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The Science of Usability

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All Q1 2016 blog posts

“Why EHR Usability has Fallen Short”
Why this is important
Conditional Probability: Monty Hall Example

\[ P(A|B) = \frac{P(A, B)}{P(B)} \]

A - Car behind 1
B - Goat shows 2

\[ P(A, B) = \frac{1}{3} \times \frac{1}{2} \]

\[ P(B) = \sum_A \]
Processing Fluency

• The ease with which a task or chunk of information is processed by the brain

• Experiencing fluency puts the user in a positive mood and instills a sense of familiarity and effortlessness — even when an interface does contain difficult or unfamiliar elements


 people perceive more aesthetic designs as being more usable.

Which recipe is harder to follow?

1. In a stainless steel or glass bowl, combine garlic, olive oil, basil, salt, pepper, lemon juice, and parsley.

2. Place the halibut filets in a shallow glass dish or a resealable plastic bag, and pour the marinade over the fish. Cover or seal and place in the refrigerator for 1 hour, turning occasionally.

3. Preheat an outdoor grill for high heat and lightly oil grate. Set grate 4 inches from the heat.

4. Remove halibut filets from marinade and drain off the excess. Grill filets 5 minutes per side or until fish is done when easily flaked with a fork.

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“You will need to take medicine twice a day. Take it every morning and night for a full 10 days. Even if you feel better, take medicine for all 10 days.”

Date Format

10/12/16
Date Format

10/12/16

Month  Day  Year
Date Format

09/07/16
Date Format

Oct 12, 2016
Date Format

09/07/16 VS Oct 12, 2016

- Takes up less space
- “Familiar”
- Faster to read
- Less mistakes
- Less cognitive load
Readability

The effectiveness, efficiency and satisfaction with which specified users achieve specified goals in particular environments. Effectiveness is the accuracy and completeness with which specified users can achieve specified goals in particular environments. Efficiency is related to the resources expended in relation to the accuracy and completeness of goals achieved. Satisfaction: the comfort and acceptability of the work system to its users and other people affected by its use.

Less focus

More time and eye strain
Readability

“Improve reading speed 20-30%”!

http://www.beelinereader.com/
Readability

Ever wonder why stop lights use colors and not words? It's because the human brain processes color very quickly—much more quickly than it can process words. BeeLine Reader uses the same principle to make reading easier and faster. With BeeLine Reader, the color of the text guides your eye across and between lines, eliminating "line transition errors" (accidentally skipping or repeating lines) and making reading faster, easier and more efficient.
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Color attracts

As color is a visual language in and of itself, a designer can use it to attract the eye and focus attention.

Bright and bold colors are excellent at attracting attention to select regions of a page, but soon become overwhelming if overused.

Color has meaning
Color has meaning
Color has meaning
Color has meaning
Color has meaning

Stop
Color has meaning
Color attracts
Color has meaning

<table>
<thead>
<tr>
<th>Location</th>
<th># of Patients</th>
<th>Target</th>
<th>Trend</th>
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<tbody>
<tr>
<td>ICU</td>
<td>43</td>
<td>35</td>
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<td>Pediatric</td>
<td>12</td>
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<tr>
<td>Surgery</td>
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Horror Vacui - ˌhôrər ˈvakyəwəˈwī

The Fear of Emptiness - A tendency to favor filling blank spaces with object and elements over leaving spaces blank or empty

⚠️ As Horror Vacui increases… value decreases!

Horror Vacui
Horror Vacui
Cognitive Tax
Cognitive Tax

BLUE
Cognitive Tax

When 2 or more perceptual or cognitive processes are in conflict, it requires additional processing to resolve the conflict and the additional time and effort have a negative impact on performance.

Decision-making research shows us that not only can more information be more cognitively taxing, but it can also lead to suboptimal decisions.

http://www.uxbooth.com/articles/cognitive-demand-not-always-by-design/
Less is More

Our gut tells us…

Science tells us…

Google search: how to make your table less terrible
\[ T = a + b \log_2 \left( \frac{D}{W} + 1 \right) \]

Constants based on input mode and skill of user

Distance from starting point to center of target

Width of target

Ignoring this formula leads to unhappy clients :)
Fitts’ Law
4.5:1
Contrast is important because it has a HUGE impact on fluency and adds to the cognitive tax that our users have to pay.

WCAG 2.0 level AA requires a contrast ratio of 4.5:1. Level AAA requires a contrast ratio of 7:1 for normal text and 4.5:1 for large text. (http://webaim.org/resources/contrastchecker/)
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007 Rule

Distance from computer (~18 inches) \times 0.007 = 0.126

Distance \times 0.007 = \text{Text Height}
The science suggests...

• Larger fonts
• Less color
• Narrower columns
• Less information
• More white space
• …
The science suggests...

- Larger fonts
- Less color
- Narrower columns
- Less information
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- ...

Greater efficiency
More effective
Higher satisfaction
Safer
Better decisions
Scroll
“Focus on click reduction. The key to acceptance and usability is to reduce frustrating additional steps. Deloitte proposes that within two clicks of the login screen, clinicians should be able to access 80 to 90 percent of their job function. Vendors and organizations should do an in-depth analysis of clicks and screens to identify extraneous steps in the process.”

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Unnecessary clicks
How do YOU use this knowledge?

1. **Believe the science** – Data vs. Instinct
2. **Use the information** – Consider how you apply this to your own customization/design
3. **Push Us** – We know this, do you see it showing up in our solutions?
4. **Be aware of the tradeoffs** – Be a part of the solution