



Module #4a: **Visualization Design**



Learning Objectives

- Discuss the visual design guidelines
- Explain the main visual design elements
 - Simplicity
 - Consistency
 - Organization
- How to achieve graphical excellence



Why discuss visual design?

- Given a visualization system or interface, user needs to know:
 - What can I do in this interface?
 - Where is X, Y, and Z?
 - What is expected of me?
 - What is related to what?
- Goal
 - Impose as little thinking as possible on the user
 - Allow user to concentrate on their task, not the interface



Visual Design Guidelines

Shneiderman (1987)

- Consistency
- universal usability
- offer informative feedback
- design task flows to yield closure
- prevent errors
- permit easy reversal of actions
- make users feel they are in control
- minimize short-term memory load

Nielsen and Molich (1990)

- consistency and standards
- visibility of system status
- match between system and real world
- user control and freedom
- error prevention
- recognition rather than recall
- flexibility and efficiency of use
- aesthetic and minimalist design help users recognize, diagnose and recover from errors
- provide online documentation and help



Visual Design: Rules of Thumb

1. Keep it simple
2. Be consistent
3. Create organization and structure

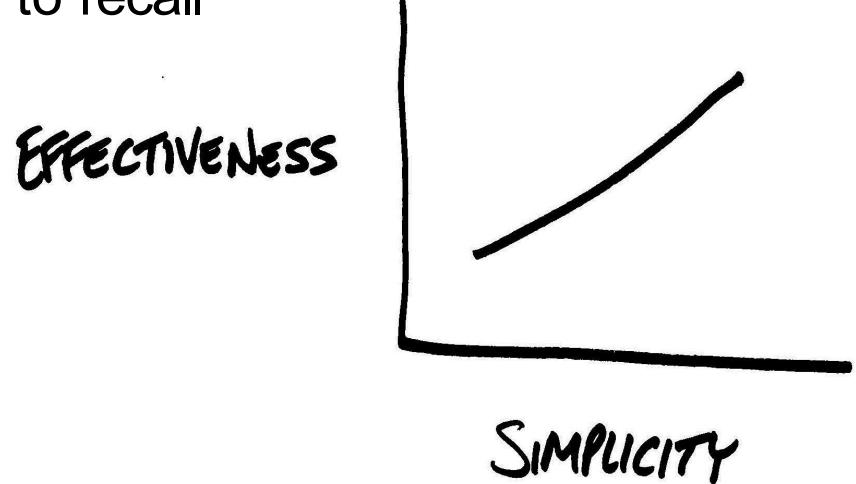


1: SIMPLICITY



Simplicity

- Minimize the amount of information provided to the users.
 1. Simplicity allows functionalities to be quickly recognized and understood
 - Less information means less time to process
 - Can more quickly produce correct mental models
 2. Simplicity also aids recall
 - Less to remember, so easier to recall





Simplicity

“Perfection is finally attained not when there is no longer anything to add but when there is no longer anything to take away.”

-- Antoine de Saint Exupery





Simplicity versus Power



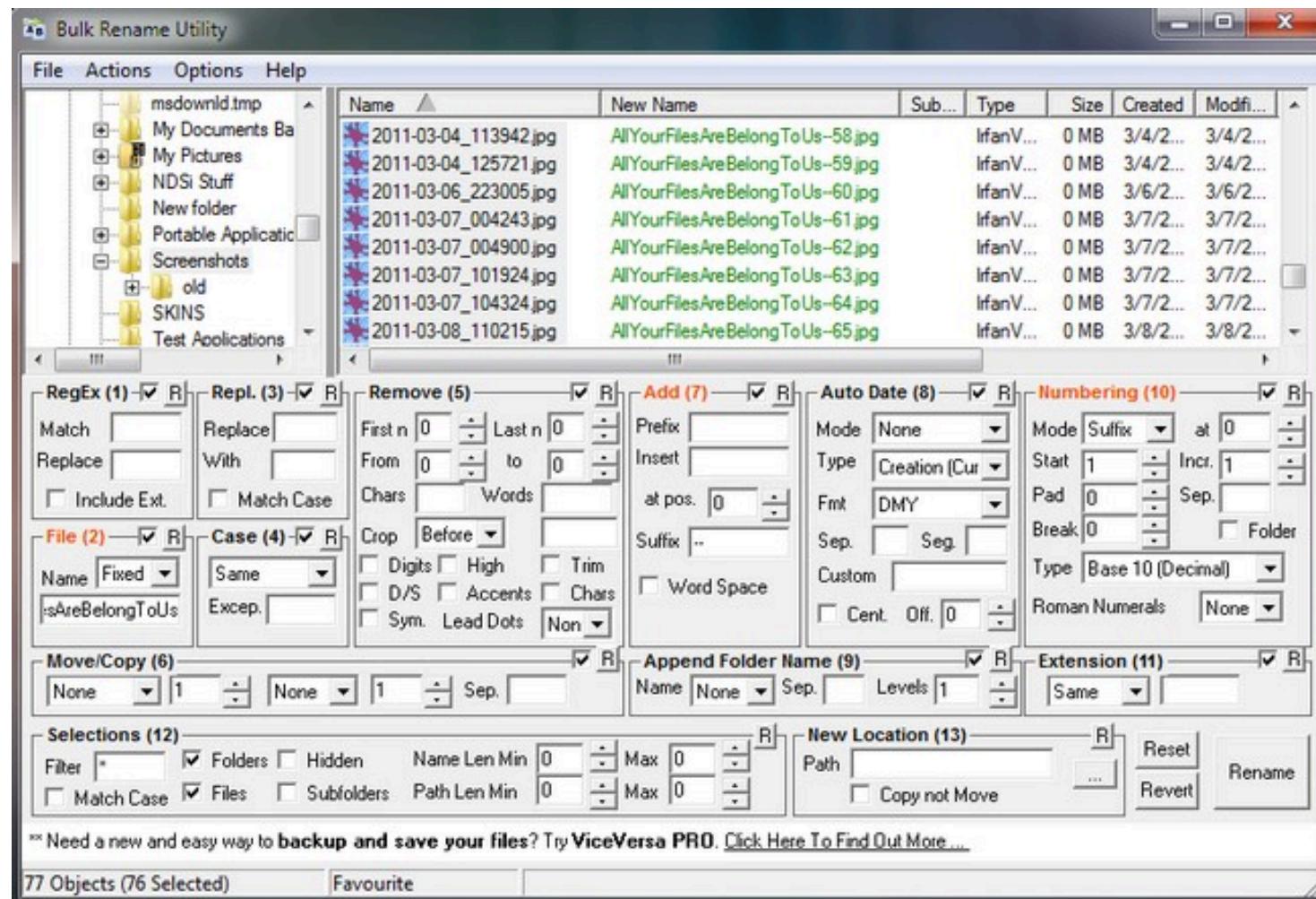
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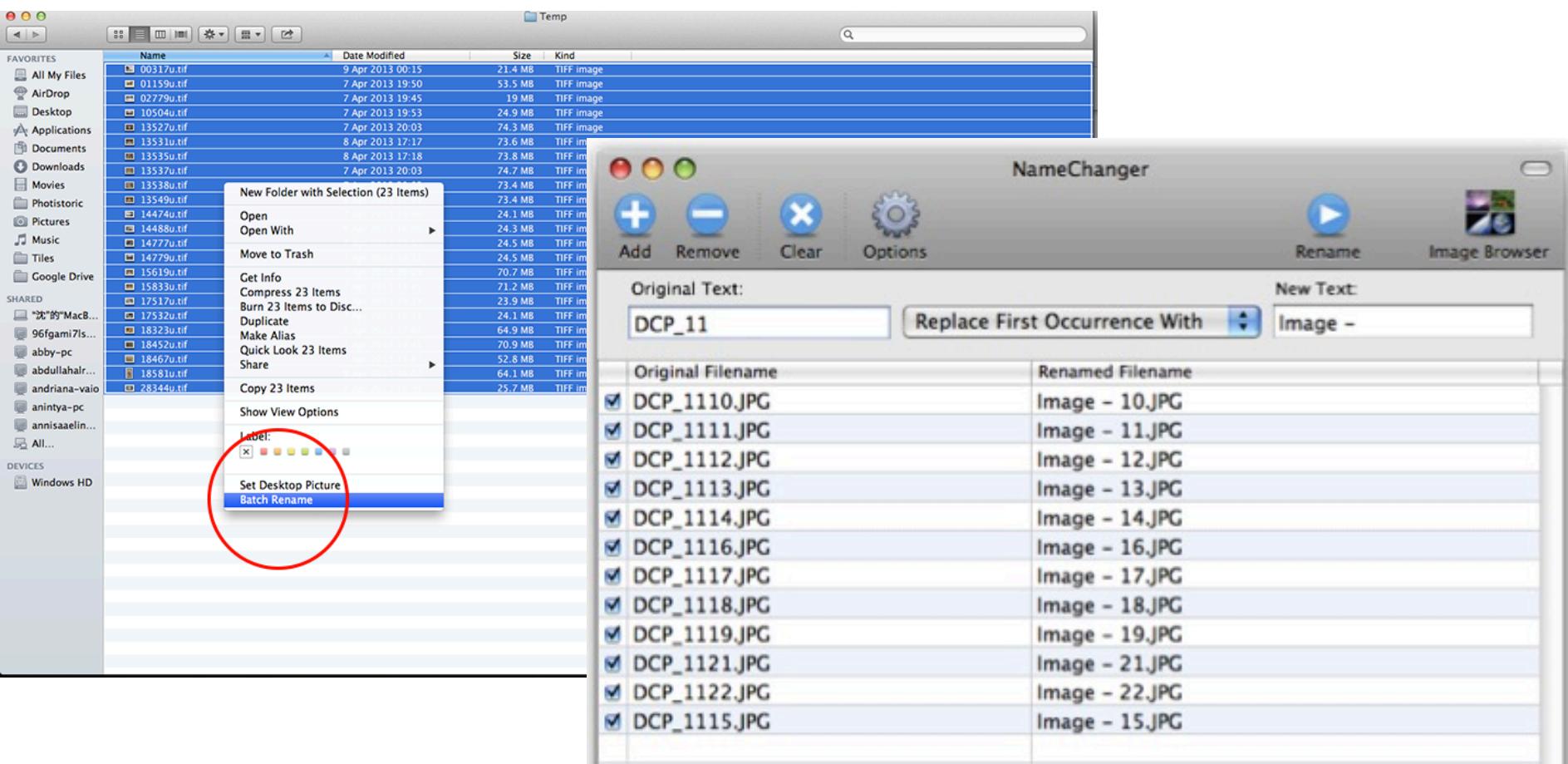


EXAMPLE: RENAME MULTIPLE FILES

Renaming Files



Rename Files



Only Absolute Essentials



How to achieve simplicity?

- Reduce, reduce, reduce
- Reduce some more
- Reduce until it hurts



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2: CONSISTENCY

What do you see?

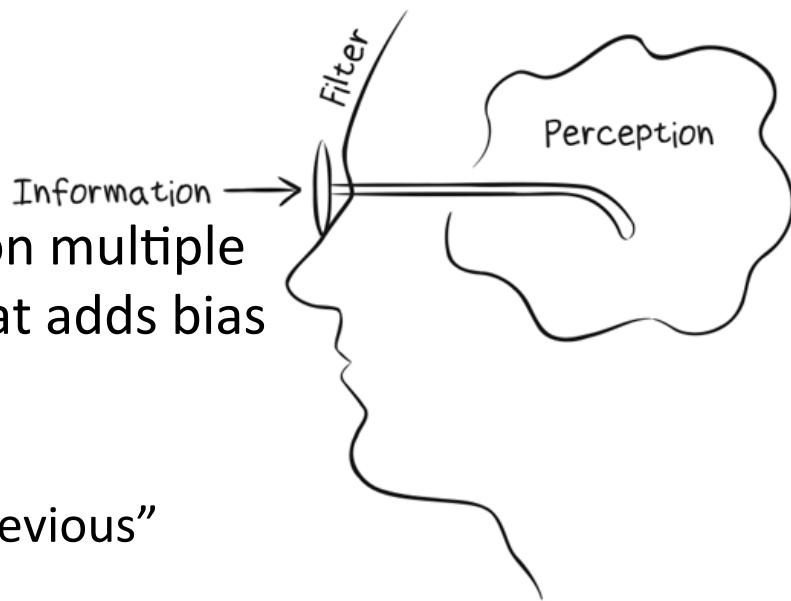


(Johnson, pg. 2)



Perceptual Basis

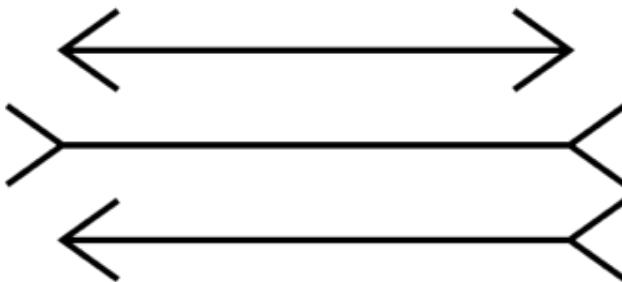
- Our perception is heavily biased by our past experience.
- Perceptual frames
 - Being exposed to a particular situation multiple times creates perceptual patterns that adds bias to our perception and induce certain expectations
 - Ex: The placement of “next” and “previous” buttons in a gallery
 - Repeated exposure reduces sensitivity to a stimuli e.g., alerts, error messages





Perceptual Basis

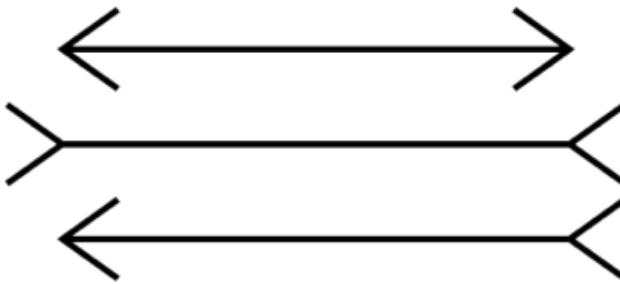
- Our perception is heavily biased by the current context.





Perceptual Basis

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Perceptual Basis

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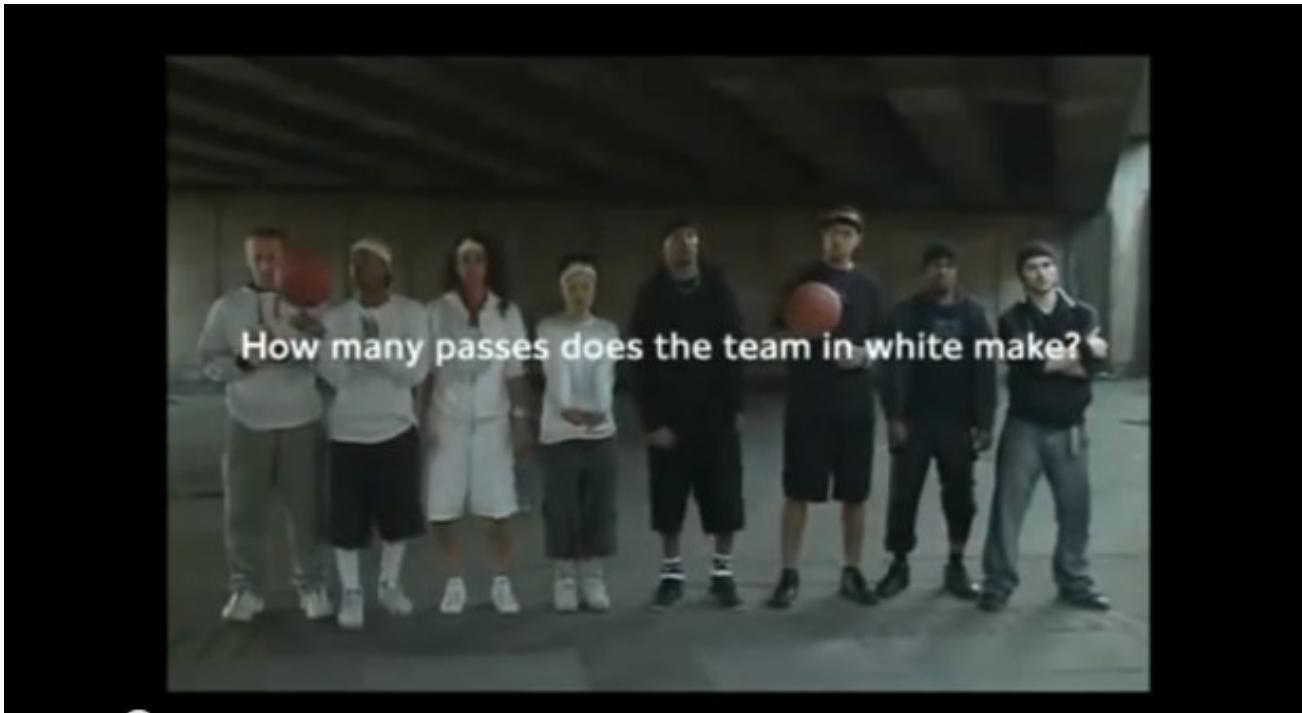


<https://www.youtube.com/watch?v=G-IN8vWm3m0>



Perceptual Basis

- Our perception is heavily biased by our goal.

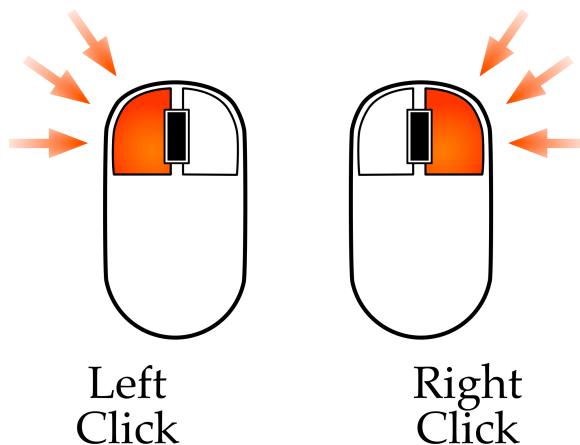


<https://www.youtube.com/watch?v=Ahg6qcgoay4>



Consistency

- Consistency:
 - Refers to designing interfaces to have similar operations and use similar elements for achieving similar tasks.
 - Example:
 - Using the same operation to select all objects. Such as using the same input action to highlight any graphical object at the interface.





Types of consistency

- There are three types of consistency:
 - internal consistency
 - external consistency
 - real-world consistency

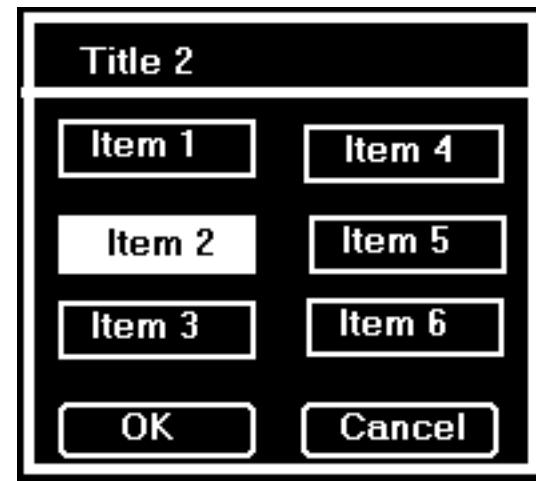
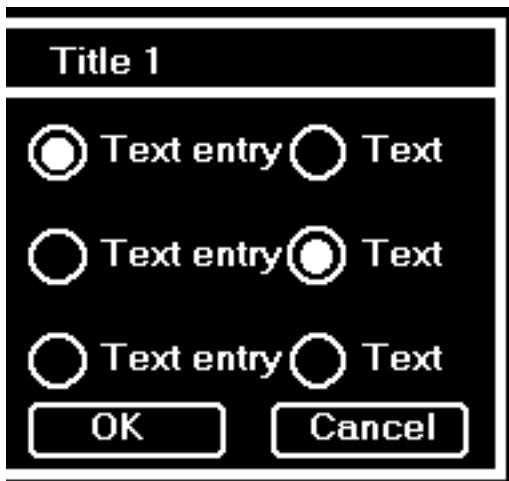
CONSISTENCY
IS THE KEY!





Internal Consistency

- Internal consistency is when the same conventions and rules are applied to all elements of the graphical interface.



Example:

- Internal Consistency - Dialogue Boxes
- Similar elements shown in the similar places.

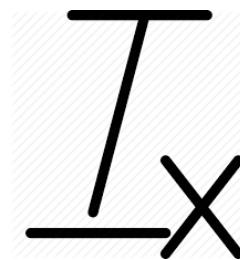
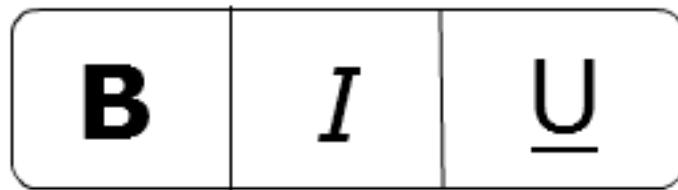
Example:

- Elements with different kinds of behavior should have different appearance.



External consistency

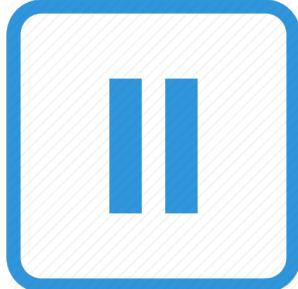
- Existing application signs, protocols, and conventions should be followed across user interfaces.





Real-world consistency

- Conventions should be made consistent with real-world experiences, observations and perceptions of the user.





How to achieve consistency

1. Avoid ambiguous presentations that might cause users to interpret their meaning in different ways.
2. Place information and controls in constant locations.
3. Ensure that presentation / prioritization of information is consistent with user goals, since goals can strongly influence what users perceive or notice.



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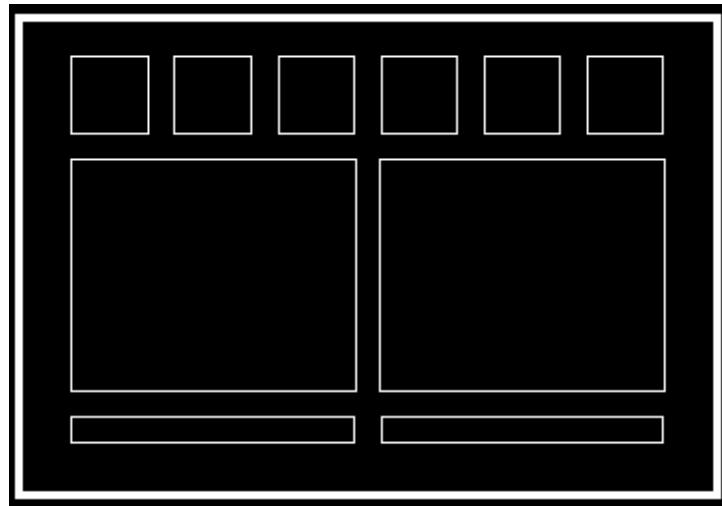
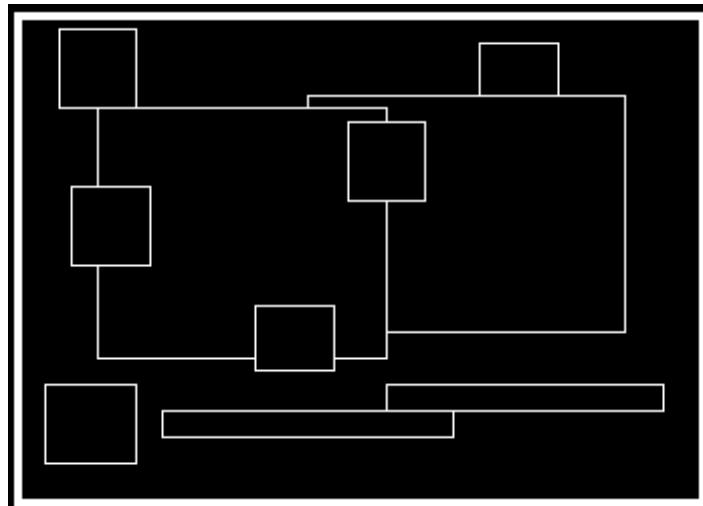


3: ORGANIZATION



Creating organization and structure

- Structure doesn't occur naturally, it must be explicitly created, designed.
- People will find order and structure, even if none was intended.
- The **Gestalt principles** can help with this.





Summary of Visual Design Rules of Thumb

1. Keep it simple
2. Be consistent
3. Create organization and structure



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