (250 ms), we're blind. Our eyes look forward most of the time during the saccades, but look backward about 10-15% to reread. A saccade spans 7-9 letters, but our peripheral vision scans ahead about 15 letters.

Most of what we read is mixed case, so we're used to that. We could teach ourselves to read capitals just as well.

Capitals should be used for calling attention (it's considered "shouting" by most).

## Reading and comprehending are two different things

For example, you could read a scientific article's abstract and recognize the individual words, but not know enough about the subject matter to understand the content.

Good measure of readability is the **Flesch-Kincaid formula**, which takes into account the number of words, sentences, and syllables for the words. A higher score means easier to read.

Use headlines to provide context for your reader.

We use different parts of our brains for passively viewing words, listening to words, speaking words, and generating verbs.

What you read depends on your point of view. For example, a study by Anderson and Pichert had people read a story about a house and its contents. One group read the story from the perspective of a home buyer, another group read it from the perspective of a burglar.

## Pattern recognition helps people identify letters in different fonts

Research shows no difference in comprehension, reading speed, or preference between serif and sans serif fonts.

If a font is hard to read, the meaning of the text will be lost.

## Font size matters

The text needs to be big enough for users to read without strain.

The **x-height** (height of the small letter 'x') can make some fonts look "bigger." Verdana and Tahoma have larger x-heights than Times New Roman.

Some look larger than others because of the x-height. Verdana 11

Some look larger than others because of the x-height. Tahoma 11

Some look larger than others because of the x-height. Times New Roman 11

## Reading a computer screen is harder than reading paper

A screen emits light and is constantly being refreshed. Paper has no refresh and is reflecting light.

Make sure you have enough contrast between foreground and background (e.g., black text on white background).

## People read faster with a longer line length, but they prefer a shorter line length

Long lines (100 characters) allow the eye to continue scanning without having to jump down to the next line as often. However, we prefer shorter lines (45-72 characters).

This article says short lines are preferred because our mental focus wears off, and we can more readily determine where lines begin and end. <https://baymard.com/blog/line-length-readability>

## Takeaways

- People perceive all-caps as shouting, so use sparingly
- Save all-caps for getting someone's attention (e.g., warnings)
- What people understand and remember depends on previous experience, point of view while reading, and the context they're given.
- Don't assume people will remember what they read
- Provide a meaningful title or headline
- Tailor your reading level of your text to your audience; fewer syllables = more approachable
- Serif and sans serif fonts are of equal readability
- Overly decorative fonts can interfere with pattern recognition
- Difficult to read fonts translate to difficulty of the meaning of the words themselves
- Choose a point size that is large enough to read comfortably
- Prefer fonts with large x-heights for online viewing
- Break up text into chunks (bullets, paragraphs, pictures)
- Provide contrast between foreground and background
- If reading speed is required, prefer long lines (100 characters)
- For comfort, prefer shorter lines (45-72 characters)

# How People Remember

## Short-term memory is limited

To maintain content in working memory requires focused attention. Stress reduces the effectiveness of working memory.

People with high-functioning working memory are able to screen out sensory input so they can focus.

## People remember only four items at once

George Miller's "seven, plus or minus two" rule of thumb wasn't in a paper backed by research. Alan Baddely applied scientific rigor and discovered the magic number is 4.

If you have more than four items, use **chunking** to break it into groups. For example, 7125694532 vs 712-569-4532.

The four-item rule applies to long-term memory as well. For example, people can usually remember four of the Seven Dwarves or countries in Europe. Remembering more is difficult.

## People have to use information to make it stick

To get from working memory to long-term memory:

- Repeat it a lot
- Connect it to something they already know

Repetition reinforces neural pathways.

**Schemas** help people reason about groups of things. For example, describing a "head", you would talk about eyes, nose, hair, mouth. Schemas help us build associations between things.

## It's easier to recognize information rather than recall it

For example, if given a list of objects, **recall** is about stating what was on the list. **Recognition** is being given an object name and asked whether or not it was on the list.

Recognition can lead to **inclusion errors**. For example, if the list of objects was "chair, desk, pencil, lamp" (i.e., office items), and you were asked whether "phone" was on the list, you might say it was because a phone is typically found in an office.

## Memory takes a lot of mental resources

The latest research says we receive 40 billion sensory inputs every second, and are only conscious of about 40. It takes a lot of mental resources to think about, remember, process, represent, and encode information.

**Recency effect** -- you remember the end of something because it was the most recent thing you observed

**Primacy effect** -- you remember the beginning because it was the first thing you observed

## People reconstruct memories each time they remember them

Memories are not movie clips that are replayed. You also fill in memory gaps with made-up sequences that seem just as real as the original event.

Eyewitness testimonies are unreliable -- see Elizabeth Loftus' work on having people recall car crash information after watching a video of an accident.

## It's a good thing that people forget

If you remembered every single thing, you'd be unable to function.

Herman Ebbinghaus created a mathematical function showing the rate of decay for memories (aka. The Forgetting Curve).

## The most vivid memories are wrong

"Flashbulb memories" -- remembering traumatic or dramatic events in great detail (e.g., where you were when you heard about the 9/11 attacks)

Studies have proven that even these vivid memories are subject to decay.

## Takeaways

- Don't ask people to remember information from one place to another; they'll likely forget and get frustrated as well
- When asking people to remember, don't ask them to do anything else until the task is complete
- Limit what people need to remember to four items; use chunking if more than four
- People tend to use external aids (notes, lists, calendars) so they don't have to rely on working memory
- Repetition helps people remember
- User/customer research can help you learn what schemas they are using
- It's easier for people to remember if they can attach something new to an existing schema
- Eliminate the need for users to remember things
- Use concrete terms and icons
- Let people rest if you want them to remember information
- Avoid interrupting people when they are learning/encoding information
- Information in the middle of a presentation is least likely to be remembered
- Don't rely on self-reports of past behavior
- Take what people say after-the-fact (e.g., remembering the experience of using your product) with a grain of salt
- People will always forget, and what they do isn't conscious
- Design with forgetting in mind; give users a way to look things up

# How People Think

## People process information better in bite-sized chunks

Don't give people too much info at once. **Progressive disclosure** means providing only the information people need at the moment.

Counting clicks is no longer a relevant measure of ease-of-use. People won't notice they're clicking if they're getting the right amount of information at each click to keep them going down a path.

Progressive disclosure works if you know what most people will be looking for at each part of the path.

## Some types of mental processing are more challenging than others

There are 3 types of demands (loads) you can make on a person

- Cognitive -- think, remember, calculate; most expensive
- Visual -- look at something
- Motor -- press a button, move the mouse; least expensive

**Fitt's Law** -- mathematical equation that helps you determine target (e.g., button) sizes so that they're not too small or too far away

Minimize motor switching (e.g., back and forth between keyboard and mouse).

Increasing load works for video games, because you want to induce a challenge.

## Minds wander 30% of the time

**Mind wandering** -- doing one task and then fading into thinking about something unrelated.

This is the closest thing we have to multitasking.

## The more uncertain people are, the more they defend their ideas

**Cognitive dissonance** -- uncomfortable feeling of having two ideas in conflict with one another

**Cognitive dissonance denial** -- not allowing any new information that would conflict with your opinion

Two ways to reduce the dissonance: change your belief, deny one of the ideas

If people are forced to defend an idea they disagree with, they tend to change their belief to fit the new idea. Otherwise, people will continue to deny any new information. People who were less certain will argue even harder.

## People create mental models

**Mental model** -- representation of something (e.g., real world, device, software) that someone has in mind. Example: You know how to read books, you know what an iPad is, so what would be your mental model for reading books on an iPad?

People use models to predict what the system will do or what they should do with it.

## People interact with conceptual models

**Conceptual model** -- actual model given to the person through the design and interface of the real product

If the mental model and conceptual model don't align, the product will be hard to learn, hard to use, and probably won't be accepted.

If your product is something brand new, there will likely be a mismatch. This is where you gradually change people's mental models to match the conceptual one.

## People process information best in story form

Stories are powerful; they grab and hold people's attentions.

The most common format is three acts:

1. Beginning -- setting, characters, situation/conflict
2. Middle -- obstacles and conflicts for characters to overcome
3. Ending -- conflict comes to a climax and is resolved

Classic stories: great journey, coming of age, sacrifice, epic battle, fall from grace, love, fate, revenge, trickery, mystery.

Stories imply causation (even if none exists) because they involve a chronological narrative. For example:

- Joey's big brother punched him again and again. The next day his body was covered by bruises.
- Joey's crazy mother became furiously angry with him. The next day his body was covered by bruises.

The last statement implies the mother punched Joey, even though that was never stated.

Your brain assumes you have been given all the pertinent information and that there is causation.

## People learn best from examples

Use pictures and videos as examples of a workflow.



## People are driven to create categories

People love to categorize. The whole field of information architecture is about how to organize information into categories.

If presented with large amounts of information, people will impose their own categories.

It doesn't matter who (designer, user) makes the categories as long as the items are well organized.

## Time is relative

The more mental processing you have to do, the more time you think has elapsed.

If people are pressed for time, they're less likely to help someone. See the "Good Samaritan" research by Darley and Batson.

Expectations of time change. For example, 20 seconds for a website to load in 1998 is very different than what we expect now.

## There are four ways to be creative

Arne Dietrich created a creativity matrix

- **Deliberate and Cognitive** -- Thomas Edison; putting together existing information in new and novel ways; uses the prefrontal cortex for focus and connection
- **Deliberate and Emotional** -- therapeutic a-ha moment; prefrontal cortex helps for focus, but cingulate cortex ties in emotions/feelings
- **Spontaneous and Cognitive** -- Isaac Newton; these are like "shower thoughts" where the idea comes from breaking from thought (unconscious mind is at work); involves basal ganglia (dopamine)
- **Spontaneous and Emotional** -- musicians and artists; amygdala (basic emotional processing)

When you're stuck, get some sleep.

## People can be in a flow state

**Flow state** -- totally engrossed in the moment; everything else falls away, your sense of time changes

- Very focused attention on your task
- Working with a specific, clear, and achievable goal
- Receive constant feedback
- Have control over your actions
- Time speeds up or slows down
- Self doesn't feel threatened
- Personal as to how you get into this state
- Crosses cultural boundaries
- Pleasurable

## Culture affects how people think

East Asians grow up paying more attention to context (background); focus is on relationships and groups

Westerners grow up paying more attention to the dominant foreground object; focus is on the individual

## Takeaways

- Show people what they need when they need it; build in paths for them to go deeper
- Prefer "less thinking" over "few clicks"
- Do your research about what people want and when they want it
- Reduce loads (cognitive, visual, motor) to make things easier to use
- Making people think or remember requires the most mental resources
- Trade cognitive load for visual or motor
- Make sure your targets are large enough (or close enough) to be easily reached
- People only focus for a short time; assume there will be mind wandering
- Build in feedback about where users are so that they can quickly reassess when they come back to the task
- Don't spend too much time trying to change someone's ingrained beliefs
- The best way to change a belief is to get them to commit to something small
- Don't give people evidence that their belief is not logical, tenable, or a good choice; they'll likely dig in harder
- People always have mental models, which are based on past experience
- Not everyone has the same mental model
- Customer research is important in helping you understand your audience's models
- Design the conceptual model purposefully; don't let it be an artifact of the technology
- Make sure the conceptual model matches the mental model
- Provide training if the conceptual and mental models aren't likely to match at first
- People naturally process information as stories
- Use a story if you want to make a causal leap
- No matter how dry your information is, use stories to make it understandable, interesting, and memorable
- People learn best by example -- don't just tell; show.
- Use pictures and screen shots to show by example; videos can be even better
- People love to categorize
- If presented with large amounts of information, people will get overwhelmed and impose their own categories
- Keep in mind the "rule of 4" when organizing
- Get input from your audience about what makes sense to them for categories; what you call things is often more important than how you have it organized
- Provide progress indicators to manage expectations of time
- Make the amount of time it takes to do a task consistent, so people can adjust their expectations
- To make a process seem shorter, break it up into smaller steps; the more mental processing it takes, the longer it seems
- Decide which of the four creative "types" you are and set yourself up for success
  - Deliberate and cognitive -- need high degree of knowledge and lots of time
  - Deliberate and emotional -- need quiet time
  - Spontaneous and cognitive -- be able to step away
- If you're designing for flow state
  - Give people control over their actions
  - Break up difficulty into stages (goal should be challenging but achievable)
  - Give constant feedback
  - Minimize distractions
- Different cultures focus on foregrounds and backgrounds in pictures differently

# How People Focus Their Attention

## Attention is selective

**Selective attention** -- people can pay attention to one thing and filter out all other stimuli

## People filter information

People seek out and pay attention to information and cues that confirm their beliefs.

Example: 1988 incident in the Persian Gulf with the USS Vincennes, who thought a civilian aircraft was a fighter jet

## Well-practiced skills don't require conscious attention

For learning music, the Suzuki method stresses constant repetition so that when you perform a piece of music, you're just observing your body execute the movements.

Too many automatic steps can lead to errors because you assume something will work, so you don't pay attention.

## Expectations of frequency affect attention

If people expect to see something happen with a particular frequency, they often miss it if it happens more or less than their expectations. Example: TSA missed a loaded handgun getting through security -- they don't often encounter guns, so they don't expect to see them.

## Sustained attention lasts about 10 minutes

## People pay attention only to salient clues

People filter out unimportant or common elements.

Example: picking the correct penny out of a lineup of examples that have the profile facing different ways, what side the year is on, what text is on the top.

## People can't actually multitask

We're just good at switching between tasks quickly.

Counterexample: If you're doing a physical task that you are proficient in, e.g., walking and talking.

Phone examples:

- Hands-free is still distracted driving because your attention is on the *conversation*.
- Hearing half of a conversation is mentally taxing because you have to fill in the half you can't hear.

## Danger, food, sex, movement, faces, and stories get the most attention

You have three brains:

1. New -- conscious, logical, reasoning
2. Mid -- emotions
3. Old -- survival

The old brain still overrides the newer ones: Can I eat it? Can I have sex with it? Will it kill me?

## Loud noises startle and get attention

Also, people start to tune out sounds they become familiar with (e.g., clock chiming every hour).

For people to pay attention to something, they must first perceive it

**Signal detection theory** (e.g., looking at an image for presence of cancer)

- Stimulus present, detected -- able to start treatment
- Stimulus present, undetected -- patient may die of cancer
- Stimulus absent, detected -- give unnecessary treatment
- Stimulus absent, undetected -- correct diagnosis of no cancer

## Takeaways

- People pay attention to one thing and ignore everything else if you give them specific instructions to do so
- People unconsciously scan for their name, messages about food/sex/danger
- Don't expect people will pay attention to the information you provide
- What's obvious to you may not be obvious to your users
- If you think people are filtering, use color/size/motion/sound to draw attention to what's important
- If it's critical for people to pay attention, make that info stand out 10x more than you think is necessary
- If you require people to perform a sequence repeatedly, make it easy (but note they could stop paying attention over time)
- Make it easy for people to undo their work
- Rather than requiring people to perform a task over and over, consider a design where the task can be performed on multiple things at once
- People build unconscious mental models of how often an event occurs
- When designing a product where people need to notice rare events, use a strong signal to get their attention
- People will focus on something for about 7-10 minutes; to go longer, introduce novel information or a break
- Decide what cues are important for your audience, and realize people will only pay attention to these
- People can't really multitask, and those that say they can are often the worst at it
- Don't give people more than one task, and if you do, expect errors (and give them ways to recover)
- It may not be a good practice, but if you want to draw attention, use food, sex, danger, or faces.
- Use stories as much as you can, even for factual information
- If you use sound, make it appropriate for the action drawing the attention
- People habituate to sound, so consider changing them so people won't ignore them
- Think about the consequences of false positives and negatives and how you would alert the user

# What Motivates People

## People are more motivated as they get closer to a goal

**Goal-gradient effect** -- you accelerate your behavior as you progress closer to your goal

Ex: Frequent buyer card with (1) 10 open slots, or (2) 12 slots with two already filled in.

Websites can do this too, for example letting you know you've completed 75% of the steps to creating your profile.

## Variable rewards are powerful

In B.F. Skinner's work on operant conditioning, you can have **interval schedules** (reward after some time has elapsed) or **ratio schedules** (reward after doing some activity X times). You can vary the interval length and number of times as well.

To engage people the most, use variable ratio schedules. For example, slot machines -- they pay out based on the number of times you play, but you can't predict when.

As a design example, instead of Dropbox giving you more storage for each *individual* user you recruit, make the reward larger for every 3-5 users you recruit.

## Dopamine makes people addicted to seeking information

Dopamine causes you to want, desire, seek out, and search. The opioid system is involved with feelings of pleasure. These two systems work together, but dopamine is stronger, so you seek more than you are satisfied.

## Unpredictability keeps people searching

Dopamine is also stimulated by unpredictability. For example, e-mails show up, but you don't know when or from whom.

**Pavlovian reflex** -- associate a stimulus with a reward. This happens with the sound you hear when you get an e-mail.

If you keep the amount of information small (e.g., 140 characters for a tweet), the dopamine system is even more stimulated.

To break out of the loop, get away from the information-seeking environment (e.g., put your phone away or out of reach).

## People are more motivated by intrinsic rewards than extrinsic rewards

See for example the Lepper, Green, Nisbett research on rewards.

**Contingent rewards** -- rewards given based on specific behavior that is spelled out ahead of time; these lead to less of the desired behavior once the reward is taken away

From Dan Pink's book *Drive*, there are two types of work:

- Algorithmic (follow procedures)
- Heuristic (knowledge work)

Extrinsic punishments and rewards work best for algorithmic work; not so for heuristic work.

## People are motivated by progress, mastery, and control

People like to feel they're making progress, that they're learning and mastering new skills.

Mastery is asymptotic -- you never really get there.

## People's ability to delay gratification (or not) starts young

**Delayed gratification** -- resisting the impulse to act

This can be observed in children, and it continues on to adulthood. Those who can't resist tend to have problems as adults.

## People are inherently lazy

Humans have evolved to conserve their energy.

To handle the myriad of choices and weighing costs/benefits, we **satisfice** -- pick an option that's adequate, even if suboptimal.

Design websites for scanning, not reading.

## People will look for shortcuts only if the shortcuts are easy

If it seems like too much work to change your behavior (use a shortcut), people stay with their old habits.

Having default values/behaviors helps reduce the amount of work needed to complete a task.



## People assume it's you, not the situation

**Fundamental attribution error** -- people have a tendency to give personality-based explanations for other people's behavior more weight than situational factors. For example, that person cut me off in traffic because he's rude, rather than he's late for an important meeting.

We as individuals assume our motivation is based on our reaction to the situation instead of personality.

In other words, we judge others by their behavior; we judge ourselves by our intention.

## Forming a habit takes a long time and requires small steps

A study by Lally found that people show an increase in how automatic a behavior becomes, followed by a plateau.

There's no rule of thumb about how long it takes a habit to form. For some it could be a few weeks, for others it could be several months.

If you miss more than a few days in a row for building your habit, you will see a decline in progress.

## People are more motivated to compete when there are fewer competitors

When there are more people, it's harder to assess where you stand and therefore you're less motivated to try to come out on top.

(See SAT test study by Garcia and Tor.)

## People are motivated by autonomy

People like to do things the *way* they want to do them, and *when* they want to do them.

## Takeaways

- The shorter the distance to the goal, the more motivated people are to get there
- The illusion of progress has an effect
- People enjoy being part of a reward program
- Motivation drops off after the goal is met (**post-reward resetting phenomenon**)
- For operant conditioning to work, the reward must be something the user wants
- Use variable ratio schedules to get maximum behavior repetition
- People are motivated to keep seeking information
- The easier you make it for people to find information, the more information-seeking behavior they will engage in
- Pairing sound with the arrival of information makes people seek more
- Give small bits of information to motivate people to seek more
- Unpredictable arrival of information makes people addicted to seeking it
- Don't assume money is the only way to reward people
- Extrinsic rewards, if used, should be given unexpectedly
- To keep people coming back to your product, it needs to have activities people inherently want to do
- Motivate people by acknowledging tasks that are truly boring, then let them do it their way
- Show people how they're progressing toward goals
- Look for ways to help people set goals and track them
- Some people are better than others at delaying gratification
- People who are not good at resisting delayed gratification are suggestible to images/messages of scarcity (e.g., only 3 left in stock)
- Assume people will get things done with the least amount of effort possible
- People satisfice -- find a good-enough solution
- Provide shortcuts; make them easy to learn, find, and use
- Provide defaults if you know what most people will do most of the time
- When interviewing users, be mindful of whether there are biases toward situations vs. personalities
- Competition can be motivating, but don't overdo it
- Showing more than 10 competitors can dampen the motivation to compete
- People like to do things themselves
- If bringing in a model of self-service, make sure you focus the messaging on people having more control

# People Are Social Animals

## The "strong tie" group size limit is 150 people

**Dunbar's number** -- limit on how many individual species have in their social group. For humans, this is about 150. This applies to maintaining stable social relationships (not just people you know or are aware of).

150 is the group size for communities with a *high incentive to stay together* (survival pressure, close proximity).

**Weak ties** -- relationships that don't require everyone to know everyone else in the group

## People are hard-wired for imitation and empathy

Our premotor cortex makes *plans* to move, then coordinates with the primary motor cortex to actually move.

**Mirror neurons** -- neurons that fire when watching other people, even though we're not taking the action ourselves; these are the starting point of empathy (mirroring how another feels)

## Doing things together bonds people together

Wiltermuth and Heath found that people who engaged in synchronous activities (doing things together in the same space) were more cooperative in completing subsequent tasks, and more willing to make personal sacrifices to benefit the group. You don't even have to feel good about the group/activity

## People expect online interactions to follow social rules

Even though they occur online, those interactions are still social -- they follow rules and guidelines. Both parties have expectations of protocol. For example, if you saw a friend in a café, said "hi", and then she didn't respond or said something like "My sister never had a dog", things would probably get awkward.

We have assumptions of how a product will respond and what the interaction will be like. One simple one is responsiveness (e.g., expect it to load quickly but doesn't). Another example is going to a website to learn more about a political candidate only to be funneled into a workflow to provide your ZIP code -- how does that help *you* learn?

## People lie to differing degrees depending on the media

Depending on written, auditory, or electronic media, people are more or less likely to be dishonest.

**Moral disengagement theory** -- people become more unethical as they distance themselves from bad consequences of their actions

## Speakers' brains and listeners' brains sync up during communication

Stephens found that as people listen to someone else talk, the brain patterns of both speaker and listener start to couple/mirror.

## The brain responds uniquely to people you know personally

Krienen found that when people answered questions about their friends (even if they weren't of similar interests), the medial prefrontal cortex was active. This was not the case when discussing strangers (with similar interests).

Facebook is about friends/relatives, even if you don't have shared interests. Twitter is for connecting to people you don't already know.

## Laughter bonds people together

### People can tell when a smile is real or fake more accurately with video

**Duchenne smile** -- mouth turned upward, but fewer wrinkles around the eyes

People are quicker to trust and like other people who are showing what are believed to be genuine emotions.

The theory was that it was difficult to fake a smile, but that's been disproven. It's harder to do on video because it's dynamic and not just a snapshot.

## Takeaways

- There's a limit to about 150 people in your "survival" community; too few and you'll feel alienated, isolated, and stressed
- Relationships in larger numbers are usually weak ties
- When designing a product with social connections, think about whether those are strong or weak
- If designing for strong ties, build in physical proximity and make it easy for people to interact/know one another
- If designing for weak ties, don't rely on direct communication among all people
- Don't underestimate the power of watching others; to influence others, show someone doing that task
- Stories trigger mirror neurons, so use stories to get people to take action
- Show video of actions happening to get compliance (e.g., people getting flu shots, kids eating vegetables)
- There are many asynchronous activities (e.g., Facebook, Twitter), but they don't satisfy all our group needs
- Designers are limited in terms of synchronous activities when people aren't collocated; consider video/audio connections
- Do the interactions of your product follow a typical person-to-person interaction?
- Many usability guidelines for products are guidelines that connect to social expectations for interactions
- From most to least likely to lie: phone, e-mail, pen and paper
- People are more negative via e-mail than pen and paper (more psychological distance)
- Prefer pen and paper for most positive and truthful responses; if possible, get feedback in person
- Listening to someone creates mirror connections to help people understand
- Presenting audio/video can be more compelling than written
- Connections to relatives/friends are stronger than to those only with a shared interest
- Laughter is more difficult to evoke in asynchronous communication
- Laughter is contagious
- Ensure smiles in videos are sincere; this builds trust
- People can spot sincere smiles by looking at several parts of the face (looking for conflicting emotions)

# How People Feel

## Seven basic emotions are universal

**Emotions** -- have physiological correlates and are expressed physically (gestures, facial expressions); usually arise because of an event and lead to actions

**Moods** -- longer than emotions; may not be expressed physically or come from an event

**Attitudes** -- more cognitive; conscious brain

Paul Ekman studied emotions:

- Joy
- Sadness
- Contempt
- Fear
- Disgust
- Surprise
- Anger

## Emotions are tied to muscle movement and vice versa

There have been studies that show if Botox is used to paralyze the muscles used in showing facial expressions for certain moods, those emotions are dampened as well.

## Anecdotes persuade more than data

There's so much information for us to process, so we think that more data is good for others (e.g., presenting a survey of customers and start to write a summary about X% said this and Y% said that). Although true, it's not compelling. Instead say, "Phil from Chicago shared the following story about our product..."

Anecdotes are stories; they trigger emotions. Better yet, use videos.

## Smells evoke emotions and memories

When you smell something, that sensory data goes right to the amygdala (emotional processing).

## People are programmed to enjoy surprises

The human brain not only looks for the unexpected; it craves the unexpected.

## People are happier when they're busy

Example: 12 minutes to walk from airport terminal to baggage claim; immediately find your bag --or-- 2 minutes to walk to baggage claim, then wait for 10 minutes.

Hsee researched this and found that although we prefer to be lazy, doing nothing makes people impatient and unhappy.

## Pastoral scenes make people happy



This kind of landscape helped us to survive as a species.

See also: <http://www.doctordisruption.com/design/principles-of-design-18-savanna-preference/>

## People use look-and-feel as their first indicator of trust

Sillence researched trust and web design (medical sites). Sites that were rejected had issues with look-and-feel, first impression, poor navigation, etc. Trusted sites were from respected organizations, advice from experts, information they felt relevant to them.

## Listening to music releases dopamine in the brain

Not only listening to music, but anticipating music and lead to a release of dopamine.

## The more difficult something is to achieve, the more people like it

Example of a fraternity: If an organization is hard to get into, then the people in it like it even more than if entry was easier.

**Cognitive dissonance theory** -- would people go through a painful experience to be part of a group they ultimately didn't like? You tell yourself the group must important because you went through discomfort.

Scarcity and exclusivity -- if it's difficult to join then not many can do so; if I don't make it in, I'll lose out. Something painful must be worth it.

## People overestimate reactions to future events

Dan Gilbert's book showed that people greatly overestimate their own reactions to both pleasant and unpleasant events in their lives.

We have a built-in regulator to keep us at about the same level of happiness most of the time.

## People feel more positive before and after an event than during it

Mitchell studied people about to take a trip; before the event everyone was looking forward to it, during they were not that positive, and afterward the events were thought of positively.

## People want what is familiar when they're sad or scared

De Vries studied that people buy familiar brands (instead of trying new things) when sad or scared

## Takeaways

- The 7 basic emotions (joy, sadness, contempt, fear, disgust, surprise, anger) are universal and shown by facial expression and physical gestures
- If using pictures, consider the 7 emotions to communicate clearly (make them pictures of genuine emotion)
- Find out what emotions drive your target audience
- Consider the emotions of stories you tell; this may affect their mood and thus next actions they take
- Unintended facial expressions may change how people feel about your product; e.g., squinting to read small text may prevent them from feeling happy/friendly
- Consider video and that people mimic others' expressions (e.g., mirroring a smile); this may impact next actions
- Information is processed more deeply and remembered longer if there's an emotional hook
- Look for ways to provide messages that invoke emotions and empathy
- Prefer anecdotes to factual data
- Scents are used in retail stores, hotels, malls, etc. to evoke memories, associations, and emotions
- Things that are novel capture attention
- Providing something unexpected gets attention, and can also be pleasurable
- Prefer consistency, but a bit of unexpected content/interaction can get people to try something new
- People don't like to be idle
- People are okay doing a task while idle, but it needs to be worthwhile (i.e., not busywork)
- Busy people are happy people
- If you must have your users wait, have something interesting for them to do
- People like pastoral scenes; if using a nature image, prefer those elements
- People make quick decisions about what is trustworthy; consider design factors to help with this (color, font, layout)
- Music can be pleasurable, but it varies by individual
- Be careful of having customers tell you to change a design because it will make them happier; they may overestimate their reaction
- If you're building a product where people are planning for the future, they'll have more positive feelings if you can draw out the planning phase
- If you measure feelings of interaction, they'll be higher before or after than during
- Brands that hold safety (from the past) are a shortcut to a positive experience
- Messages of fear or loss only work if your brand is already established; otherwise, use messages of fun and happiness



# People Make Mistakes

## People will always make mistakes; there is no fail-safe product

Assume something will go wrong in a system.

To write an error message:

- Tell the user what he/she did
- Explain the problem
- Instruct how to correct it
- Write in plain English (active voice)
- Show an example

## People make errors when they are under stress

**Yerkes-Dodson law** -- a little stress can help you perform a task, because it heightens awareness; too much stress degrades performance

When there's stress, attention gets focused and you get tunnel action (keep doing the same task even though it it's not working)

Don't assume that people will use your product in a stress-free environment.

## Not all mistakes are bad

- Errors with positive consequence -- don't get the desired result but you learn something else (e.g., looking for volume control but found brightness control instead)
- Errors with negative consequence -- don't get the desired results, undo a positive or get into a condition that cannot be reversed (drag to move file but end up deleting it)
- Errors with neutral consequence -- no effect on task completion (try to select menu item, but it's unavailable)

## People make predictable types of errors

Performance errors

- Commission -- took more steps than necessary
- Omission -- left out steps
- Wrong-action -- appropriate for procedure, but wrong action

Motor-control errors -- clicked the wrong thing, made the wrong gesture

See also, James Reason's "Swiss cheese model of human error" and Scott Shapell's /Douglas Wiegmann's HFACS for the US Office of Aviation Medicine.

## People use different error strategies

**Systematic exploration** -- users plan out what procedures they'll use to correct the error

**Trial and error exploration** -- randomly try things and see what happens

**Rigid exploration** -- do the same thing repeatedly

## Takeaways

- Think ahead about likely mistakes and anticipate them
- Create a prototype of your design to see what errors are likely to occur; test your prototype on users (e.g., if you write medical software, test on users (e.g., nurses))
- Write error messages in a plain language
- If people are performing a boring task, raise arousal using sound, colors, or motion
- If people are performing a difficult task, reduce arousal and eliminate distractions
- When under stress, people tend to miss things on the screen
- Document errors during user testing; categorize them as negative, positive, or neutral. Aim to minimize negative errors first.
- People make different kinds of errors; decide on what kind of errors (commission, omission, wrong-action, motor-control) are most important
- If in a field where errors are very costly (e.g., human lives), use more involved systems to prevent errors.
- People use systematic, trial-and-error, and rigid exploration; learn what they do and plan for it in the design

# How People Decide

## People make most decisions unconsciously

Example factors when buying things

- What other people are buying
- What's consistent with your persona
- What you stand to gain from this purchase
- Fear of loss (e.g., sale only lasts 2 days)
- Your particular motivations

The unconscious has evolved to process most of the data and to make decisions for us according to guidelines and rules of thumb that are in our best interest most of the time. This is the meaning behind "trusting your gut," and most of the time it works.

## The unconscious knows first

Bechara studied the skin conductance response of people gambling with certain decks of cards where people could get big wins (or big losses) or more conservative wins/losses. The skin readings were elevated long before people consciously changed their strategies.

## People want more choices and information than they can process

Iyengar and Lepper studied how people choose flavors of jam in the grocery store. When there were 24 options, more people stopped by to sample than when given 6 options. Regardless of the number of options, people only sampled 3-4 jams. More people actually purchased jam when there were 6 options.

## People think choice equals control

Iyengar studied several types of animals choosing between (1) press *one* button to get food, or (2) press a *series* of buttons to get food. The animals preferred the more complex path.

Sometimes having many choices makes it harder to get what they want, but people still want the choices so that they feel in control of the decision.

## People may care about time more than they care about money

Mogilner and Aaker studied the phrasing of ads for a lemonade stand (e.g., "Spend a little time" vs. "Spend a little money" vs. "Enjoy"). More people stopped at the stand that mentioned time.

When you invoke time in a message, you make more of a personal connection than when you invoke money.

## Mood influences the decision-making process

## Group decision-making can be faulty

Mojzisch and Schulz-Hard studied job candidate interviewers. One group was given information from the others, another was given no prior information. The researchers found that when a group of people starts a discussion by sharing initial preferences, they spend less time and less attention on the information available outside the group's preferences.

## People are swayed by a dominant personality

Anderson and Kilduff's research showed that it's not sufficient to have a dominating personality, you need to speak first in the group.

## When people are uncertain, they let others decide what to do

Latane and Darley studied what would happen when participants (sitting in a group of researchers) would do when a room started to fill up with smoke. The more people, and the more the non-participants ignored the smoke, the more likely it was for the participant to also ignore it.

Testimonials and ratings are powerful.

## People think others are more easily influenced than they are themselves

**Third-person effect** -- most people think others are influenced by persuasive messages, but that they themselves are not

People are literally unaware (i.e., unconscious) that they are being influenced. It's also partly because people don't like to think of themselves as easily swayed/gullible, because then they wouldn't be in control.

## People value a product more highly when it's physically in front of them

Bushong researched what people did when given (1) item description, (2) item image, (3) the actual item. They valued the item more highly when it was actually in front of them.

## Takeaways

- Be aware of the unconscious motivations of your audience
- Be skeptical of reasons people voice for deciding to take a certain action, as many of these decisions are unconscious
- Give people rational and logical reasons for acting in a certain way, even when you know those may not be the real reasons people do act
- People respond to unconscious signals of danger
- People often take actions or have preferences, but can't explain why they prefer what they do, as the unconscious acts more quickly
- Limit the number of choices to your audience to 3 or 4 items
- If you need to provide more choices, do so using progressive disclosure to show subsets
- People need to feel they have choices
- Consider offering different ways for users to achieve a goal; they may prefer the less effective ones
- Think carefully before taking choices away from users
- Know your audience; if they are influenced by prestige/possessions, mention money; otherwise mention time
- Most people are influenced by time and experiences that produce a personal connection
- Some people tend to make decisions intuitively; others are more deliberative
- Mood is influenced fairly easily (through a video clip for example)
- People in a good mood rate products as more valuable if deciding quickly
- People in a sad mood rate products as more valuable if deciding deliberately
- If someone on a team is less competent (team knows this, but individual doesn't), the team can make poor decisions because they ignore that individual's input
- Give everyone time to consider information before sharing it with others
- Ask people how confident they are in their decisions, not just what that decision is
- Don't just follow the first solution presented by a dominant person
- For group sharing meetings, have people write down contributions before the meeting to prevent dominant personalities from taking over
- People are very influenced by others' opinions, especially when they are uncertain
- Use testimonials, reviews, and ratings to influence behavior
- The more info you provide in the review about the person who left it, the more influential it will be
- Don't believe customers when they say they aren't swayed by what others say; people are largely unaware of their unconscious processes
- Brick-and-mortar stores can retain an edge if they have products on-hand
- Having a product behind glass or some other barrier may lower the price the customer is willing to pay