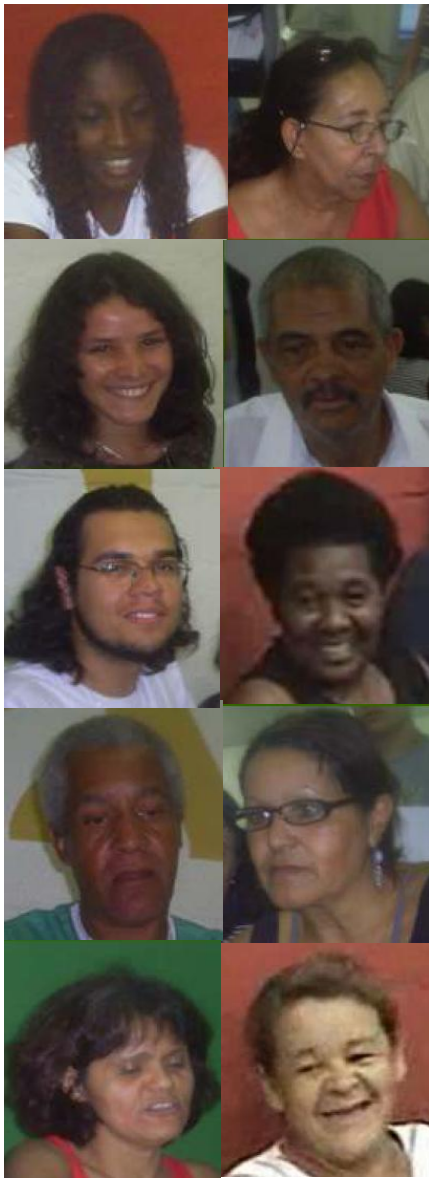


## Auxílio para a proposição de soluções de design

Vania Paula de Almeida Neris  
vania@dc.ufscar.br



# Objetivos desta aula

---

- Apresentar o conceito de Modelos Mentais e discutir o uso deles em IHC.
- Refletir sobre fatores humanos e como aplicá-los em IHC.
- Exemplificar o uso de diretivas e padrões no auxílio à tomada de decisão de design.



# Modelos Mentais

# Modelos mentais

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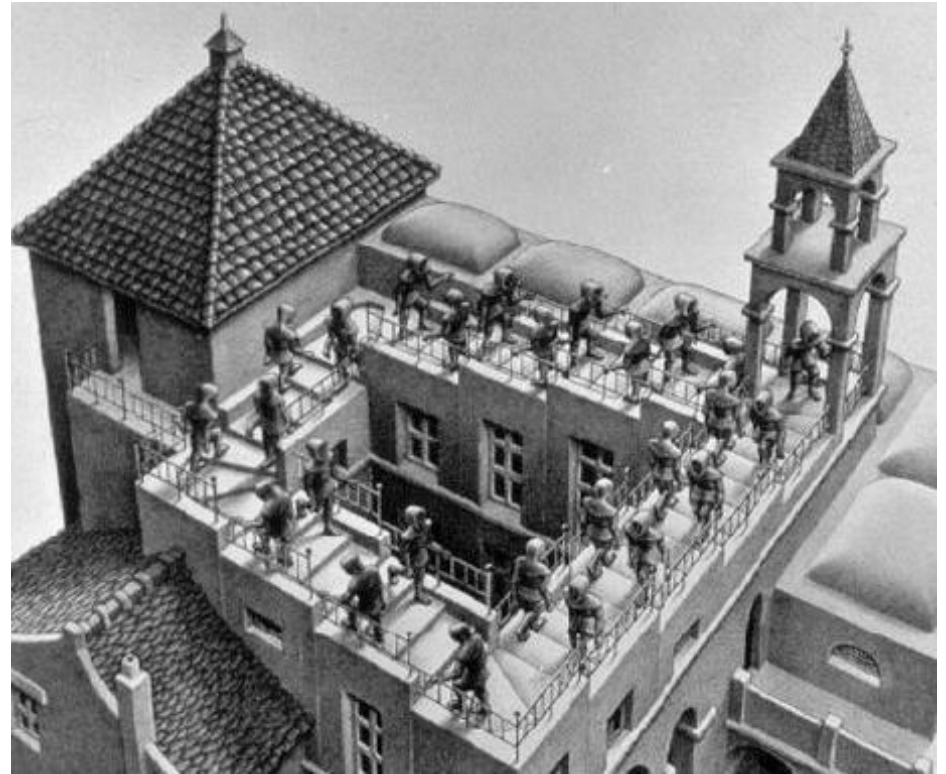
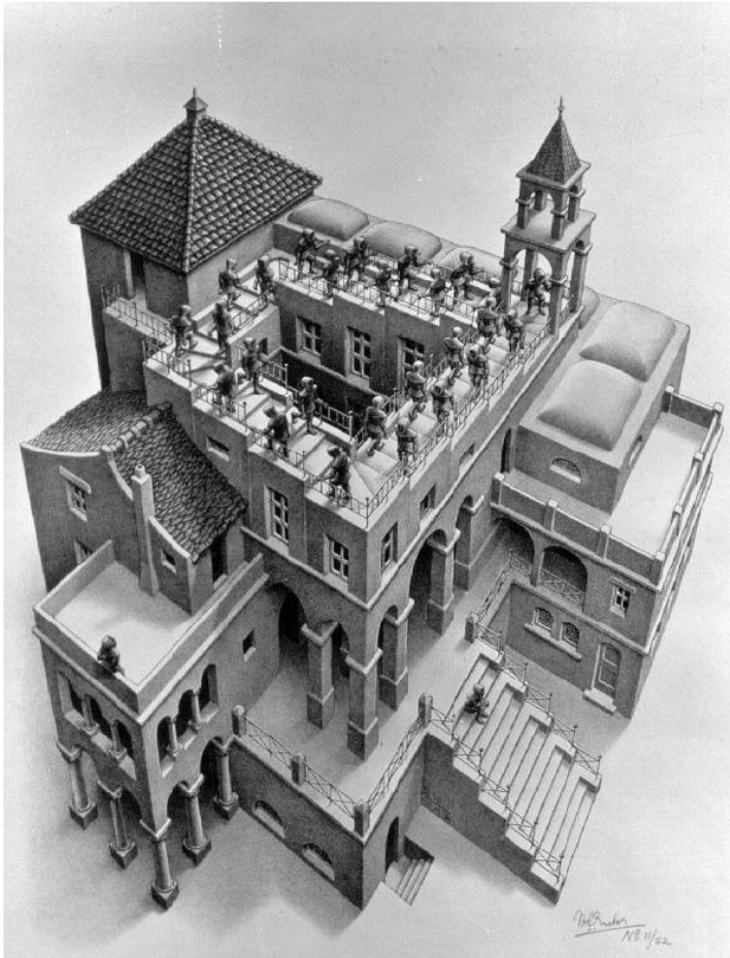
- São representações que criamos internamente (cérebro) de coisas reais ou imaginárias.
- Os modelos mentais são construídos a partir da percepção, imaginação e interpretação... de signos

# Características dos modelos mentais

---

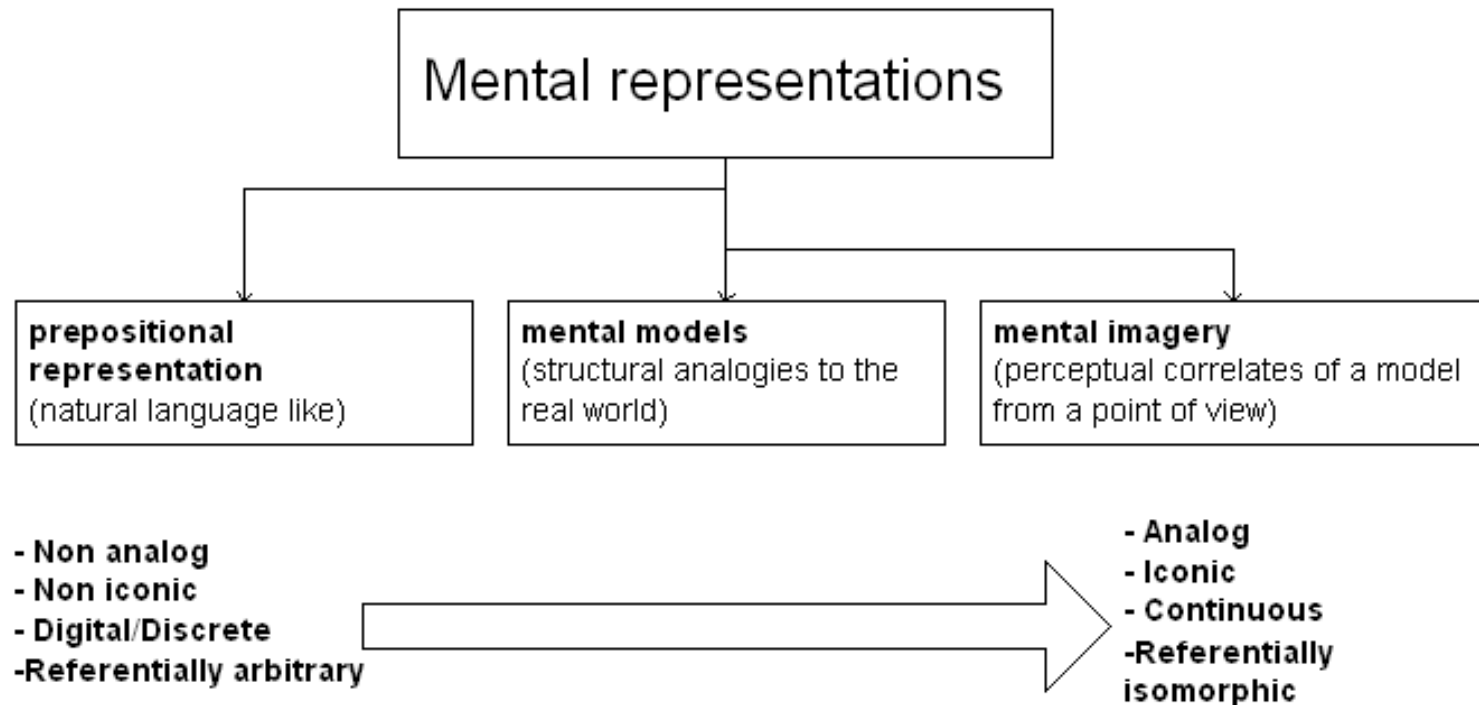
- ❑ Incompletos
- ❑ Imprecisos
- ❑ Estão constantemente evoluindo
- ❑ Representação simplista
- ❑ Pode ser representado por um conjunto de regras if-then-else
- ❑ Representam explicitamente o que é verdade e não o que é falso.

# Subindo ou descendo?



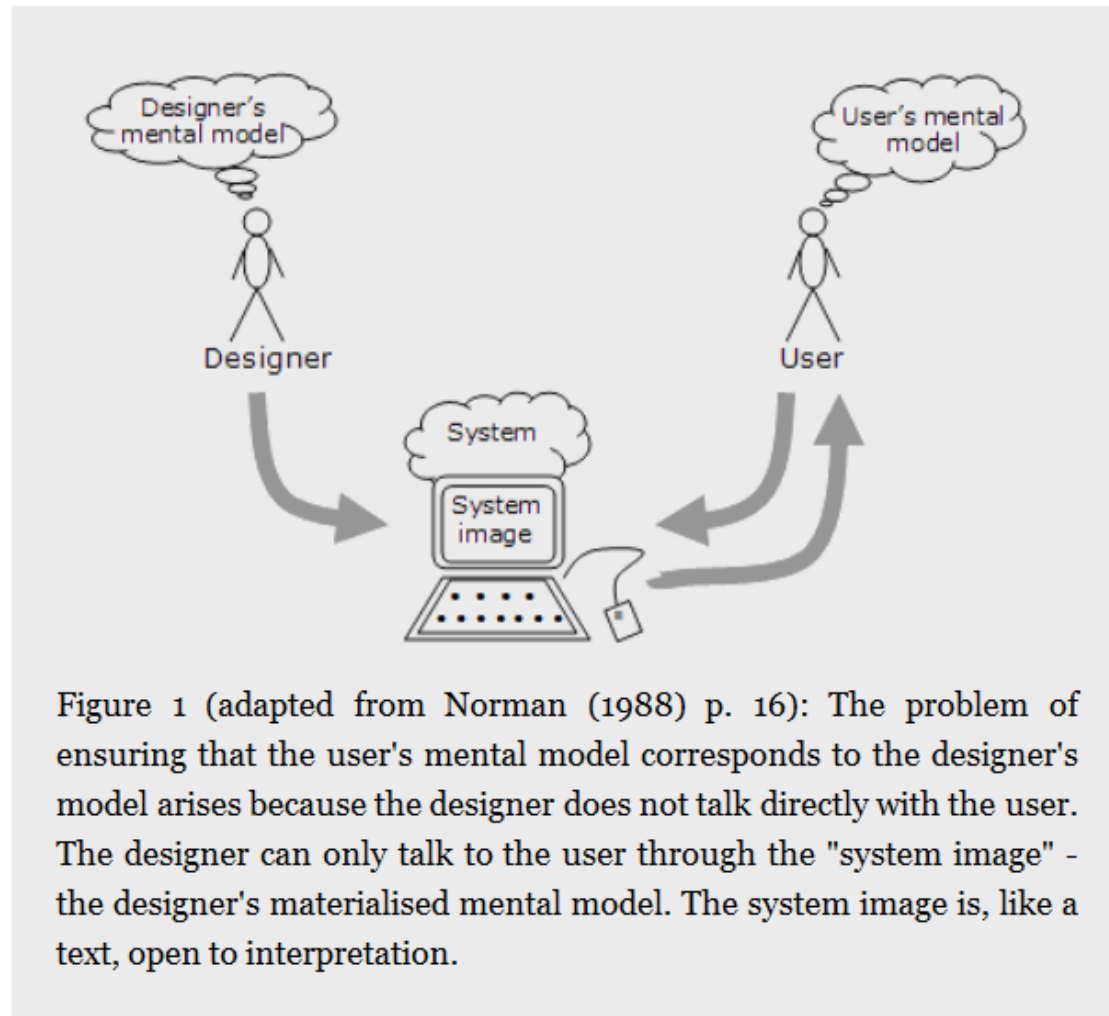
Maurits C. Escher. Ascending and Descending (1960)

# Representações mentais



Johnson-Laird (1983)

# Modelos mentais e IHC





# Exemplo

- “As an example of how users build mental models, let's take an example of a windows typical user exposed to a Unix environment for the first time and as a task in hand, he has to type a document on Emacs as opposed to his favorite windows text editor. The user makes a typo and without hesitating presses his fingers on the Control and the Z buttons since these are the keys he always used as a keyboard shortcut for UNDO command. The user gets frustrated as the Emacs editor completely disappears from the screen and he got back to the Unix prompt with no single notification message. The fact that the user has been working on windows builds a mental model for the UNDO command in almost all windows programs and associates this model with the action of pressing CTRL-Z, not knowing that these actions will cause a completely different action in Unix environment (which is running Emacs as a background process and the only way to bring it back is to type "fg" at the Unix prompt.”



# Fatores Humanos

# Usuários

- Se estamos preocupados com a Interação **Humano**-Computador devemos considerar também as características:
  - ▣ Físicas (questões ergonômicas)
  - ▣ Cognitivas (psicologia cognitiva)
  - ▣ Emocionais
- E como essas características influenciam o design de sistemas computacionais

# Modelo de Processamento de Informação Humano (MPIH)

- As arquiteturas de computadores são descritas pelos engenheiros de computação em termos de memórias, processadores, seus parâmetros e interconexões.
- Card *et al* (1983) propõem o Modelo de Processamento de Informação Humano (MPIH), como uma descrição aproximada para ajudar a prever a interação usuário-computador, com relação à seus comportamentos

# Modelo de Processamento de Informação Humano (MPIH)

PP - Processador Perceptual

PM – Processador Motor

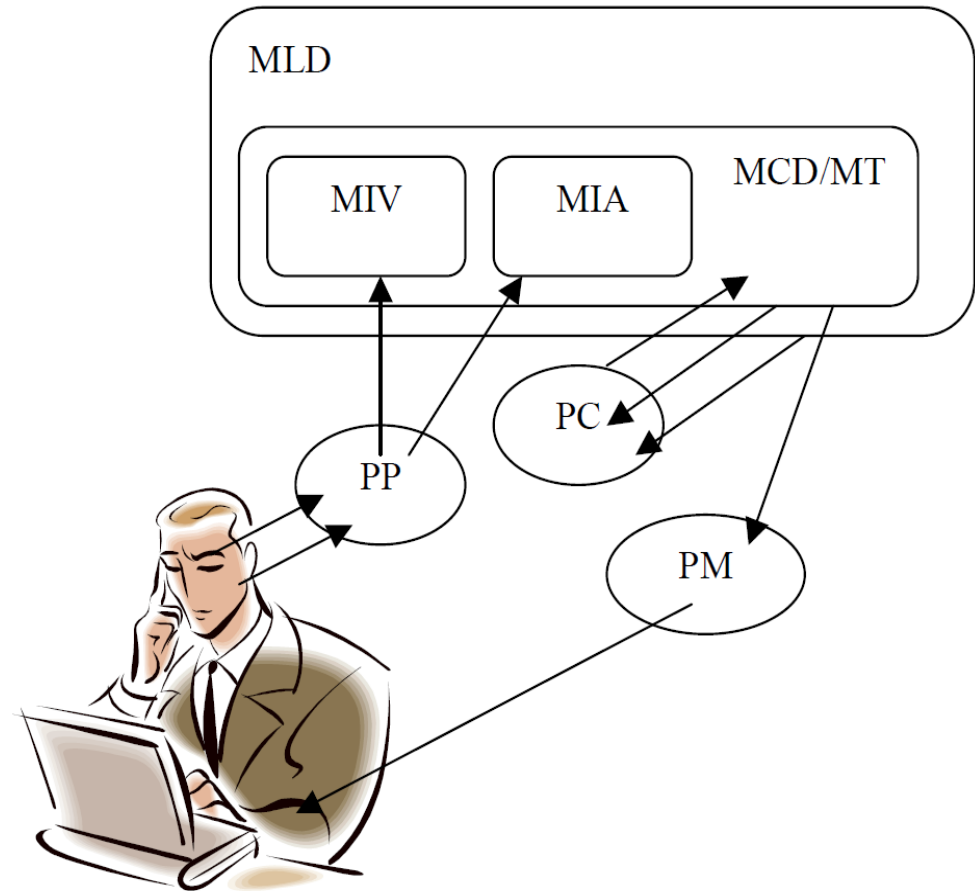
MIV - Memória da Imagem Visual

MIA - Memória da Imagem Auditiva

PC – Processador Cognitivo

MCD/MT – Memória de Curta Duração ou Memória de Trabalho

MLD – Memória de Longa Duração



MPIH e seus componentes principais (Card *et al*, 1983)

# Mecanismos da Percepção Humana

- Várias teorias tentam explicar a maneira como percebemos a informação apresentada, dentre elas:

- **TEORIA CONSTRUTIVISTA**

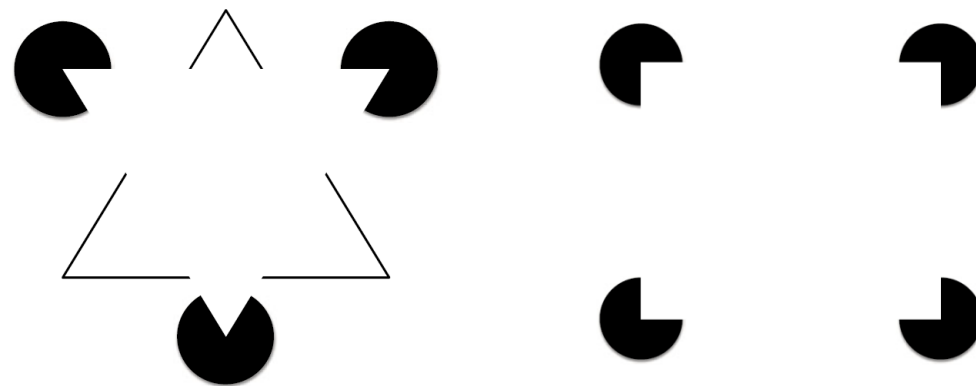
- Acredita que a nossa visão de mundo é construída de forma ativa por informação obtida do ambiente somada ao conhecimento previamente armazenado.

- **TEORIA ECOLOGISTA**

- Acredita que a percepção é um processo direto que envolve a detecção da informação do ambiente e não requer quaisquer processos de construção ou elaboração.
- A noção de *affordance* é derivada do entendimento da linha ecologista para a percepção.

# A Visão e o Cérebro

- O cérebro não interpreta exatamente o que os olhos vêem.
- O cérebro está constantemente interpretando as coisas de tal forma que a imagem faça sentido considerando as experiências obtidas durante a vida.



# O que você vê?





# Entendendo os Mecanismos de Percepção Humana

- Para “ver” o cachorro nós adicionamos informações que não estão presentes na imagem.
- Se alguém pede a você que procure encontrar o cachorro, fica mais fácil de vê-lo. Além disso, uma vez que se vê o cachorro é muito difícil não vê-lo mais.
- Isso explica um fenômeno que não se restringe à percepção de imagens visuais: *Quando se olha para o que se quer ver é mais fácil “ver”.*

# O Poder de Manipular



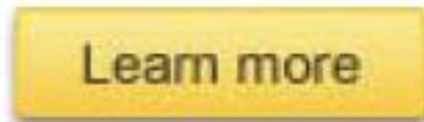
FIGURE 1.3 Color and shapes can influence what people see [by Weinschenk]

O que as pessoas veem na interface dos sistemas computacionais depende do plano de fundo, conhecimento, familiaridade com o que está sendo exibido e expectativas

# Botões possuem sombras e bordas



**FIGURE 7.3** Buttons on physical devices have shadows that make you want to press them



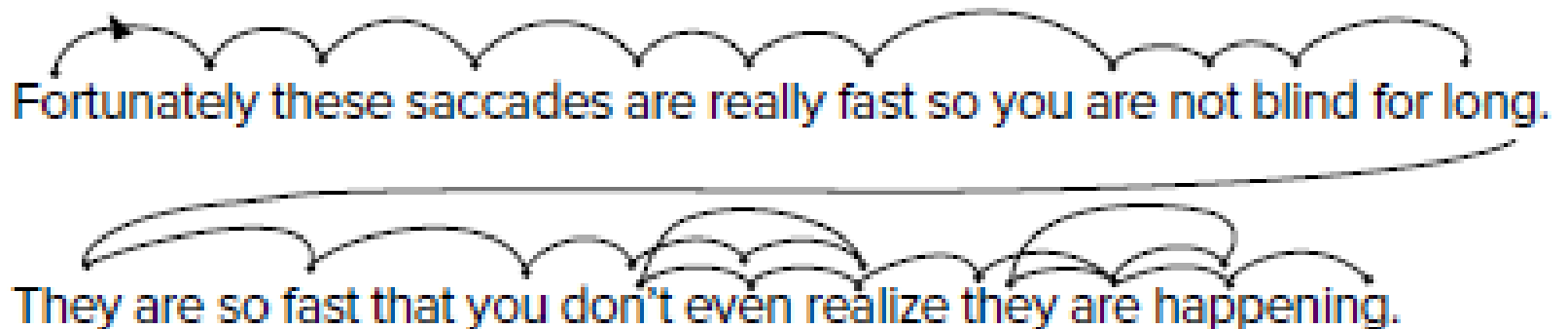
**FIGURE 7.5** The use of shading makes this look like a button



**FIGURE 7.6** Online buttons are losing their cues

[by Weinschenk]

# Como as pessoas leem?



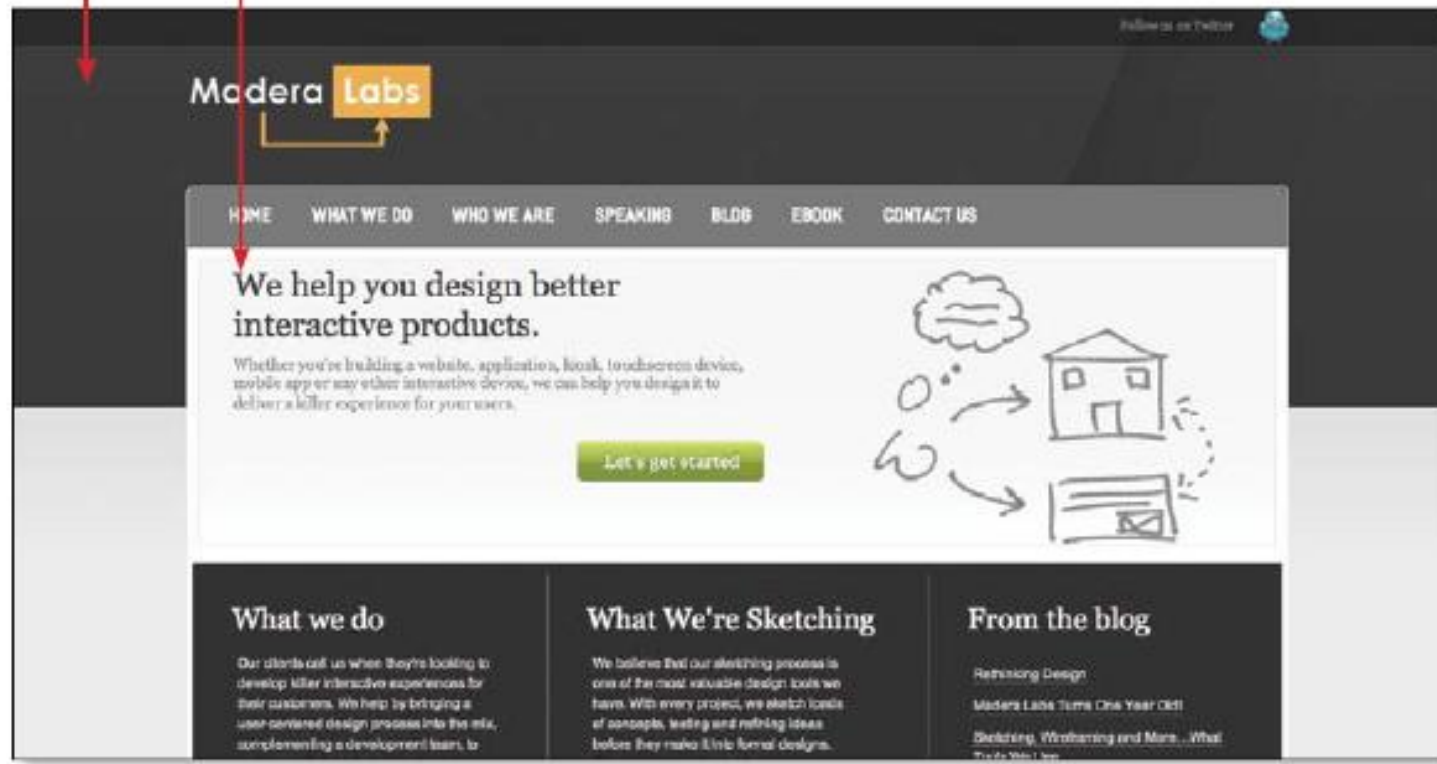
**FIGURE 13.2** An example of a saccade and fixation pattern

[by Weinschenk]

# A primeira olhada

People don't look at screen edges

People consider the point where the meaningful information begins to be the true "top left"



**FIGURE 6.1** We skip the edges of a screen and move to meaningful information

[by Weinschenk]

# Como chamar atenção do usuário

---

- PERIGO;
  - SEXO;
  - MOVIMENTOS;
  - COMIDA;
  - ROSTOS;
  - HISTORIAS;
- 
- Utilize sons sempre que possível.

# Motivação

- Mostrar os objetivos
- Explicitar as etapas do processo

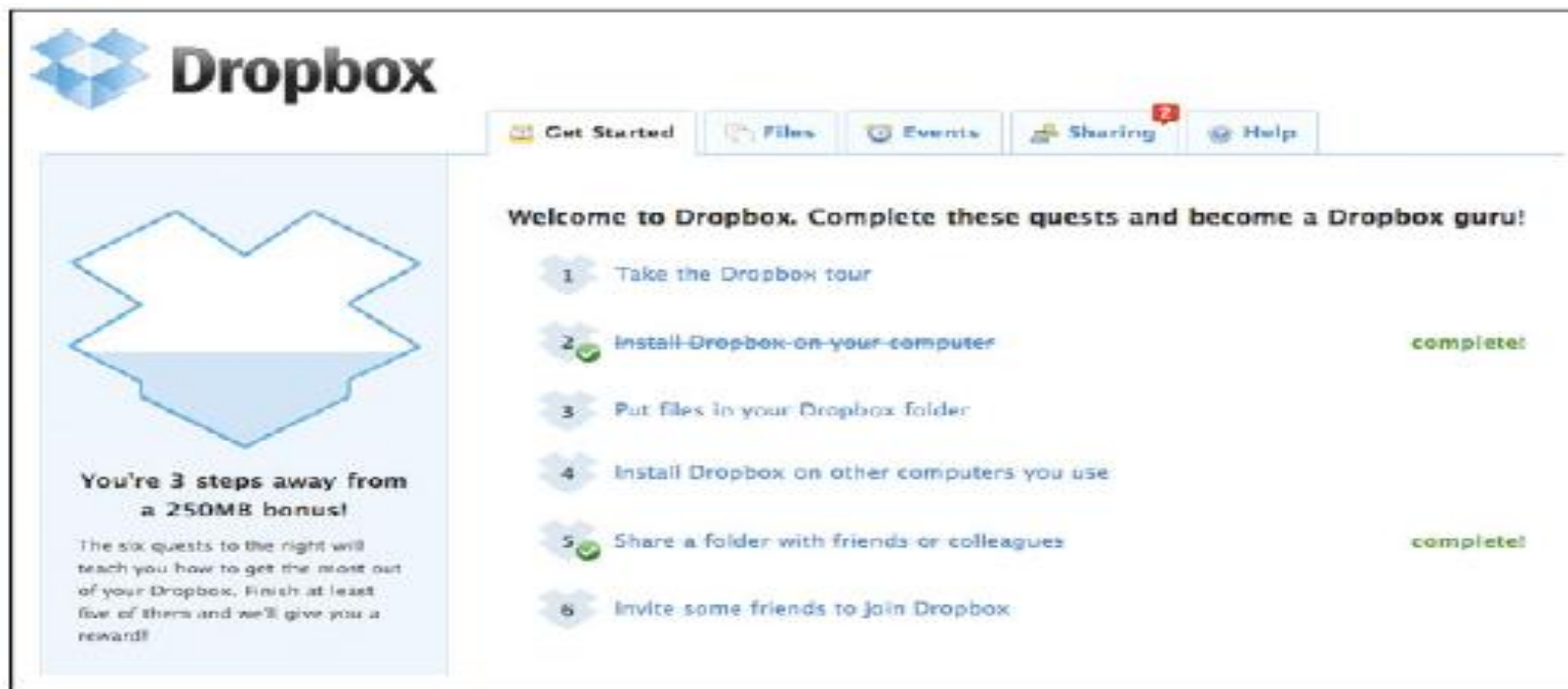


FIGURE 50.1 Dropbox shows you how close you are to the goal

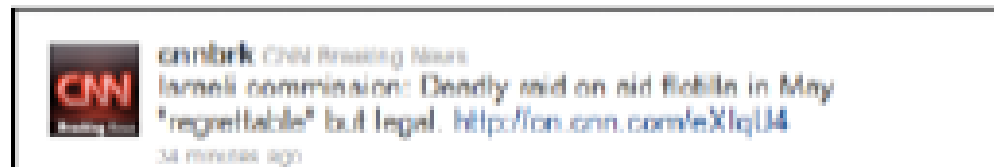
[by Weinschenk]

# Motivação



**FIGURE 55.1** LinkedIn shows your progress in completing your profile

- Conheça como o cérebro humano funciona e use essas informações a favor do design



[by Weinschenk]

**FIGURE 53.3** Short and frequent, Twitter messages are ideal for stimulating the dopamine system



# Teoria dos Chunks

- George Miller (1956) apresentou a ideia de que a memória de curto prazo poderia ter somente 5-9 chunks (pedaços) de informação (sete mais ou menos dois).
- Um chunk é qualquer unidade significativa.
- Um chunk pode se referir a dígitos, palavras, posições de xadrez, ou rosto de pessoas.
- O conceito de chunking e a capacidade limitada da memória de curto prazo se tornaram um elemento básico em todas as teorias de memória posteriores.

# Illustrando...

16047559385	Without chunking, the number is hard to remember.
1 604 755 9385	The breaking down of the number into more “logical” chunks makes the number easier to remember.
1 (604) 755-9385	The addition of delimiters can also make the chunking process even more effective.



# Diretivas de Usabilidade e Padrões de Interação

# Usabilidade

- Característica de qualidade de software
- Relacionada com:
  - ▣ Eficácia
  - ▣ Eficiência
  - ▣ Satisfação de uso

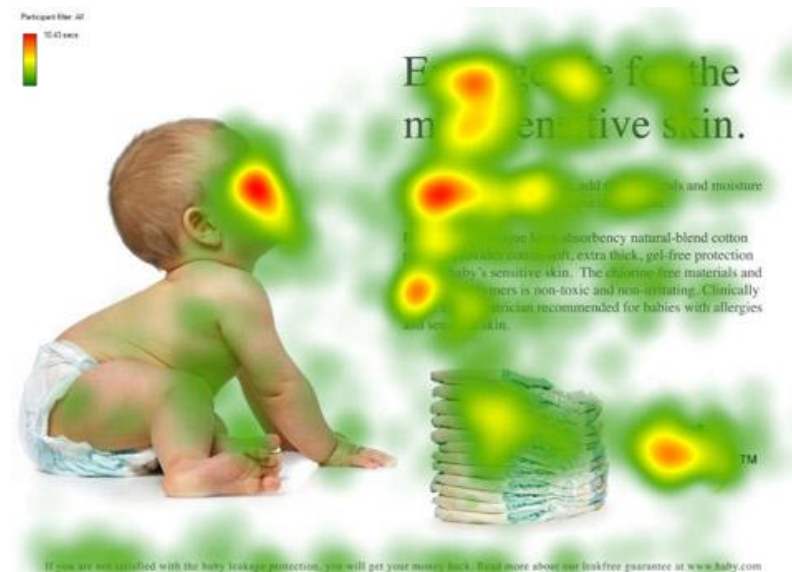
# Diretivas

- Em inglês *guidelines*
- Reúnem lições aprendidas e informam, de maneira direta e prática, o que fazer
- Existem muitas e muitas diretivas
  - ▣ Escolha aquelas de fontes confiáveis
  - ▣ Verifique a experiência do autor e a maneira como as diretivas foram obtidas

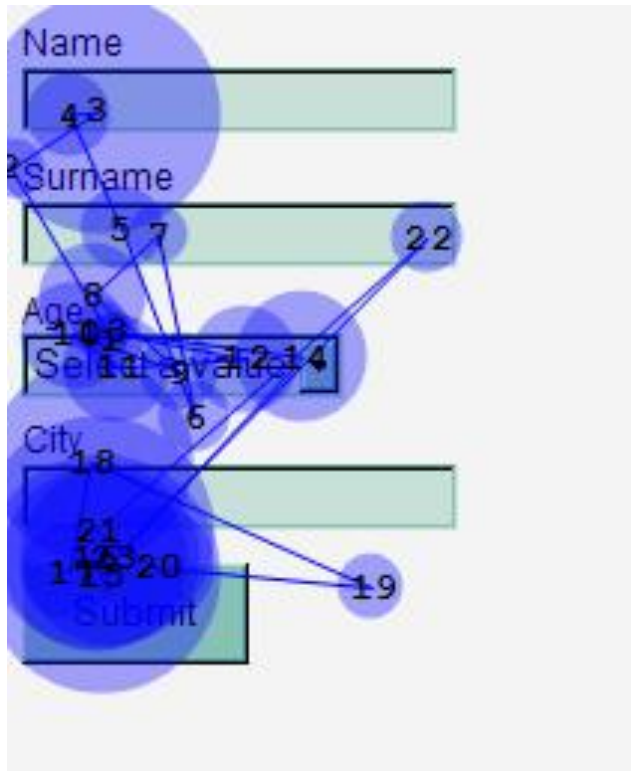
# Usuários olham para faces



Heat map feito com 106 usuários  
Fonte: <http://usableworld.com.au>

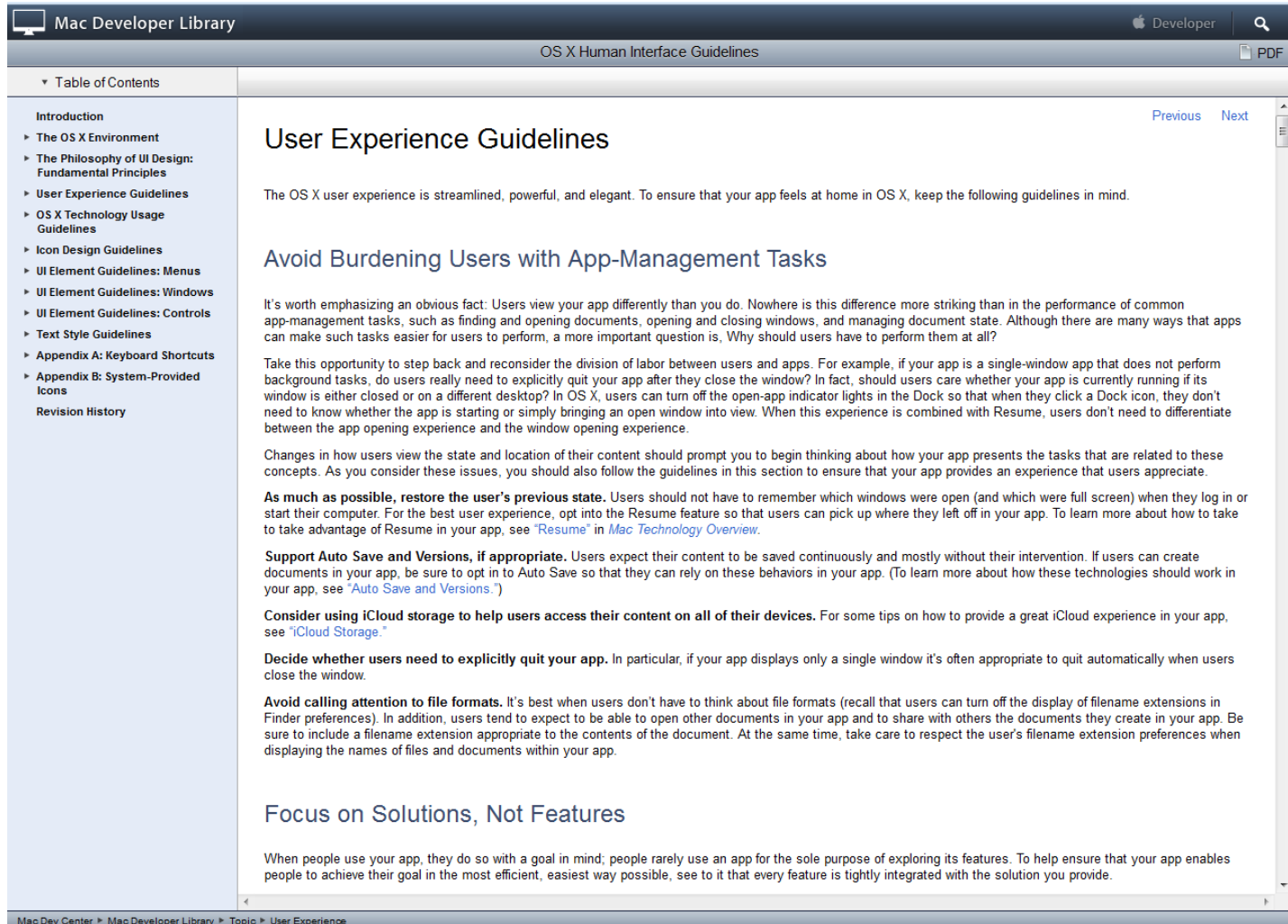


# Onde colocar *labels* em formulários?



Colocar o *label* acima da caixa de texto, e alinhado, faz com que o usuário veja os dois elementos em um único movimento dos olhos.

# Diretivas da Apple



The screenshot displays the Mac Developer Library interface. At the top, the title bar reads "Mac Developer Library" with an Apple logo and "Developer" on the right. Below the title bar, a navigation bar shows "OS X Human Interface Guidelines" and a "PDF" icon. A left sidebar contains a "Table of Contents" with links to various sections: Introduction, The OS X Environment, The Philosophy of UI Design: Fundamental Principles, User Experience Guidelines (selected), OS X Technology Usage Guidelines, Icon Design Guidelines, UI Element Guidelines: Menus, UI Element Guidelines: Windows, UI Element Guidelines: Controls, Text Style Guidelines, Appendix A: Keyboard Shortcuts, Appendix B: System-Provided Icons, and Revision History. The main content area is titled "User Experience Guidelines" with "Previous" and "Next" links. It begins with the text: "The OS X user experience is streamlined, powerful, and elegant. To ensure that your app feels at home in OS X, keep the following guidelines in mind." Below this, the section "Avoid Burdening Users with App-Management Tasks" is highlighted. The text under this section discusses the importance of user experience, the division of labor between users and apps, and the need to restore the user's previous state. It also mentions supporting Auto Save and Versions, using iCloud storage, and deciding whether users need to explicitly quit the app. The section "Focus on Solutions, Not Features" follows, emphasizing that users have a goal in mind and that features should be tightly integrated with the solution. The footer of the page shows the breadcrumb: "Mac Dev Center > Mac Developer Library > Topic > User Experience".

Mac Developer Library

OS X Human Interface Guidelines

PDF

Table of Contents

- Introduction
- The OS X Environment
- The Philosophy of UI Design: Fundamental Principles
- User Experience Guidelines
- OS X Technology Usage Guidelines
- Icon Design Guidelines
- UI Element Guidelines: Menus
- UI Element Guidelines: Windows
- UI Element Guidelines: Controls
- Text Style Guidelines
- Appendix A: Keyboard Shortcuts
- Appendix B: System-Provided Icons
- Revision History

## User Experience Guidelines

Previous Next

The OS X user experience is streamlined, powerful, and elegant. To ensure that your app feels at home in OS X, keep the following guidelines in mind.

### Avoid Burdening Users with App-Management Tasks

It's worth emphasizing an obvious fact: Users view your app differently than you do. Nowhere is this difference more striking than in the performance of common app-management tasks, such as finding and opening documents, opening and closing windows, and managing document state. Although there are many ways that apps can make such tasks easier for users to perform, a more important question is, Why should users have to perform them at all?

Take this opportunity to step back and reconsider the division of labor between users and apps. For example, if your app is a single-window app that does not perform background tasks, do users really need to explicitly quit your app after they close the window? In fact, should users care whether your app is currently running if its window is either closed or on a different desktop? In OS X, users can turn off the open-app indicator lights in the Dock so that when they click a Dock icon, they don't need to know whether the app is starting or simply bringing an open window into view. When this experience is combined with Resume, users don't need to differentiate between the app opening experience and the window opening experience.

Changes in how users view the state and location of their content should prompt you to begin thinking about how your app presents the tasks that are related to these concepts. As you consider these issues, you should also follow the guidelines in this section to ensure that your app provides an experience that users appreciate.

**As much as possible, restore the user's previous state.** Users should not have to remember which windows were open (and which were full screen) when they log in or start their computer. For the best user experience, opt into the Resume feature so that users can pick up where they left off in your app. To learn more about how to take to take advantage of Resume in your app, see [Resume](#) in [Mac Technology Overview](#).

**Support Auto Save and Versions, if appropriate.** Users expect their content to be saved continuously and mostly without their intervention. If users can create documents in your app, be sure to opt in to Auto Save so that they can rely on these behaviors in your app. (To learn more about how these technologies should work in your app, see [Auto Save and Versions](#).)

**Consider using iCloud storage to help users access their content on all of their devices.** For some tips on how to provide a great iCloud experience in your app, see [iCloud Storage](#).

**Decide whether users need to explicitly quit your app.** In particular, if your app displays only a single window it's often appropriate to quit automatically when users close the window.

**Avoid calling attention to file formats.** It's best when users don't have to think about file formats (recall that users can turn off the display of filename extensions in Finder preferences). In addition, users tend to expect to be able to open other documents in your app and to share with others the documents they create in your app. Be sure to include a filename extension appropriate to the contents of the document. At the same time, take care to respect the user's filename extension preferences when displaying the names of files and documents within your app.

### Focus on Solutions, Not Features

When people use your app, they do so with a goal in mind; people rarely use an app for the sole purpose of exploring its features. To help ensure that your app enables people to achieve their goal in the most efficient, easiest way possible, see to it that every feature is tightly integrated with the solution you provide.

Mac Dev Center > Mac Developer Library > Topic > User Experience



# Diretivas da Microsoft

The screenshot shows the MSDN website interface. At the top is a navigation bar with links: Home, Library, Learn, Downloads, Support, and Community. On the right of the bar are links for 'Sign in', 'Brasil - Português', and icons for settings and a printer. Below the navigation bar is a search box labeled 'Search MSDN with Bing'. A left sidebar contains a tree view of the MSDN Library, with 'Usability Guidelines' highlighted. Below this is a 'Community Content' section with a user icon and a prompt to 'Add code samples and tips to enhance this topic.' The main content area is titled 'Usability Guidelines' and includes the text 'Windows Mobile 6.5' and '0 out of 1 rated this helpful - Rate this topic' with a date of '4/19/2010'. The text states: 'Use the following checklist to confirm that an application user interface meets basic usability requirements:'. This is followed by a bulleted list of guidelines. Below the list is a 'See Also' section with a link to 'Error and Informational Message Guidelines'. At the bottom of the page is a feedback form asking 'Did you find this helpful?' with 'Yes' and 'No' radio buttons.

Home Library Learn Downloads Support Community Sign in | Brasil - Português |

Search MSDN with Bing

- MSDN Library
- Mobile and Embedded Development
- Windows Mobile
- Windows Mobile 6.5
- Programming Techniques for Windows Mob
- Designing Applications for Windows Mobile
- Design Guidelines
  - Accessibility and Ergonomic Guidelines
  - Home Screen Guidelines
  - Navigation Guidelines
  - Screen Rotation Guidelines
  - Soft Key and Menu Guidelines
  - Usability Guidelines**
  - User Interface Control Guidelines
  - User Interface Text Guidelines

Community Content

Add code samples and tips to enhance this topic.

More...

## Usability Guidelines

Windows Mobile 6.5 | 0 out of 1 rated this helpful - Rate this topic  
4/19/2010

Use the following checklist to confirm that an application user interface meets basic usability requirements:

- Dialog boxes do not contain irrelevant information because it diminishes the visibility of relevant information.
- Information appears in a logical order in the dialog box based on the functionality provided. The information is communicated using words and concepts that are familiar to a user. Consider the following to keep the user interface simple and focused:
  - Place commands for critical features in a prominent area such as a menu.
  - Place advanced and less-frequently used commands in a less prominent area such as a submenu or settings dialog.
  - Avoid placing commands redundantly, with the exception of shortcut menu commands on Windows Mobile Professional and Windows Mobile Classic.
- Instructions for using an application are visible or easily accessible whenever appropriate. Avoid complicated instructions.
- When appropriate, the same user action is consistently used to complete the same application operation.
- Consistency is applied to the visual presentation of information, placement of user interface elements, and format, capitalization, and punctuation of user interface text.

Avoid visual noise in the user interface because it distracts users from completing tasks. Visual noise is created by misaligned controls or redundant borders of neighboring controls.
- Appropriate feedback is provided to a user within a reasonable time.
- Shortcuts for experienced users are provided for completing tasks.
- Error messages are provided that concisely explain a problem and contain meaningful suggestions for resolving the problem. For more information, see [Error and Informational Message Guidelines](#).
- Whenever possible, the application design prevents errors from occurring.

### See Also

Concepts

[Error and Informational Message Guidelines](#)

Did you find this helpful? ☐ Yes ☐ No

<http://msdn.microsoft.com/en-us/library/bb158578.aspx>

# Diretivas para Homepages

- 113 diretivas apenas para a home page
  - ▣ Logos
  - ▣ Frases de impacto
  - ▣ Layout
  - ▣ Estilo de escrita
  - ▣ ...

<http://www.useit.com/homepageusability/guidelines.html>

# Padrões / Patterns

**Um padrão é uma solução de sucesso para um problema recorrente em certo contexto**

- ▣ Padrões não são criados ou inventados
- ▣ Eles são identificados considerando-se experiências de sucesso
- ▣ Podem ser utilizados para registrar as experiências de projetos

# Padrões de Interação

- Soluções de sucesso para problemas recorrentes no design de interfaces de usuário
  
- Exemplos:
  - ▣ **Jennifer Tidwell (1999):** Common Ground: a Pattern Language for Human-Computer Interface Design  
[http://www.mit.edu/~jtidwell/interaction\\_patterns.html](http://www.mit.edu/~jtidwell/interaction_patterns.html)
  
  - ▣ **Martijn van Welie (2003):** Padrões para a Web, para interfaces GUI (*Grafical User Interface*)  
<http://www.welie.com>

# Mobile Design Patterns



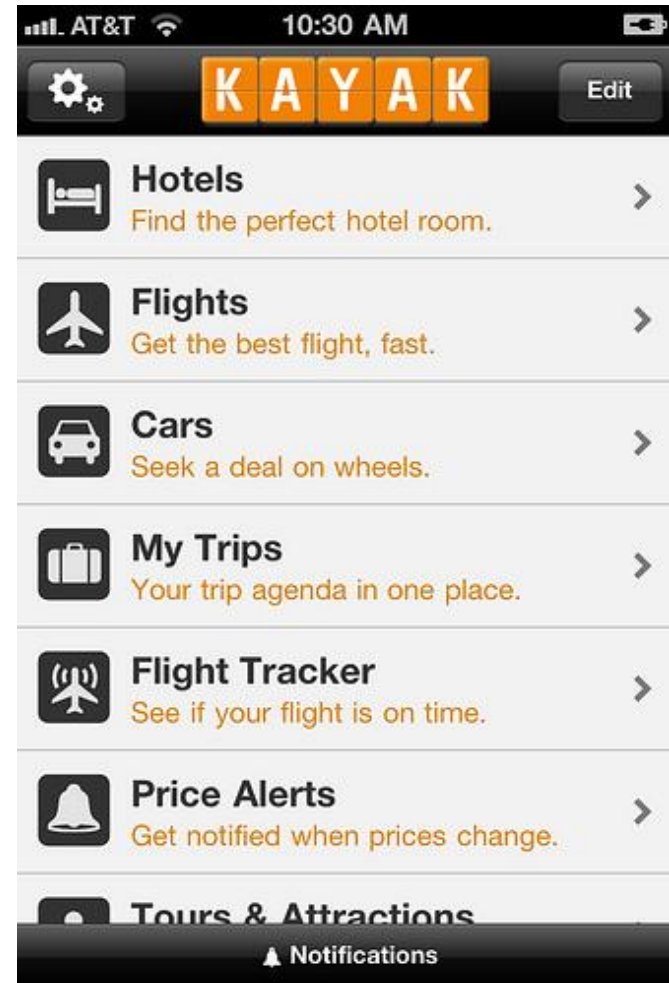
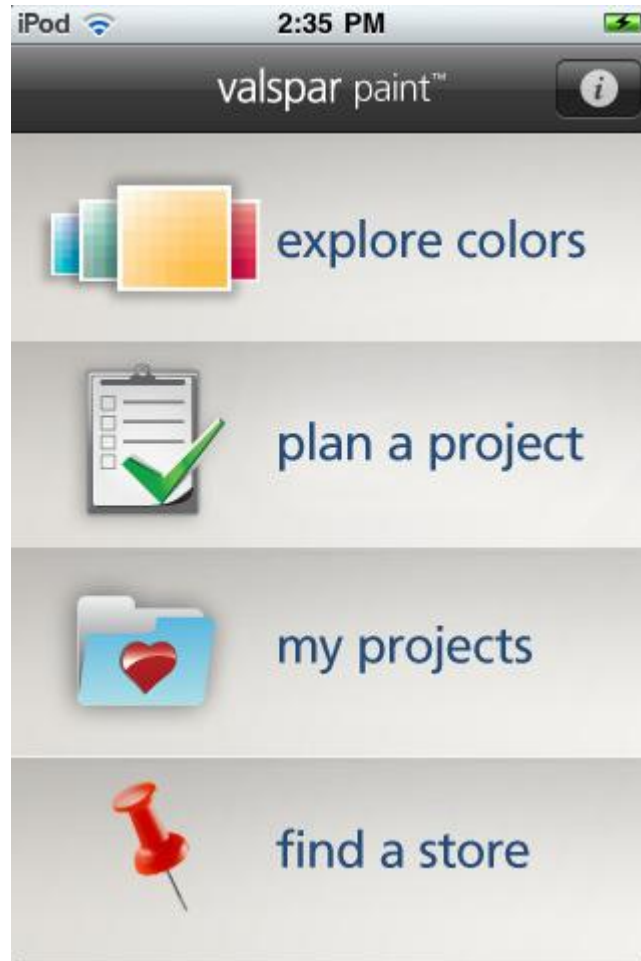
Autor: Theresa Neil

Mobile Design Pattern  
Gallery: UI Patterns for  
iOS, Android and More

Web:

<http://www.mobiledesignpatterngallery.com/mobile-patterns.php>

# Menu lineares



# Designing Social Interfaces



Autores: Christian Crumlish,  
Erin Malone

Designing Social Interfaces.  
Principles, Patterns, &  
Practices for Improving  
the User Experience

Web:  
[http://www.designingsocialinterfaces.com/patterns/Main\\_Page](http://www.designingsocialinterfaces.com/patterns/Main_Page)

# Sign In Continuity

## Problema:

Um usuário com uma conta mas que não está logado quer participar contribuindo com alguma coisa (participando de uma enquete, por exemplo)

## Solução:

Quando o usuário tentar preencher (ou realizar ação semelhante) lembre-o que ele precisa fazer o login antes e disponibilize um link para o login

Quando o usuário tiver feito o login satisfatoriamente, retorne ao contexto de onde partiu para que já possam preencher (ou realizar ação semelhante)

Quando lidar com o envio de informações, preservar qualquer data que tenha sido apresentada antes do login

## Exemplo:



The screenshot shows a web interface for a sports news site. At the top, the word "Sports" is displayed. Below it, a navigation bar shows "View by: Past 6 hours | **Past 12 hours** | Past 24 hours | Past 7 days | Past 30 days". A yellow banner with a speech bubble icon contains the text "Please sign in to start voting! Signing in ensures votes are counted accurately and prevents system abuse." To the right of this banner is a "Sign In" button with a "Close" link. Below the banner, there is a news article titled "Celtics' comeback one for the ages" by Press Democrat, dated 11 hours ago. The article text says "LOS ANGELES - In their comeback season, the Celtics saved the biggest one of all for the NBA..." with a "More" link. Below the article, it says "FIRST BUZZED BY: Tom Mack". To the right of the article, there is a "32 Votes" section with a "Buzz up!" button and a "Buzz Down" button.



# Leitura obrigatória

- Capítulo 2. **Fundamentos de Fatores Humanos em IHC.** Heloísa Rocha e Maria Cecília Baranauskas. Design e Avaliação de Interfaces Humano-Computador. UNICAMP. 2003

Disponível em: <http://www.nied.unicamp.br/?q=content/design-e-avalia%C3%A7%C3%A3o-de-interfaces-humano-computador>

# Leituras extras

- Susan Weinschenk. 100 Things Every Designer Needs to Know About People. New Riders. 2011.
- Donald Norman. The Design of Everyday Things. Basic Books. 1988.
- Nielsen Norman Group Reports. Strategies to enhance the user experience. <http://www.nngroup.com/reports/>
- Jan Borchers. A Pattern Approach to Interaction Design. Wiley. 2001
- Jenifer Tidwell. Designing Interfaces. O'Reilly. 2011