Towards Efficacy-Centered Game Design Patterns For Brain Injury Rehabilitation: A Data-Driven Approach

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Introduction

- Therapists use commercial and specialized video games to help engage patients in BI rehabilitation activities.
- Creating effective and engaging therapy-centered games is an important area for the future of BI therapies.
- Game design patterns are valuable tools that support mutual understanding among game designers and therapists.
  - Structuralize qualitative game design knowledge
  - Serve as a common language to support communication
  - Summarize a large amount of data
- We can generate design patterns based on how commercial games are currently used

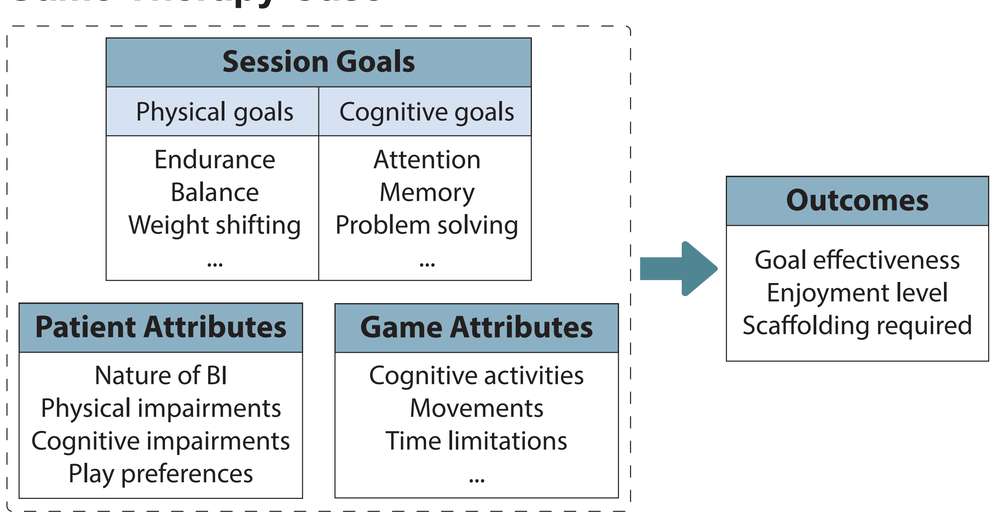
Study Aims

CURRENT: Investigate game design patterns that capture knowledge about how games address therapeutic goals in BI rehabilitation.

OVERALL: Support the use and creation of therapy-centered games for brain injury rehabilitation

Methods

A Game Therapy Case



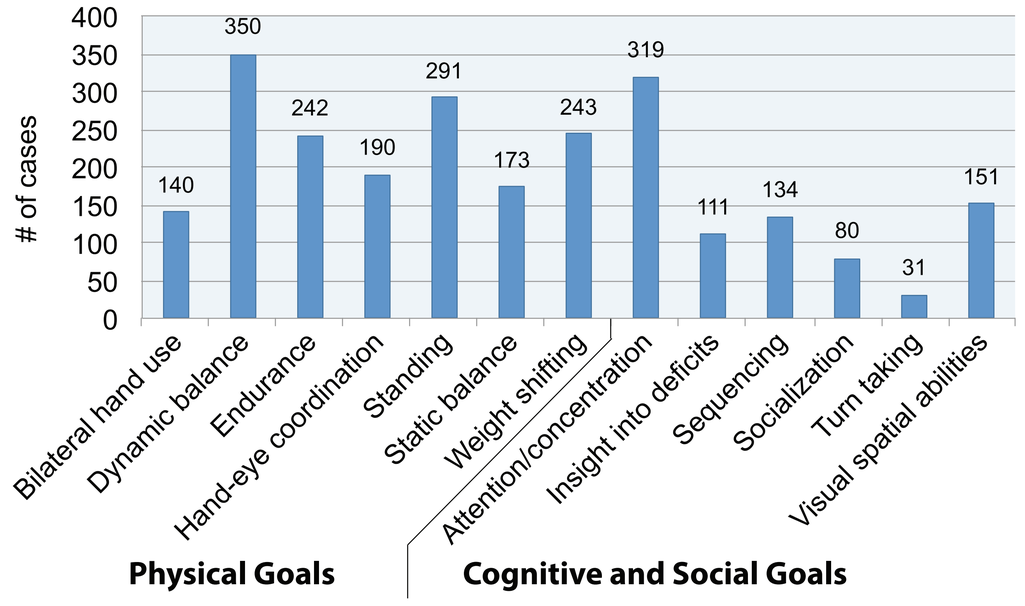
Diary studies to collect game therapy 'cases'

- At two rehabilitation hospitals in Chicago area
- Paper and digital diary forms **See Demos**

Paper Diaries	Digital Diaries
244 Cases (from 16 therapists)	**322 Cases** (from 29 therapists)
566 Game Therapy Cases	

Data Analysis and Pattern Generation

Top Goals Selected by Therapists



Efficacy-Centered Patterns

Category	Pattern name	Main goal(s)
Physical mechanics	Change Hands	Bilateral hand use
	Integrated Standing Duration	Standing
	Moving Different Body Parts	Insight into deficits
	Self-paced Weight Shifting	Dynamic balance; Weight shifting
	Weight Shifting to the Extremes	Weight shifting
Game rules	Fine Control	Weight shifting; Balance
	Minimalist Task	Attention/concentration
	Optimal/adjustable Pace	Processing Speed
	Randomized Events	Hand-eye coordination
	Step by Step	Sequencing; Command following
Perception	Focus and Distraction	Standing; Endurance
	Three-dimensional Space	Visual spatial abilities
Social	Collocated Multiplayer	Socialization
	Turn-based Multiplayer	Turn taking

An Example Pattern: *Change Hands*

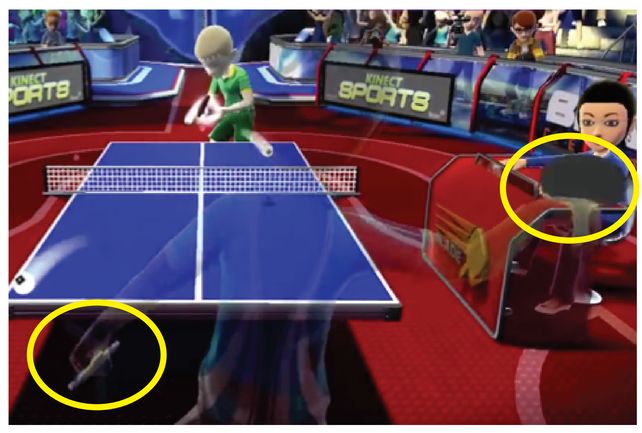
- **Main goal:** Bilateral hand use
- **Problem:** A game that only requires movements of one side of the body may discourage the patients to use their non-dominant side.
- **Solution:** Encourage movements of both sides of the body. Include mechanics to encourage hand/arm/leg change so the players can work on their non-dominant side.
- **Example Game:**

  Kinect Sports –

  Table Tennis Paddle Panic
- **Related Patterns:**

  - Fine Control

  - Move different body parts



DEMO #1 — **'Choose a Game' Tool:** A prototype tool to support therapists in brain injury rehabilitation

DEMO #2 — **Digital Diary Forms:** A method to collect data about game use in brain injury rehabilitation