

Designing Rhythm Game Interfaces for Touchscreen Devices



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Touchscreens

- Touchscreen devices on the rise
 - iPod Touch/iPad
 - Android phones/tablets
 - Windows 8 slates

- New input paradigm
 - No mouse/keyboard
 - New interface designs!



Rhythm Games

- Rhythm Games
 - Timing-critical music games
 - Measure player's sense of rhythm

- Popular examples:
 - Dance Dance Revolution
 - Guitar Hero
 - Beatmania IIDX
 - etc.



Rhythm Games + Touch

- Gameplay
 - Action performed in response to note patterns
 - Better timing = higher score
- Design Factors
 1. User Responsiveness
 2. Gameplay Experience
- Visual-recognition/physical input relation
 - Perfect for touchscreen UI study!



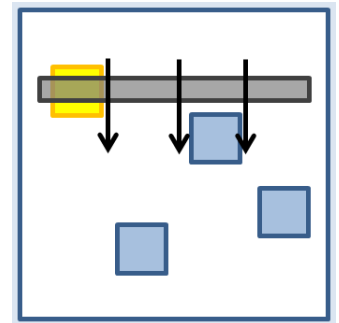
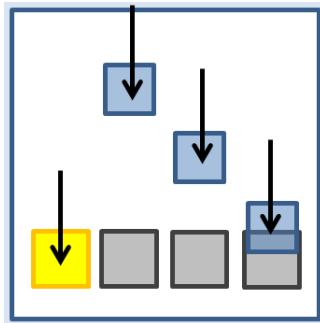
Project - Focus

The study focus:

The comparison of different user interface designs for the future development of rhythm games on touchscreen devices.

Project - Solution

- How?
 - Make a prototype rhythm game and collect data!



Project – Three Stages

- Three stages
 1. Design
 2. Prototype
 3. Evaluation



Design – Analyzing Existing Games

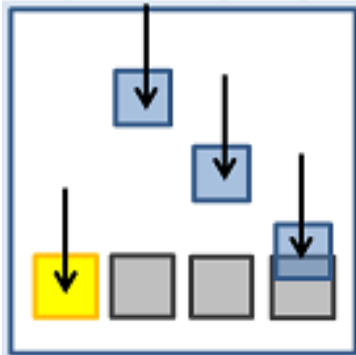
- Analyze and categorize existing rhythm games
 - 22 analyzed
 - Layout, Notes, Hitbox, Movement, Design

Rhythm Game	Layout	Notes	Hitbox	Movement	Design
Dance Dance Revolution	4/6 columns	4/6 arrows	Box at top	Notes scroll up	Falling Notes
In The Groove	4 columns	4 arrows	Box at bottom	Notes scroll up	Falling Notes
Pump It Up NX	5 columns	4 arrows + middle stomp	Box at bottom	Notes scroll up	Falling Notes
Dance Maniax	4 columns	4 motion sensors	Bar at top	Notes scroll up	Falling Notes
Beatmania IIDX	6/8 columns	5/7 bars + 1 scratch	Bar at bottom	Notes fall down	Falling Notes
Pop 'N Music	9 columns	9 buttons	Bar at bottom	Notes fall down	Falling Notes
DJMax	4/5/6/8 columns	4/5/6/8 bars	Bar at bottom	Notes fall down	Falling Notes
GuitarFreaks	3 columns	3 tabs	Bar at bottom	Notes fall down	Falling Notes
Drummania	6 columns	5 drum + 1 foot pedal	Bar at bottom	Notes fall down	Falling Notes
Keyboardmania	24 columns	24 keys	Bar at bottom	Notes fall down	Falling Notes
Guitar Hero	5 columns	5 tabs	Bar at bottom	Notes approach from distance	Spreading Notes
DJ Hero	3 columns	3 buttons on scratch	Bar at bottom	Notes approach from distance	Spreading Notes
Rockband	5 columns	5 tabs or 4 drum + 1 foot pedal	Bar at bottom	Notes approach from distance	Spreading Notes
Taiko no Tatsujin	1 row	2 drum parts	Box on side	Notes stream to single point	Streaming Notes
The iDOLM@STER	1 row	6 buttons	Box on side	Notes stream to single point	Streaming Notes
Hatsune Miku: Project DIVA	Fullscreen	8 buttons	Sequence of hitboxes	Notes focus to corresponding hitbox	Focusing Notes
Gitaroo Man Lives!	Fullscreen	4 buttons	Box in centre	Notes focus to single point	Focusing Notes
DJMax Technika	3/4 rows	3/4 buttons	Moving bar	Hitbox slides across rows	Sliding Hitbox
Parappa The Rapper	1 row	4 buttons	Cursor	Cursor slides across row	Sliding Cursor
Audition Online	1 row	4 arrows	Cursor	Cursor slides across row	Sliding Cursor
Os! Tatakae! Ouendan	Fullscreen	Anywhere buttons	Shrinking rings	Rings shrink around buttons	Appearing
jubeat	Grid	16 buttons	Collapsing box	Box solid fills grid	Grid

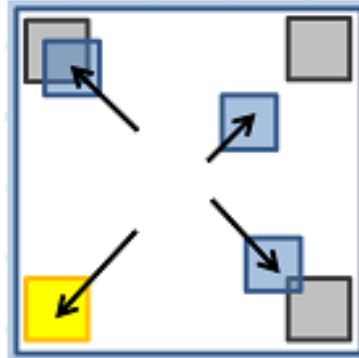
Design - Interfaces

- Eight different rhythm game interface designs

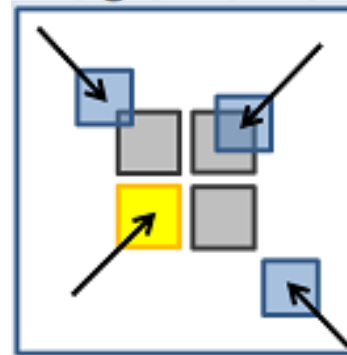
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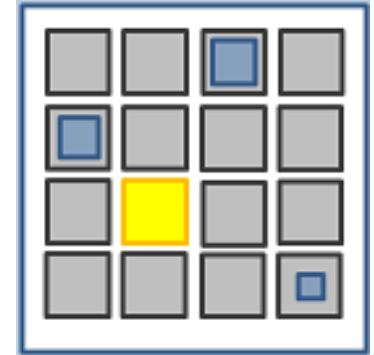
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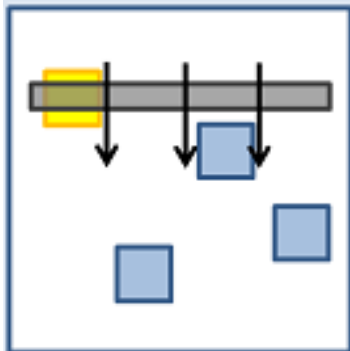
Design 3: Focus



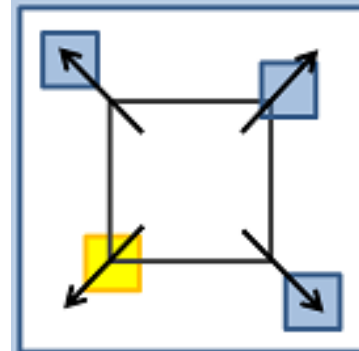
Design 4: Grid



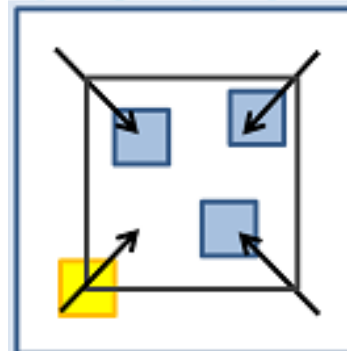
Design 5: Slide



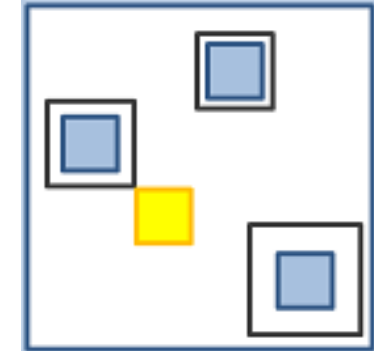
Design 6: Expand



Design 7: Collapse

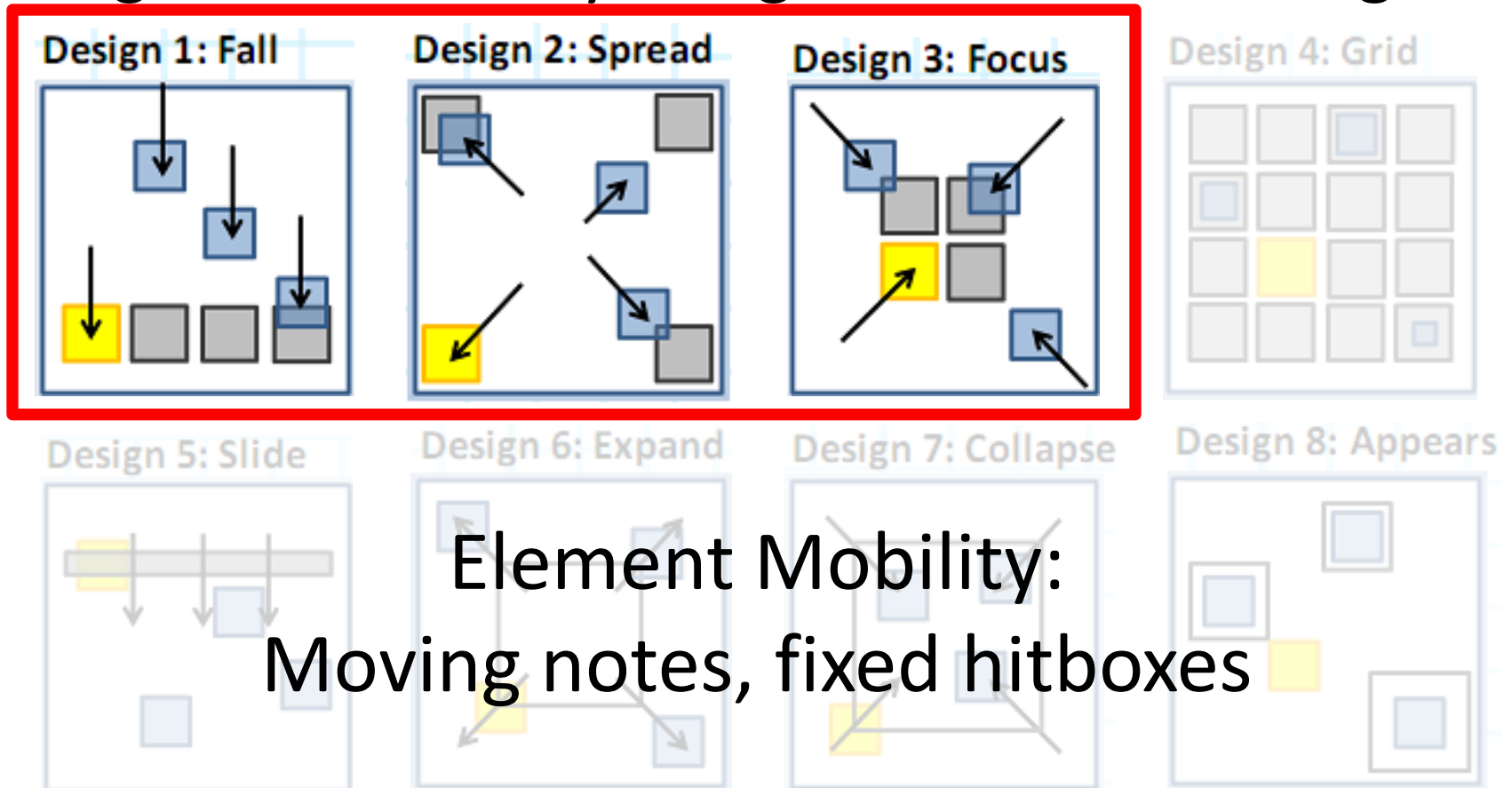


Design 8: Appears



Design - Interfaces

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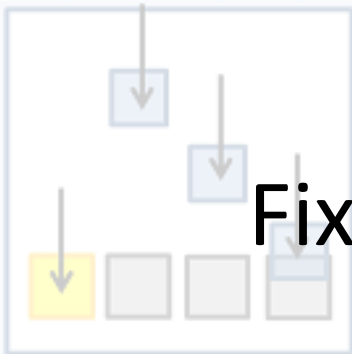


Element Mobility:
Moving notes, fixed hitboxes

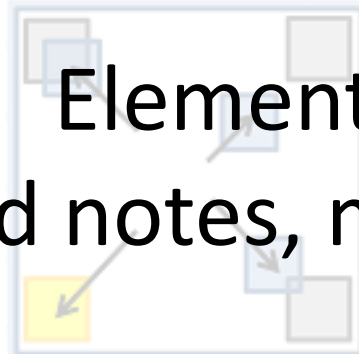
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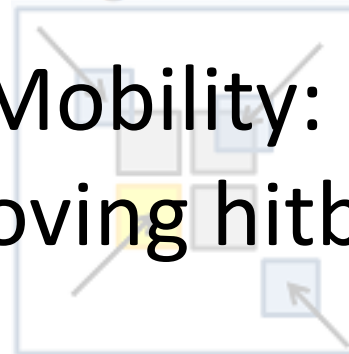
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Design 2: Spread



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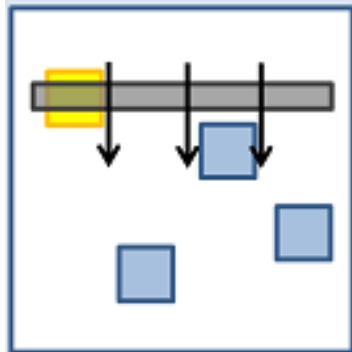


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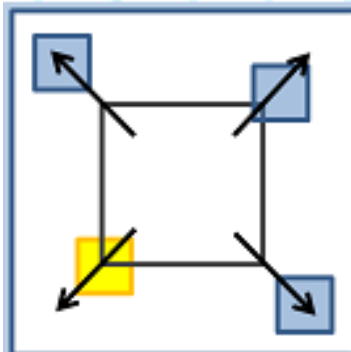


Element Mobility:
Fixed notes, moving hitboxes

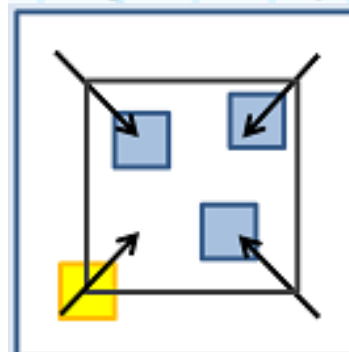
Design 5: Slide



Design 6: Expand



Design 7: Collapse



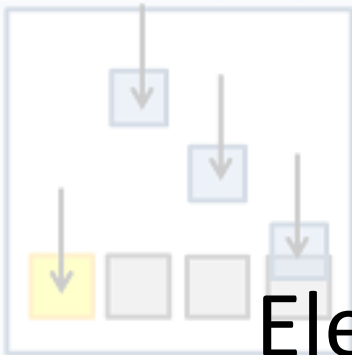
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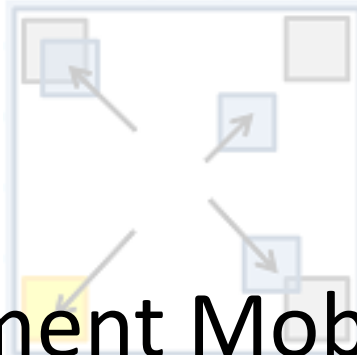
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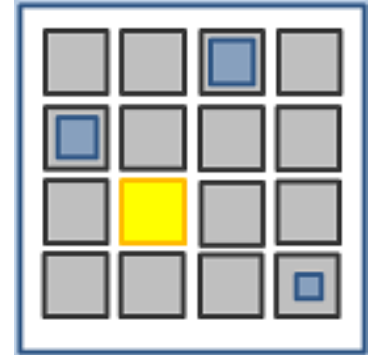
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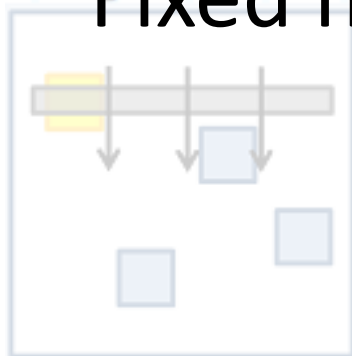
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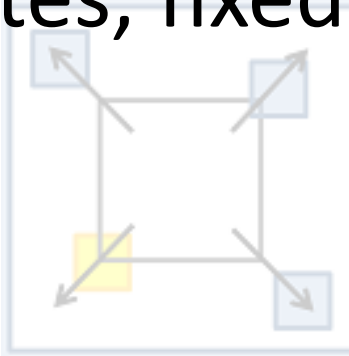
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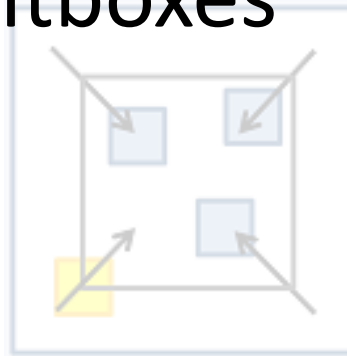
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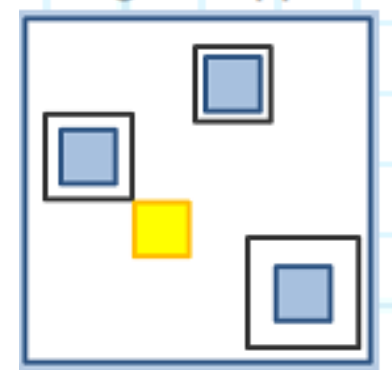
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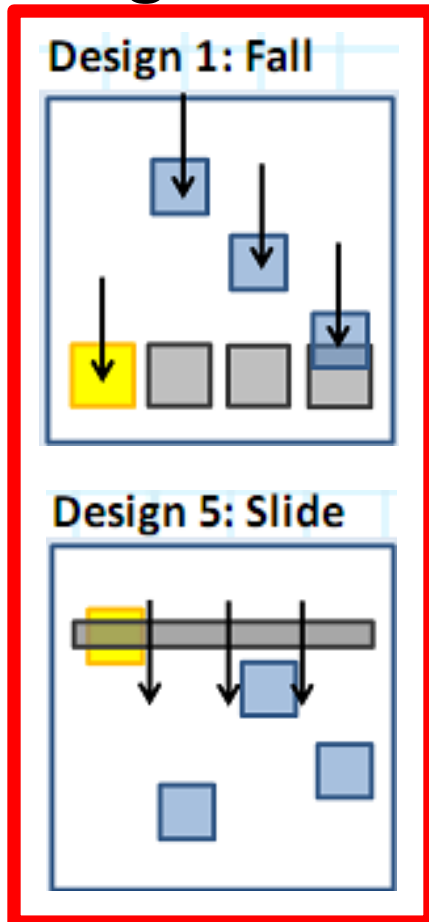


Design 8: Appears

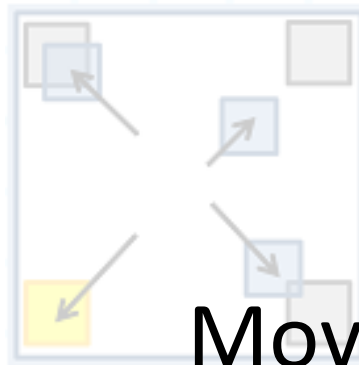


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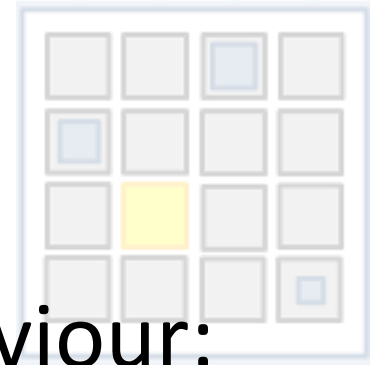
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Design 3: Focus



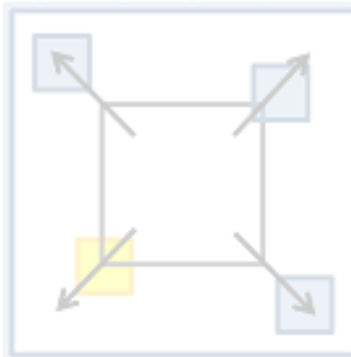
Design 4: Grid



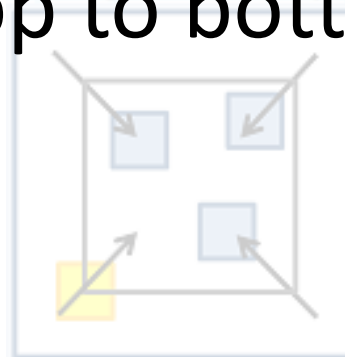
Movement Behaviour:

Top to bottom

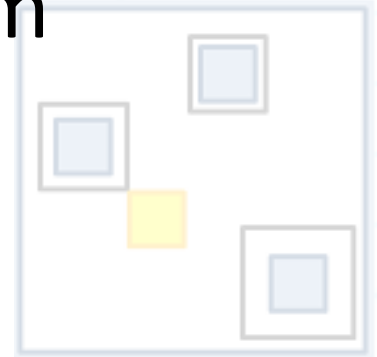
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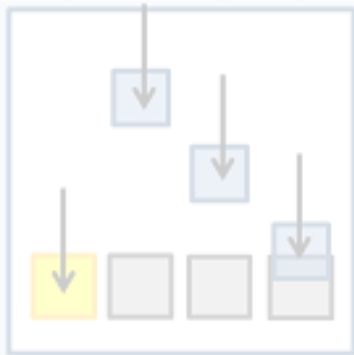
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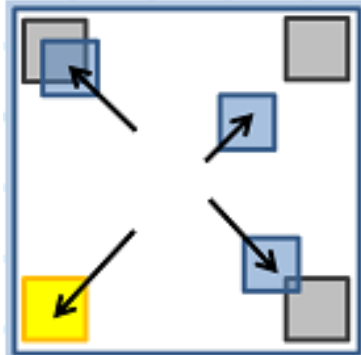
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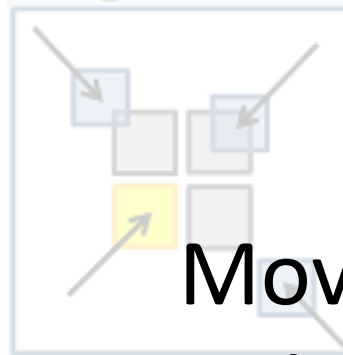
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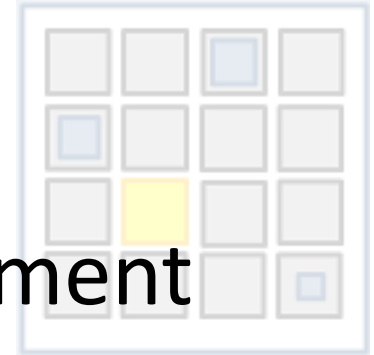
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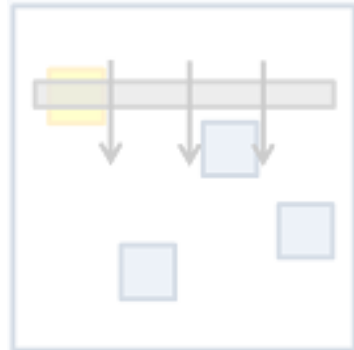
Design 3: Focus



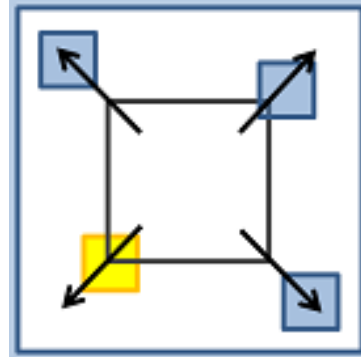
Design 4: Grid



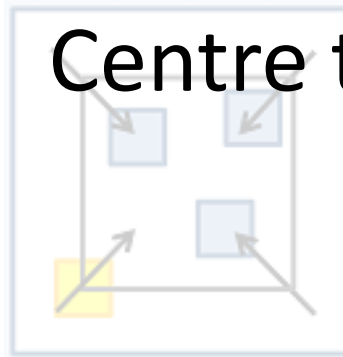
Design 5: Slide



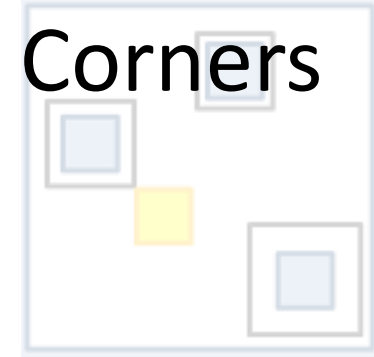
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Design 7: Collapse



Design 8: Appears



Movement

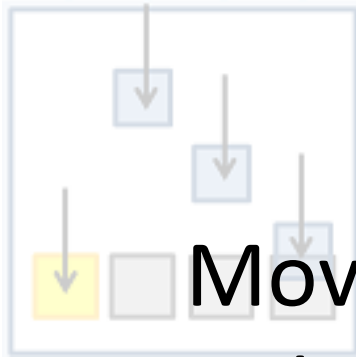
Behaviour:

Centre to Corners

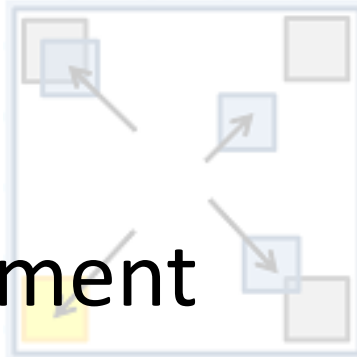
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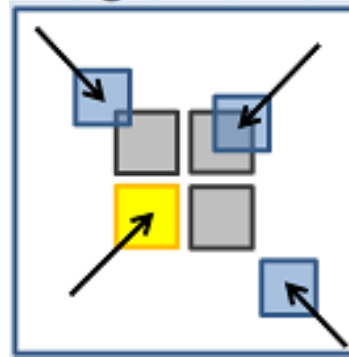
Design 1: Fall



Design 2: Spread



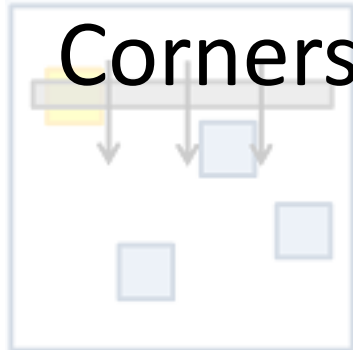
Design 3: Focus



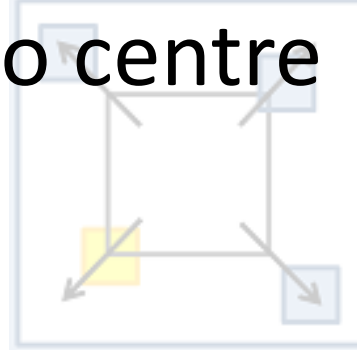
Design 4: Grid



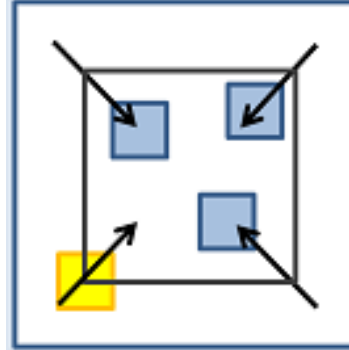
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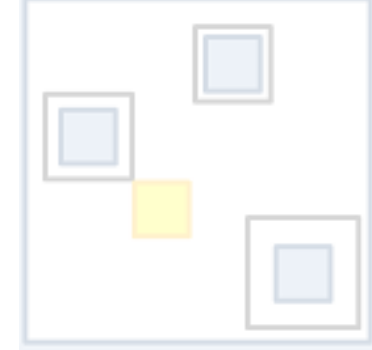
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Design 8: Appears



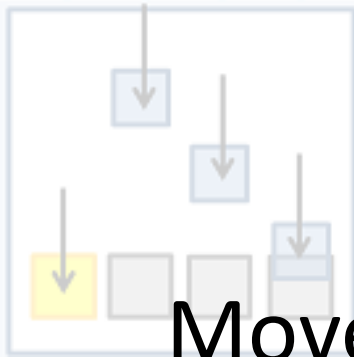
Movement
Behaviour:

Corners to centre

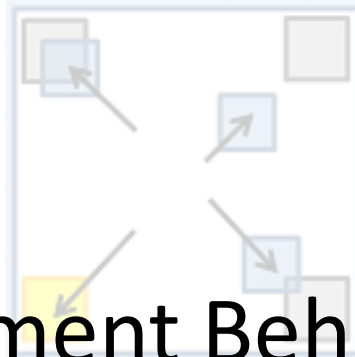
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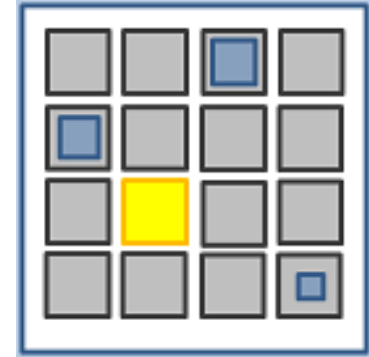
Design 2: Spread



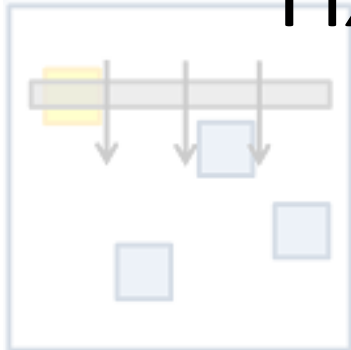
Design 3: Focus



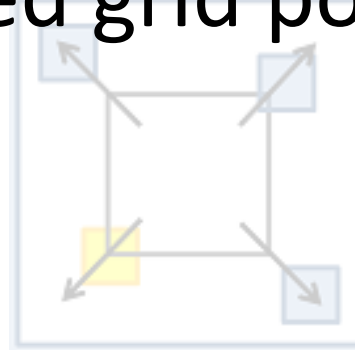
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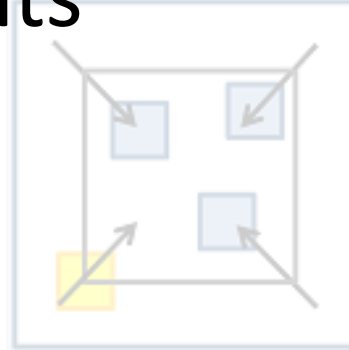
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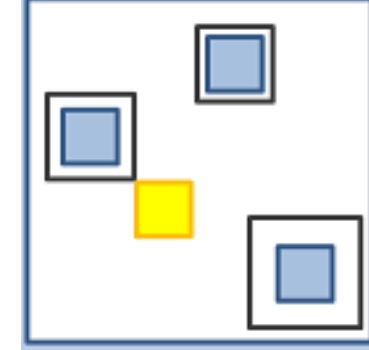
Design 6: Expand



Design 7: Collapse



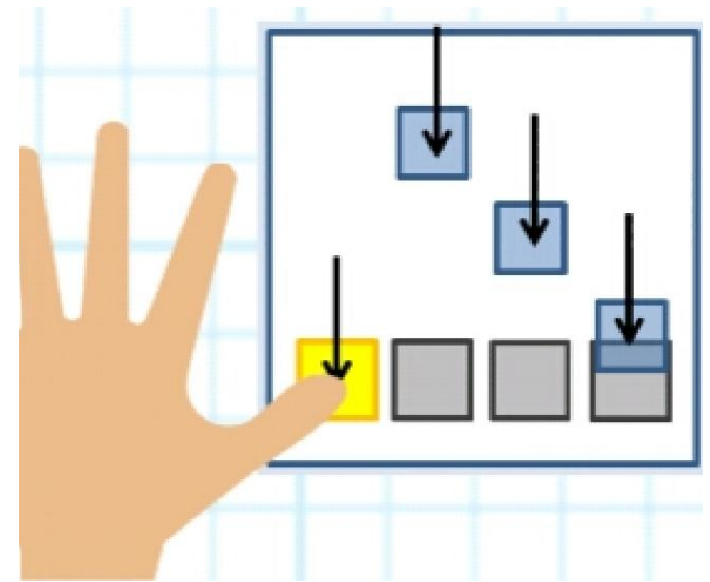
Design 8: Appears



Movement Behaviour:
Fixed grid points

Implementation - Development

- Prototype game developed
 - “Beats2 Prototypes”
<http://git.to/beats2protot>
 - Simple game for study
 - 4 notes of same colour
 - Tap action
 - Featured 8 design as modes
 - Use same backend and game data



Implementation - Technical

- Developed for Unity3
 - C#, Cross-platform
- Target device
 - Android tablets
 - Test device: Samsung Galaxy Tab 10.1
 - Could run on iPad (but don't have one)



Demo Video

<http://www.youtube.com/watch?v=n-pFAVSPj10>

Evaluation – App Release

- Android app released publically



- Google Play: <http://git.to/beats2protot>

- Website: <http://beatsportable.com/2012/04/beats2-prototypes/>

- Total of 100+ players, 30 tablet users

A screenshot of the Google Play Store page for the app 'Beats2 Prototypes' by Keripo. The page shows the app's title, developer name, a 5-star rating with 22 reviews, and an 'INSTALLED' button. A green banner at the bottom states 'This app is compatible with all of your devices.' The main content area has tabs for 'OVERVIEW', 'USER REVIEWS', 'WHAT'S NEW', and 'PERMISSIONS'. The 'Description' tab is active, showing a note about tablet compatibility and a paragraph about the app's purpose as a demo for academic research. On the right, there are social sharing options (Google+, Tweet) and app details like 'RATING: 5 stars (22)', 'UPDATED: April 23, 2012', and 'CURRENT VERSION: 1.2'. A small 'engineering' logo is visible in the bottom right corner.

Evaluation – User Responsiveness

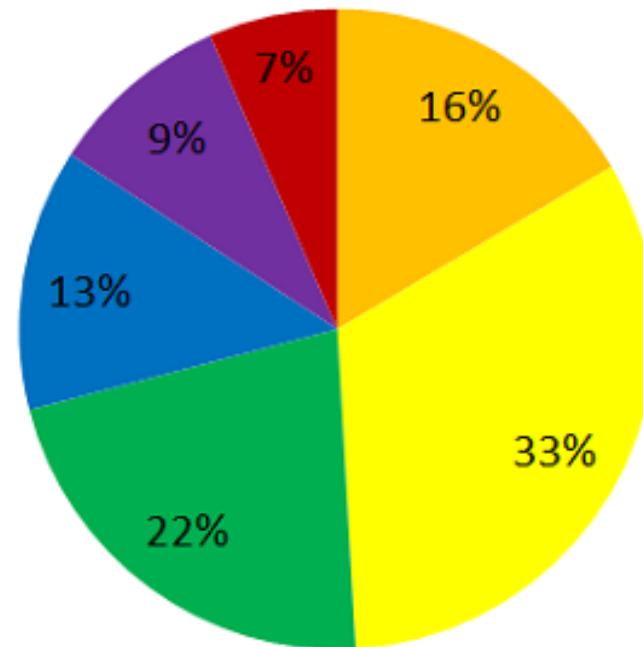
- To obtain data, built-in tracker implemented

- **Timing Accuracy**

(quantitative measure of user responsiveness)

- MARVELOUS
- PERFECT
- GREAT
- GOOD
- ALMOST
- MISS

Timing Accuracy



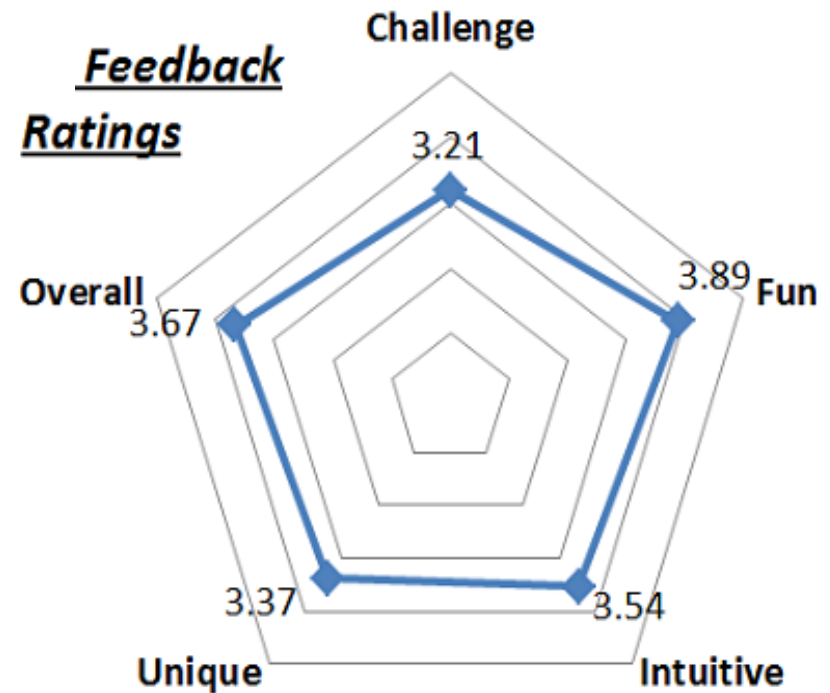
Evaluation – Gameplay Experience

- Feedback Ratings

(qualitative measure of gameplay experience, loosely based on Swetser & Wyeth’s Gameflow model)

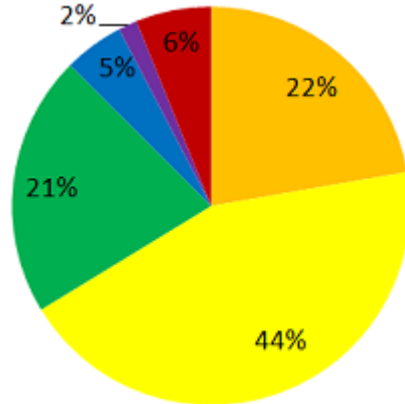
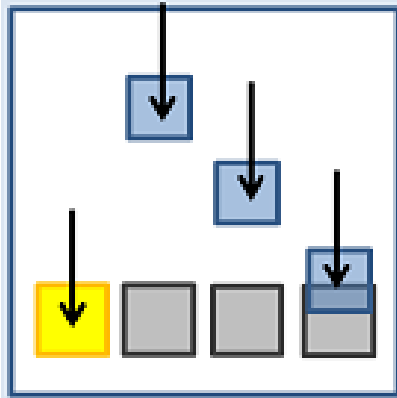
- Challenge
- Intuitive
- Fun
- Unique
- Overall

Rated on 1-5 scale,
normalized for comparison

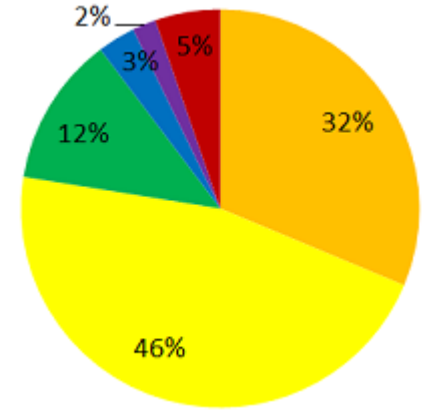
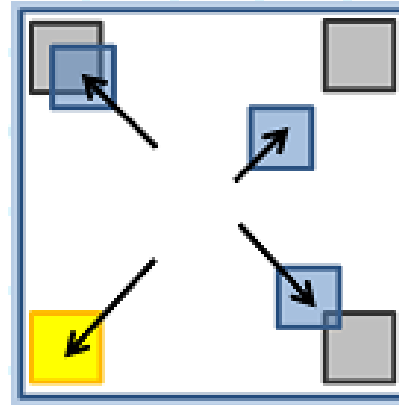


Results – Timing Accuracy

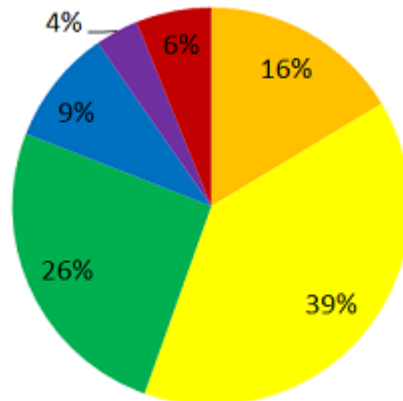
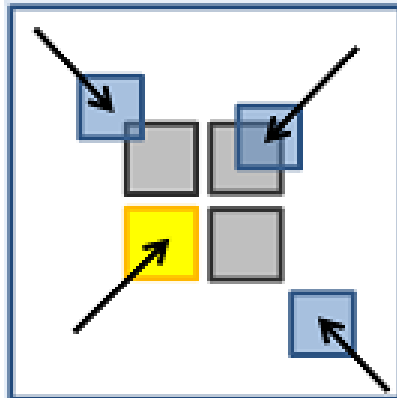
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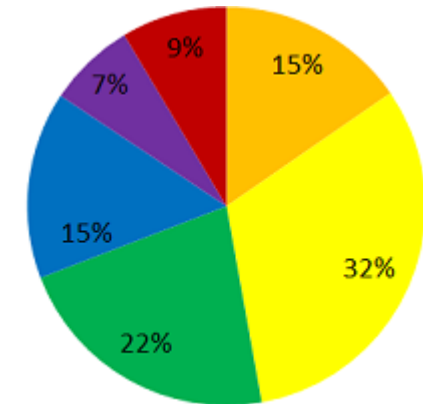
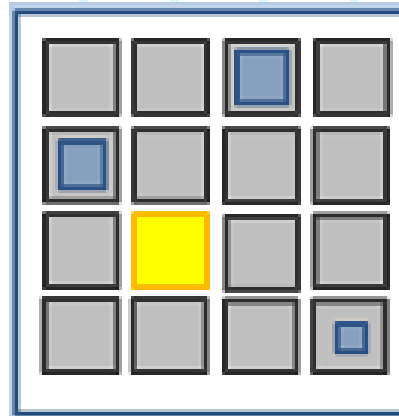
Design 2: Spread



Design 3: Focus

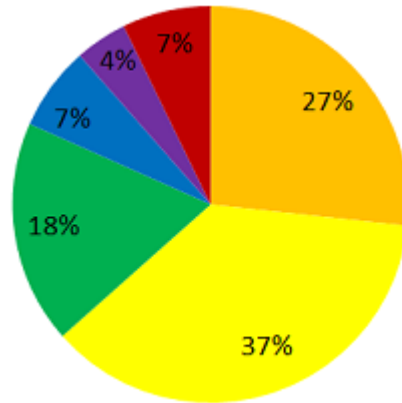
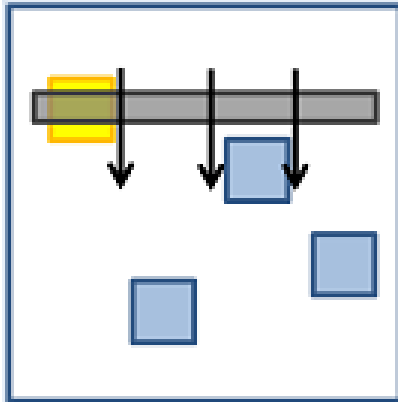


Design 4: Grid

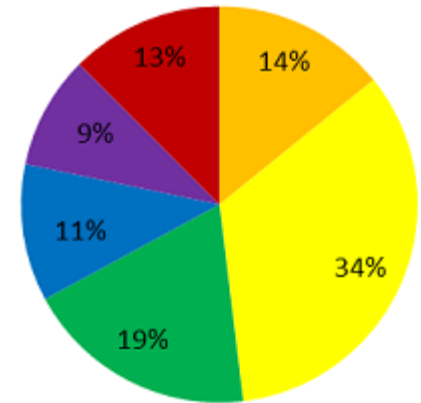
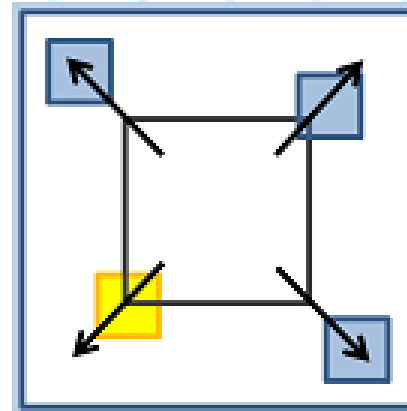


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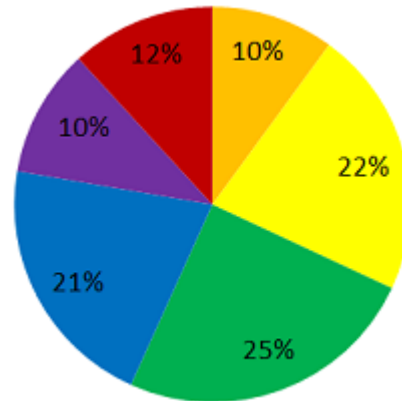
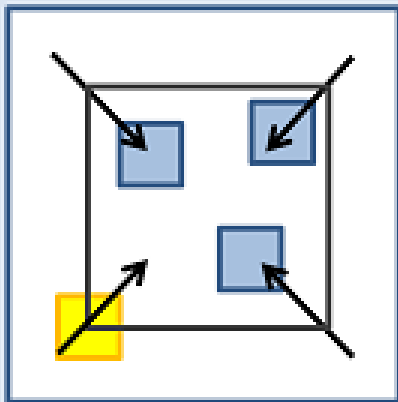
Design 5: Slide



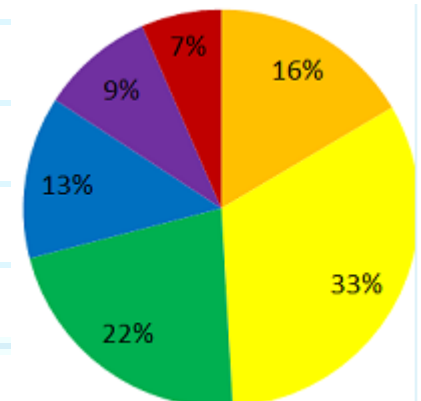
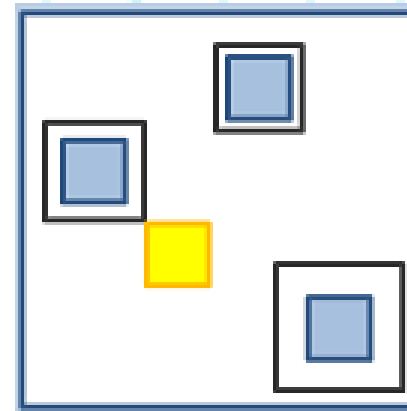
Design 6: Expand



Design 7: Collapse

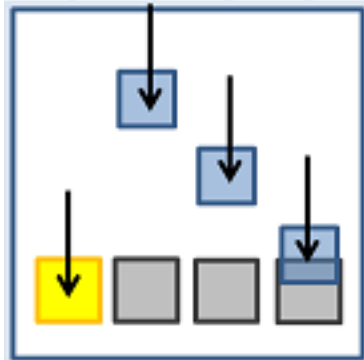


Design 8: Appears

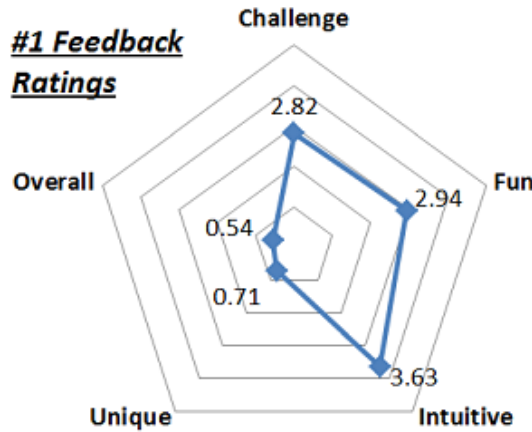


Results – Feedback Ratings

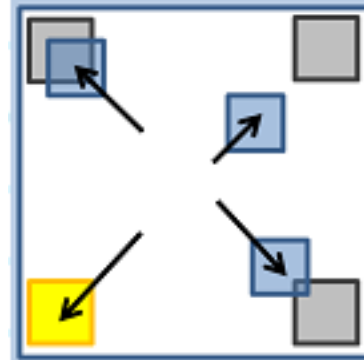
Design 1: Fall



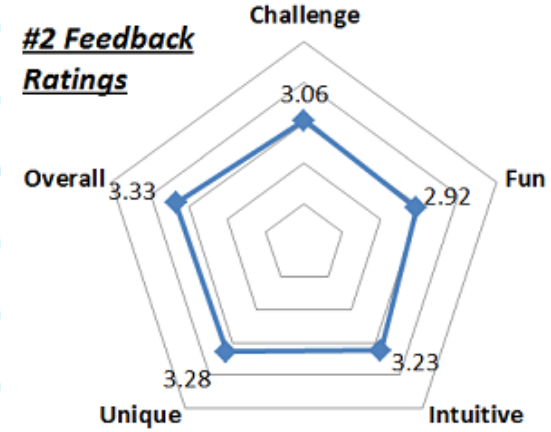
#1 Feedback Ratings



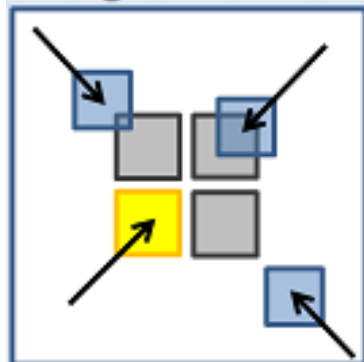
Design 2: Spread



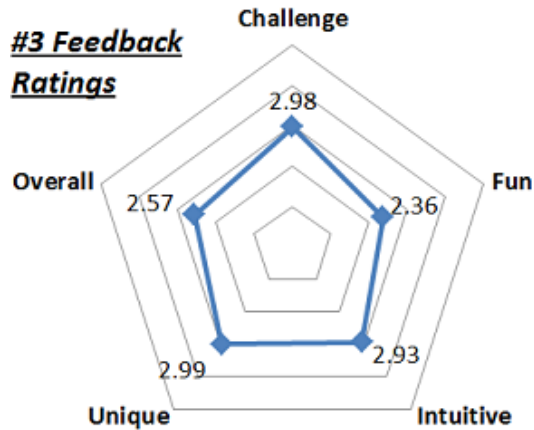
#2 Feedback Ratings



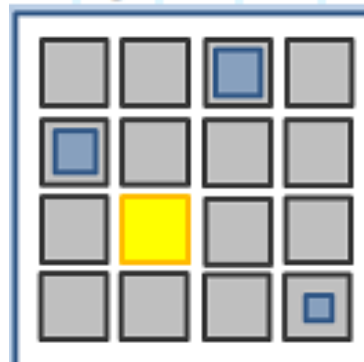
Design 3: Focus



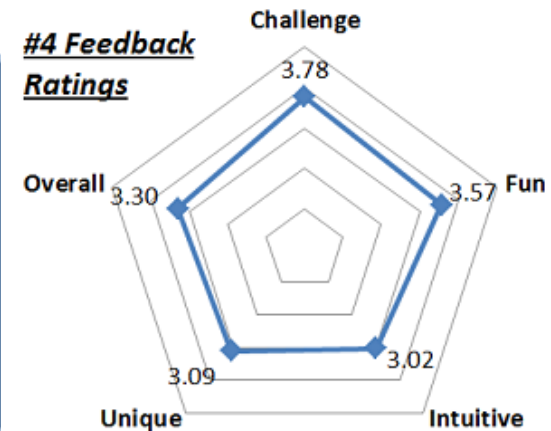
#3 Feedback Ratings



Design 4: Grid

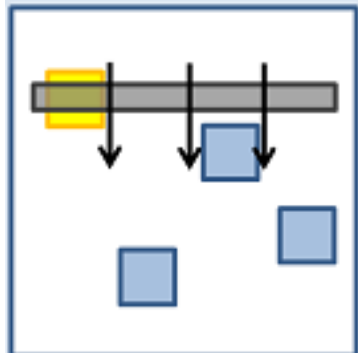


#4 Feedback Ratings

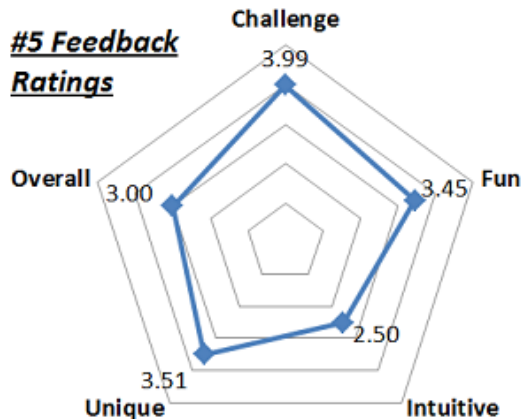


Results – Feedback Ratings

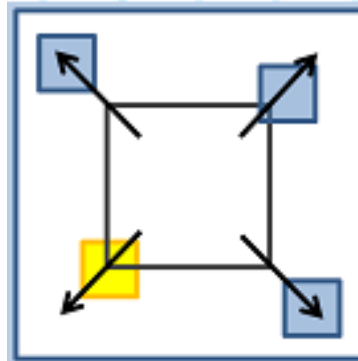
Design 5: Slide



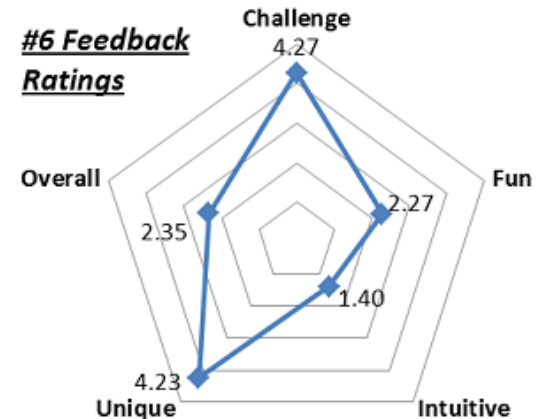
#5 Feedback Ratings



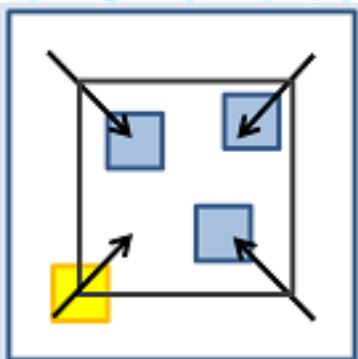
Design 6: Expand



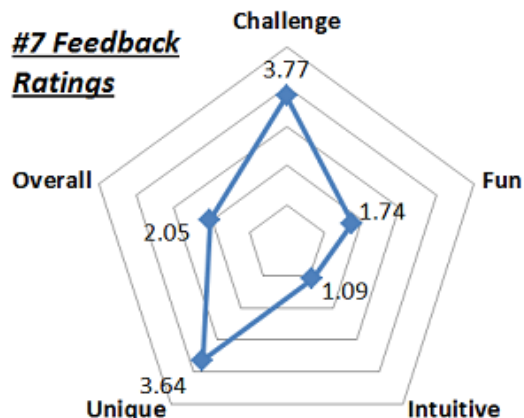
#6 Feedback Ratings



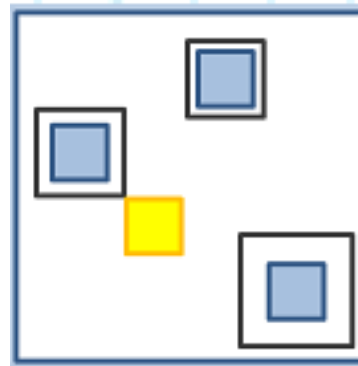
Design 7: Collapse



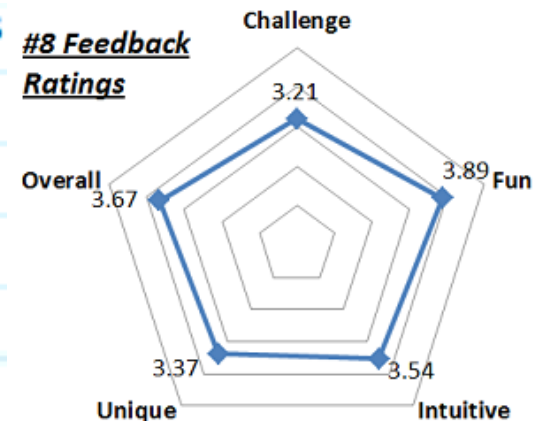
#7 Feedback Ratings



Design 8: Appears



#8 Feedback Ratings



Results – Overall

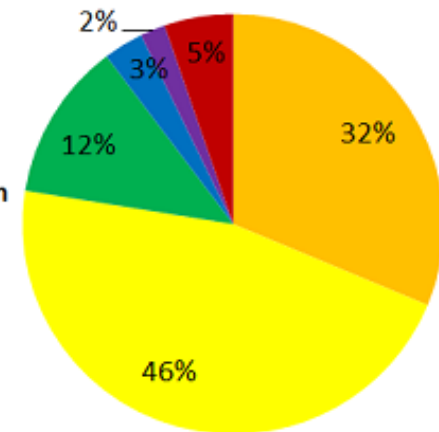
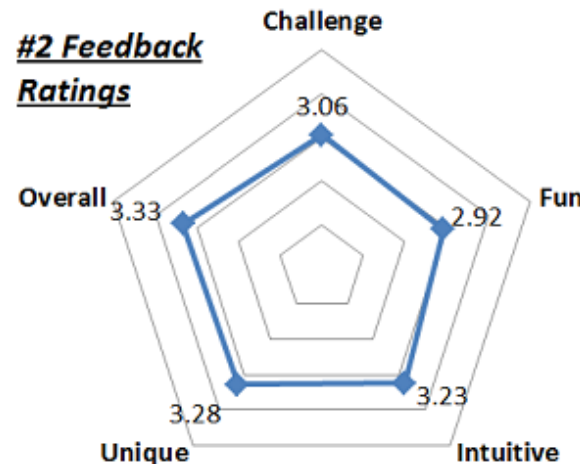
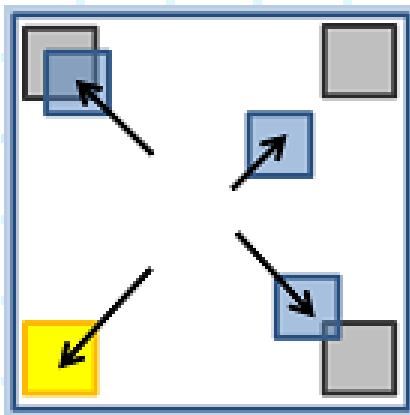
- Overall results:
 - User Responsiveness and Gameplay Experience not correlated but both important (e.g. #1 and #4/#8)
 - Moving Notes, Fixed Hitboxes > Fixed Notes, Moving Hitboxes

Design	User Responsiveness	Gameplay Experience
#1: Falling Notes	Great	Bad
#2: Spreading Notes	Great	Great
#3: Focusing Notes	Good	Good
#4: Grid	Poor	Great
#5: Sliding Hitbox	Good	Good
#6: Expanding Hitbox	Poor	Poor
#7: Collapsing Hitbox	Bad	Bad
#8: Appearing	Poor	Great

Results – Conclusion

- Focus: *The comparison of different user interface designs for the future development of rhythm games on touchscreen devices.*
- Answer: **Design #2** is the best candidate for future rhythm game development

Design 2: Spread



Thanks

- Faculty Advisor:
 - Stephen H. Lane
- CIS 401 Professor and TAs:
 - Insup Lee
 - Andrew G. West
 - Alex Roederer
- Prototype Testers
 - STWingers
 - Anonymous internet testers
 - You (in advance if you download and try it out)

