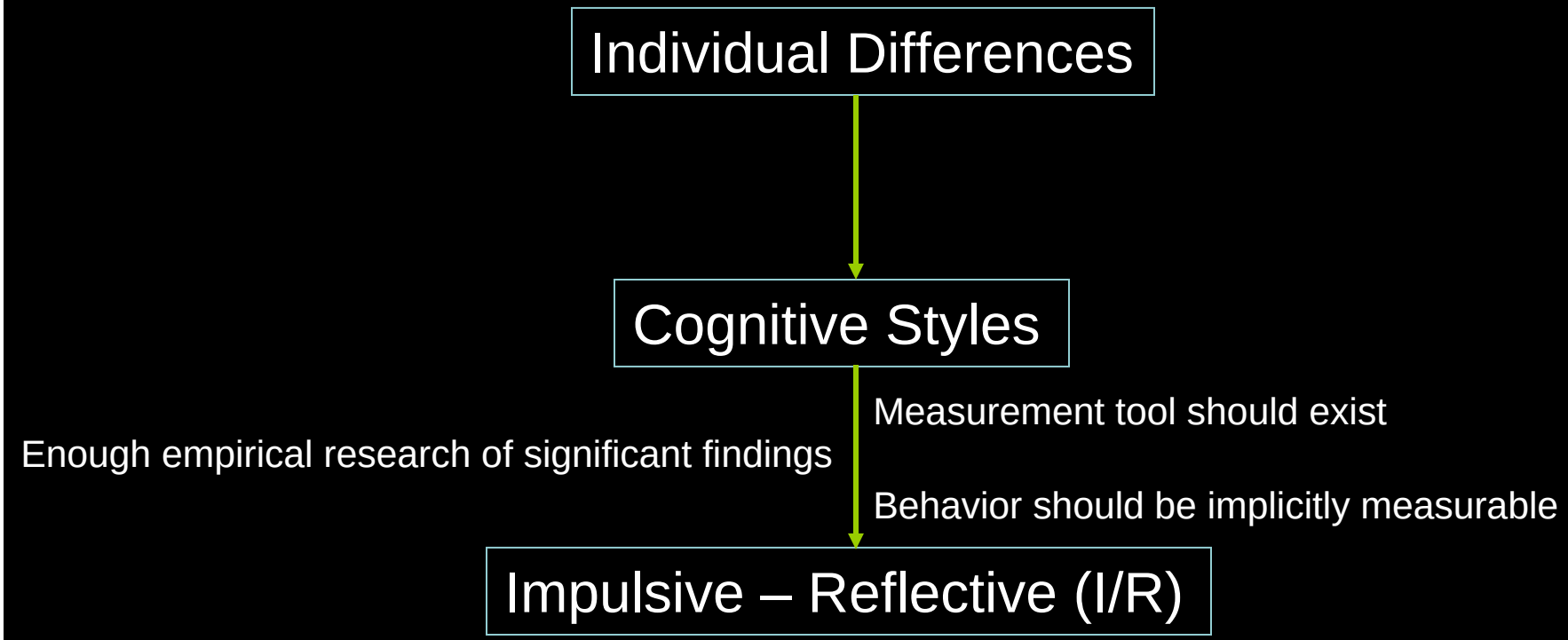
Adaptive Game-Based Learning

Dynamic Adjustment to Impulsive and Reflective Learning Behavior

Introduction

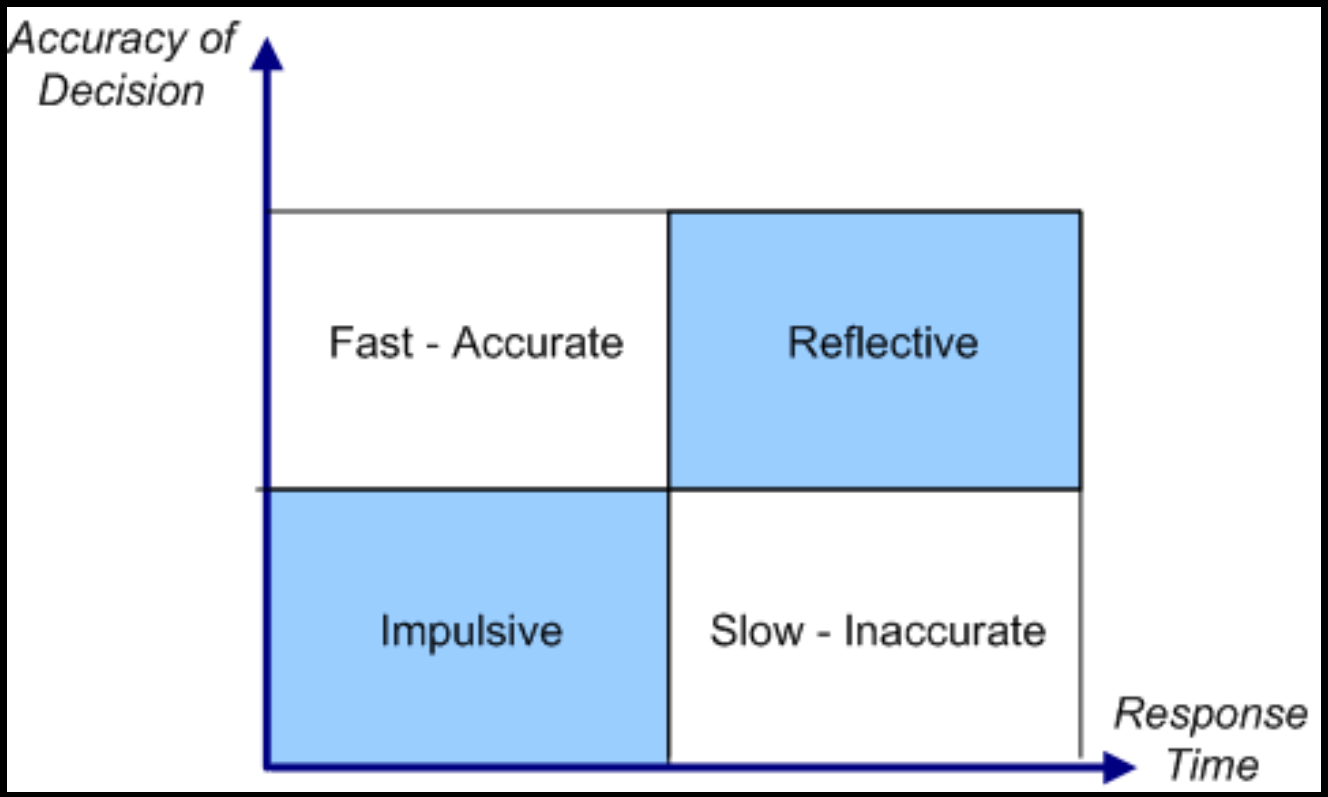


Impulsive - Reflective

Impulsive	**Reflective**
Spontaneous	More hesitant
Global scanning style	Analytical (more sequenced) scanning style
Afraid of seeming incompetent if the answer comes up too slow	Afraid of making mistakes
Lower achievers	Higher achievers
Reward sensitive	Unaffected by rewards
Distracted	Focused

Impulsive/reflective traits based on Jonassen and Grabowski (2001).

MFFT (Matching Familiar Figures Test)

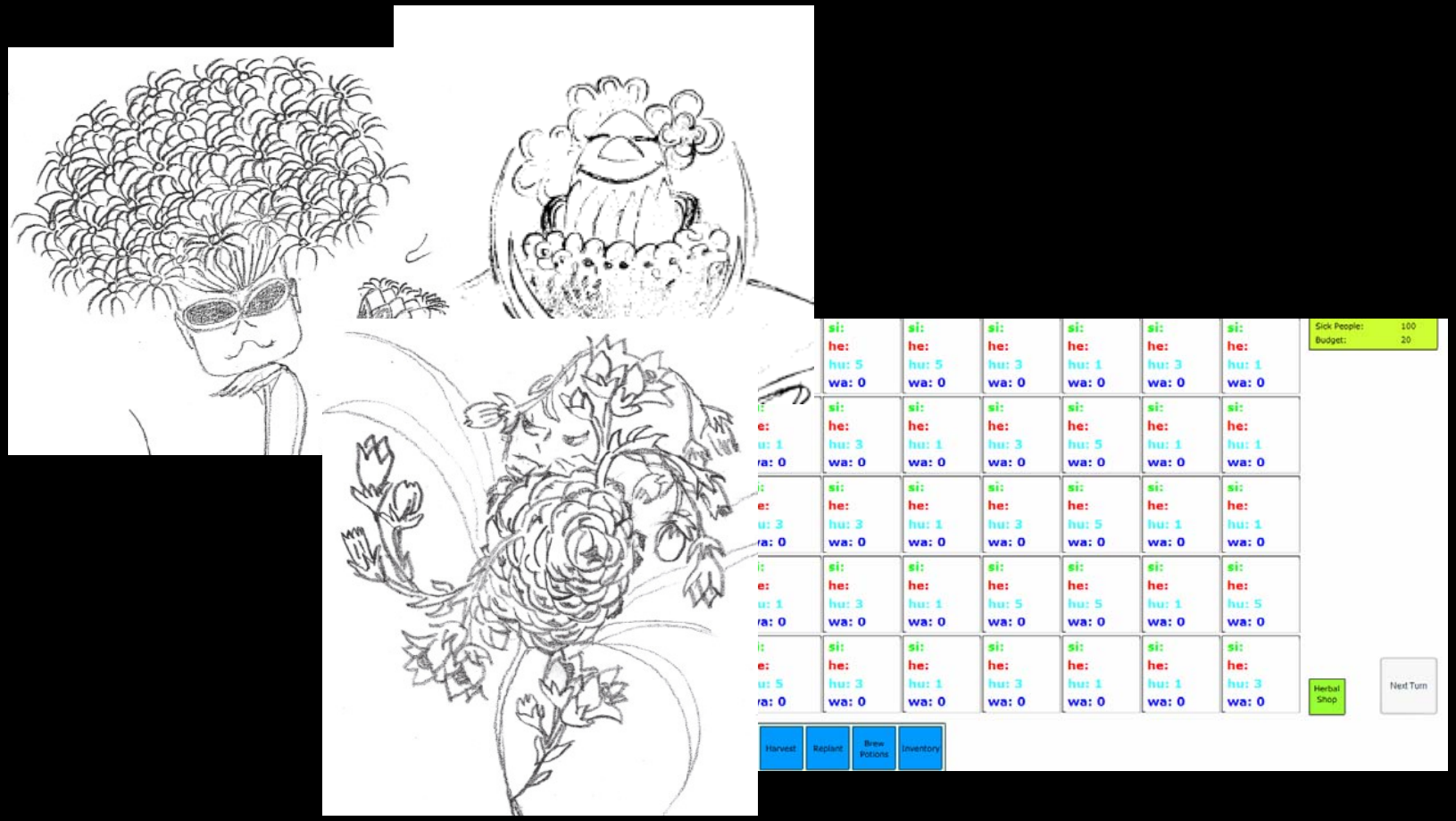


Measurement Tool for I / R

Hypothesis

- The learning success of impulsive learners will improve if they are supported in their cognitive style.
- Impulsive learners are more motivated to learn in an environment that supports their style.
- The learning success of reflective learners will improve if they are supported in their cognitive style.
- Reflective learners are more motivated to learn in an environment that supports their styles.

Hortus


Sick People: 100
Budget: 20
Herbal Shop
Next Turn
Harvest
Replant
Brew Potions
Inventory

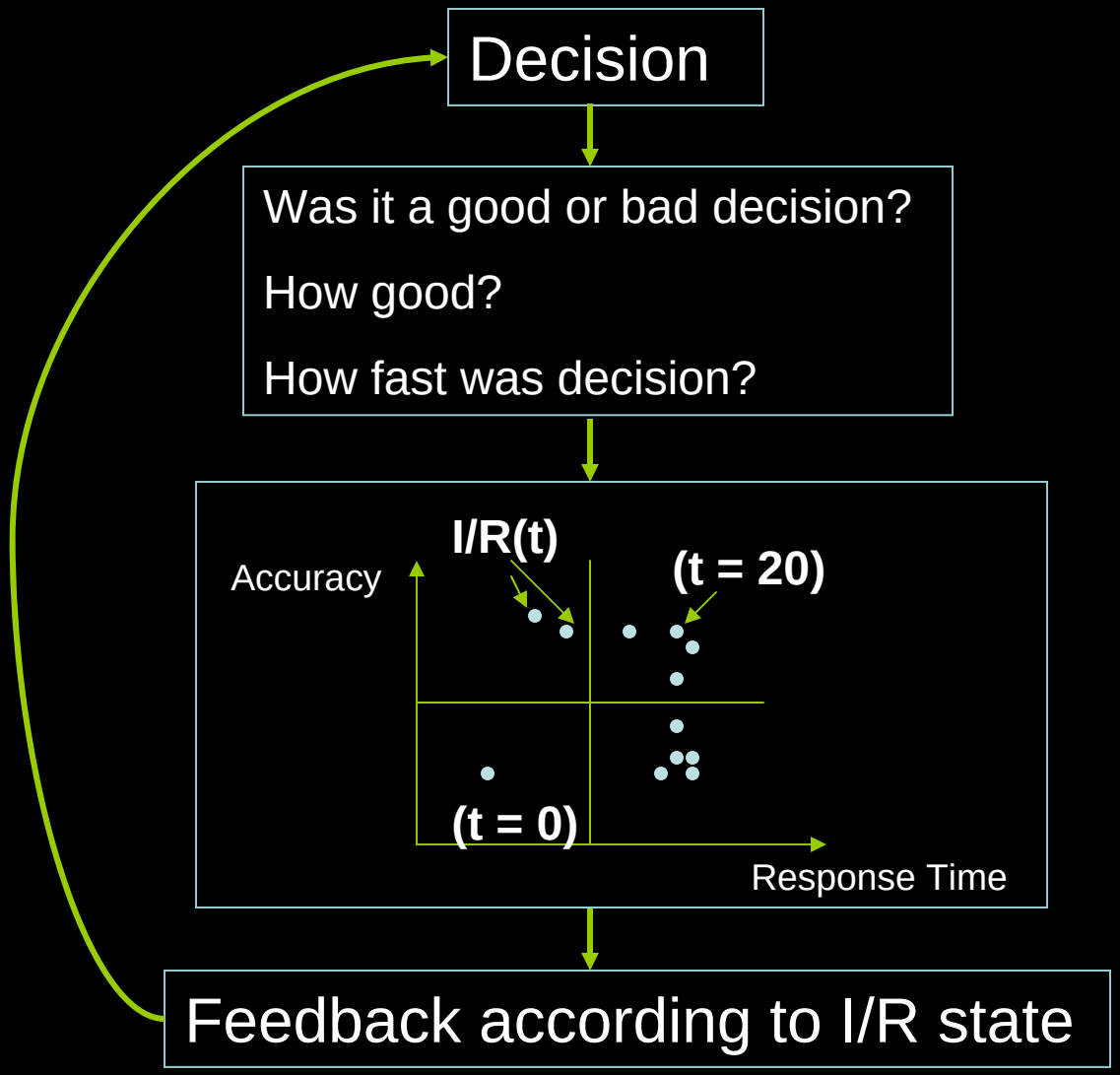
Phantasy Context

- Everyone is a Novice
- Prior Knowledge
- Learning Content not Central

Learning in Hortus

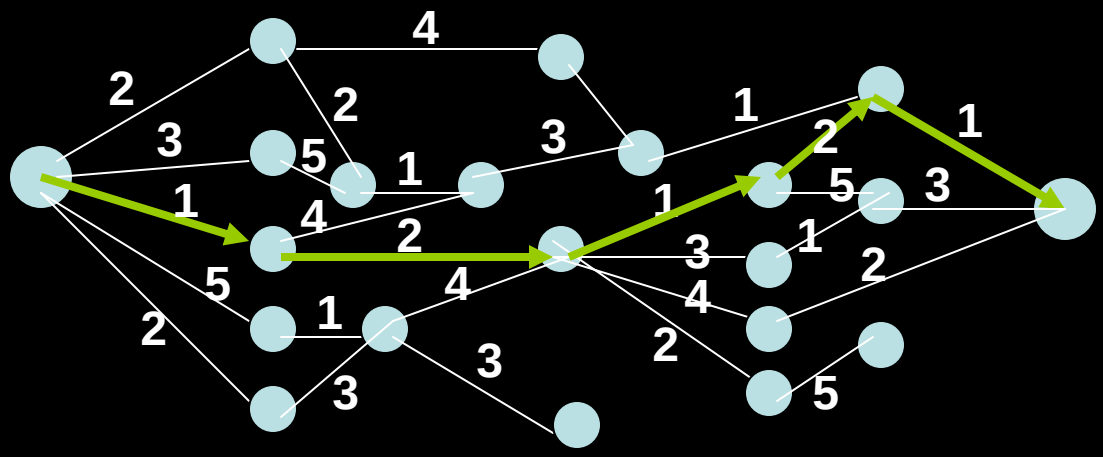
- Learning by Doing
- Cause – Effect Learning
- Reverse Engineering
- Information On-Demand

Dynamic Adjustment to I/R



In-Game Measurement of I/R

Example: Choice of path



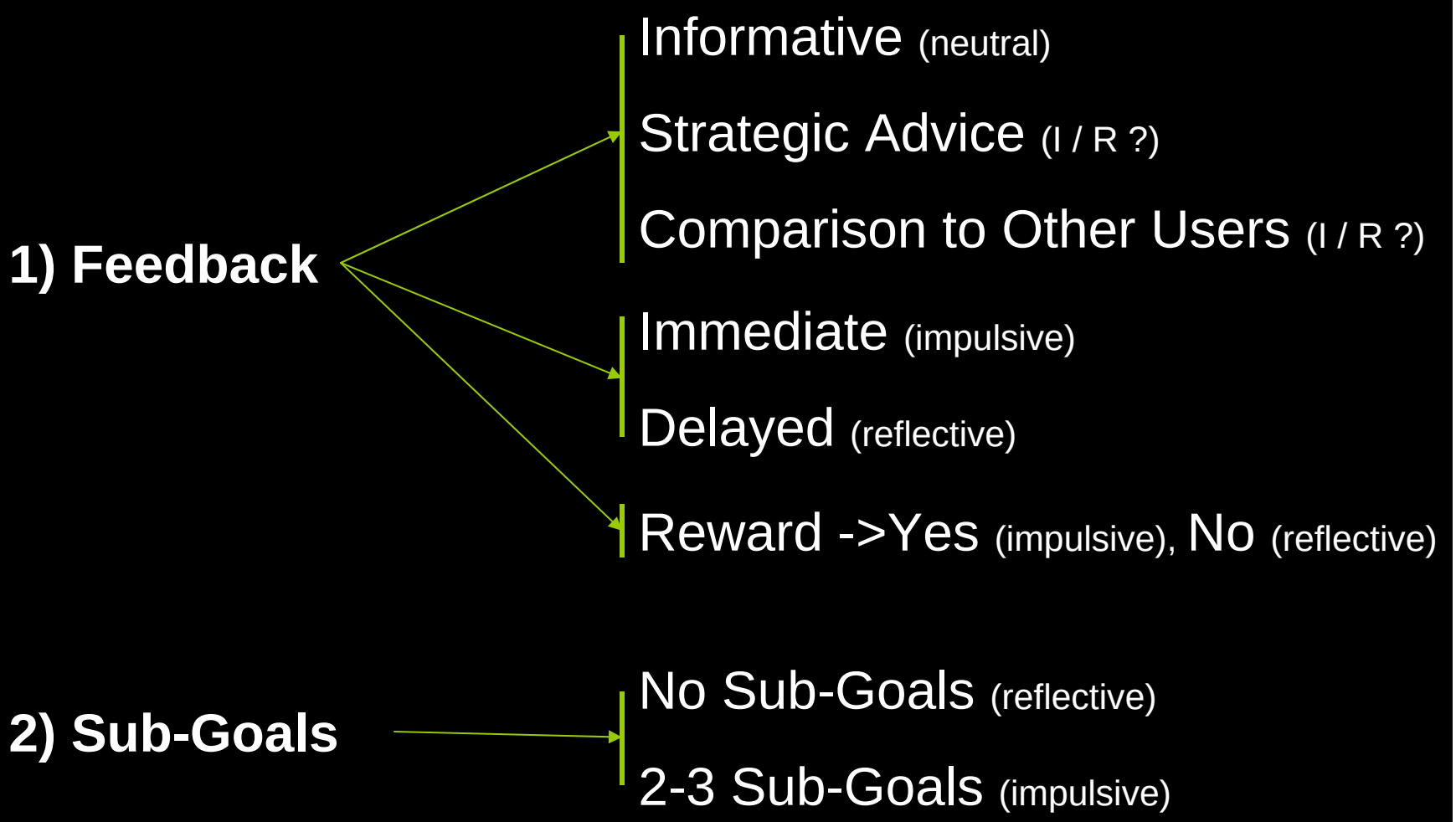
Path - Weight:

- Health of flowers
- Steps until part of goal is achieved

Feedback for I/R

Impulsive	**Reflective**
Short term goals	Long term goals
Immediate feedback	Open problems
Reward dependent	Reward Independent
No direct questions	*Take away fear of failure*

Adaptation of System Reaction

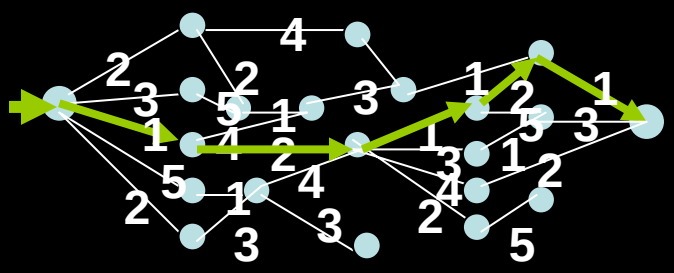


Pilot Study

MFFT

I/R (t = 0)

Hortus



I/R(t) = P(P_1, P_2, P_3, …)

(P = Behavioral Pattern)

P_1, P_2, P_3, …

Garden Knowledge

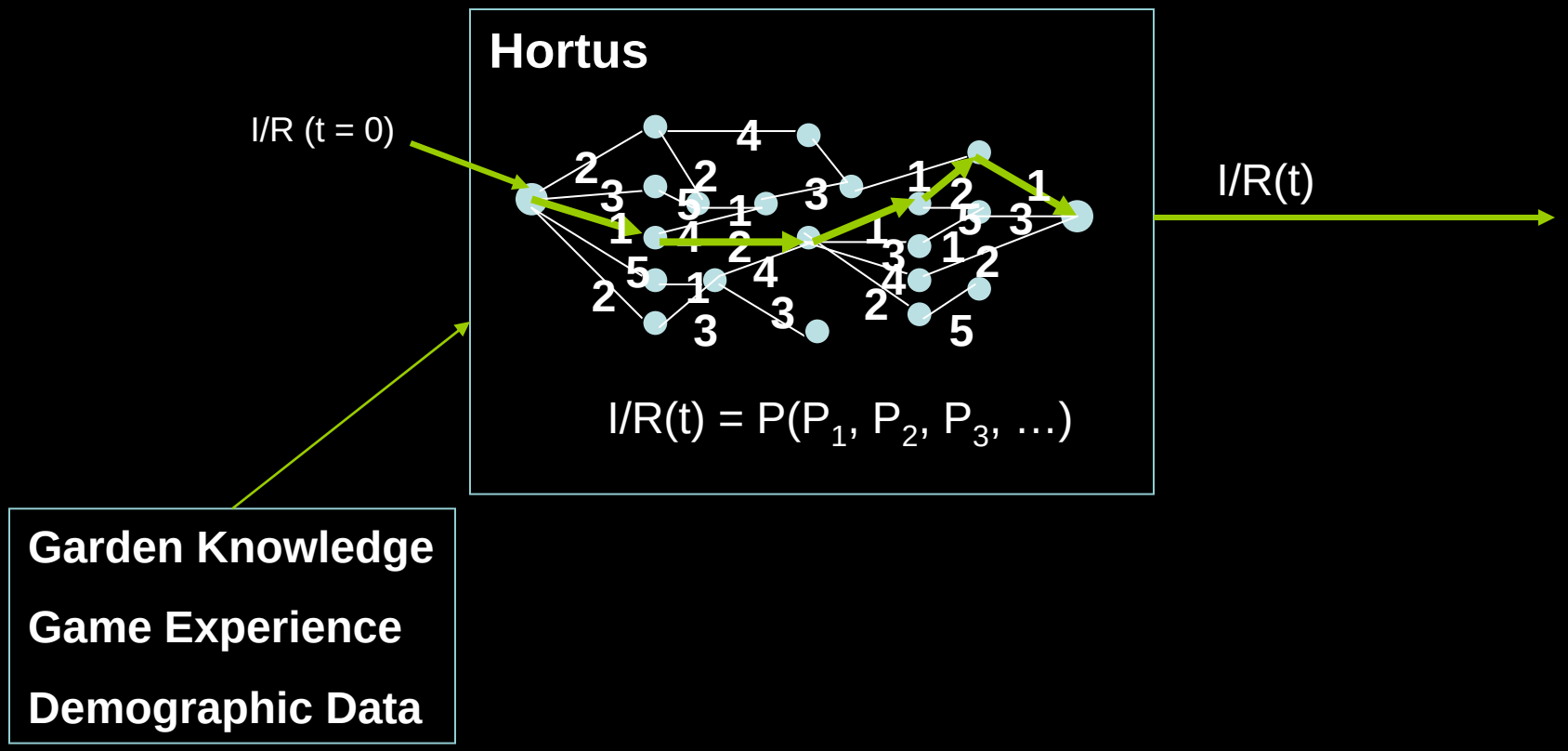
Game Experience

Demographic Data

Assumption:

Behavior does not change for one sub-goal.

Main Study


Hortus
I/R (t = 0)
I/R(t)
I/R(t) = P(P1, P2, P3, …)
Garden Knowledge
Game Experience
Demographic Data

Open Problems

- Algorithm
- Adaptation – Kind of Feedback
- Participants (Experimental Design)

Thanks!

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Data Collection

Spontaneous - Hesitant

Time until a decision is made

- Time until flower is picked
- Time until flower is set into field
- Time until an “action” is chosen

Distracted - Focused

- Time until goal is achieved
- Choice of path for achieving goal

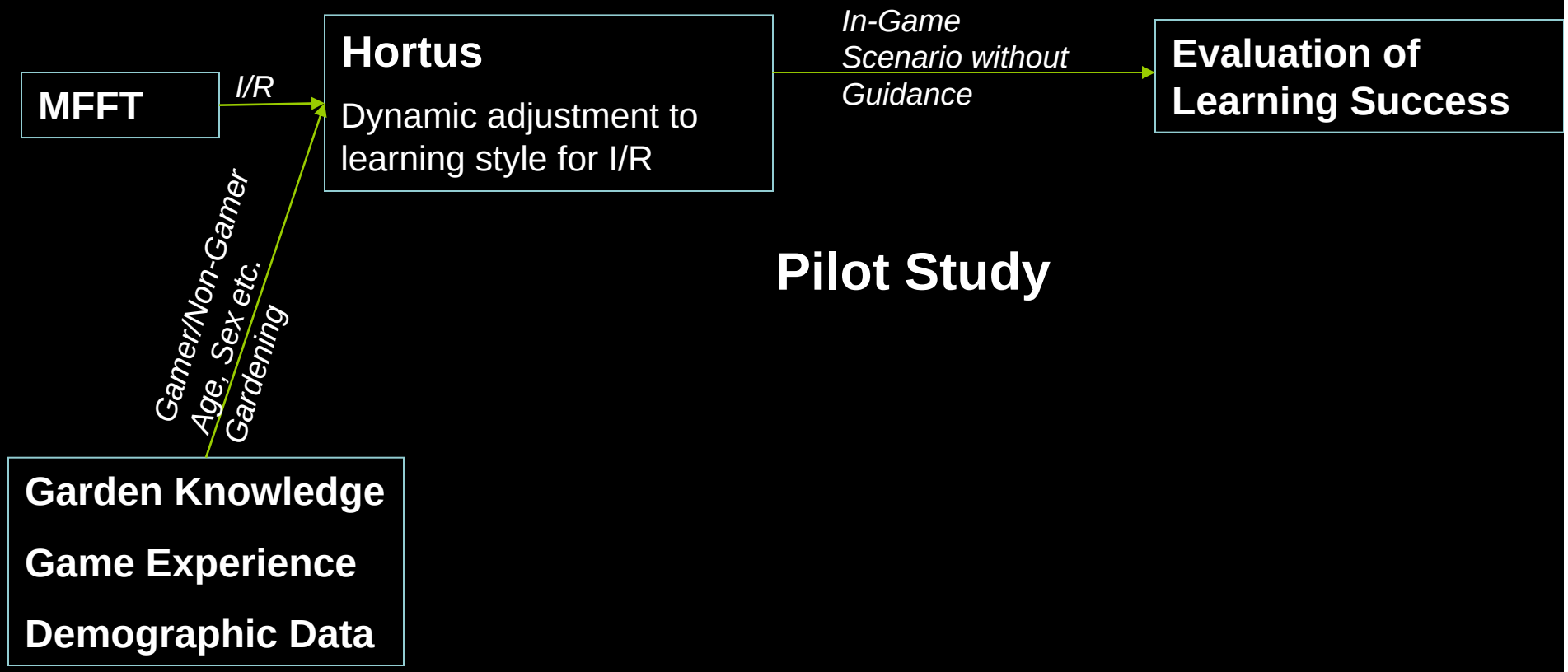
Experimental Design

Kind of Adaptation / Style	**Impulsive Adaptation**	**Reflective Adaptation**
Impulsive	Learning Success ↑	Learning Success ↓
Reflective	Learning Success ↓	Learning Success ↑

Data Collection - Analysis

- Reference values from pilot study
- Shortest path (how fast and how good was decision)

Experimental Design



Pilot Study