

# Innovation and Imitation Strategies in the Age of the Upgrade

- An agent-based simulation model -



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# What is the age of the upgrade?

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# Agent-based model

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## **Setup:**

- Durable consumer goods market with upgrading behavior
- Producers compete using innovation and imitation strategies

## **Purpose:**

- Compare success of different strategies
- Evaluate effect of policies that change market conditions

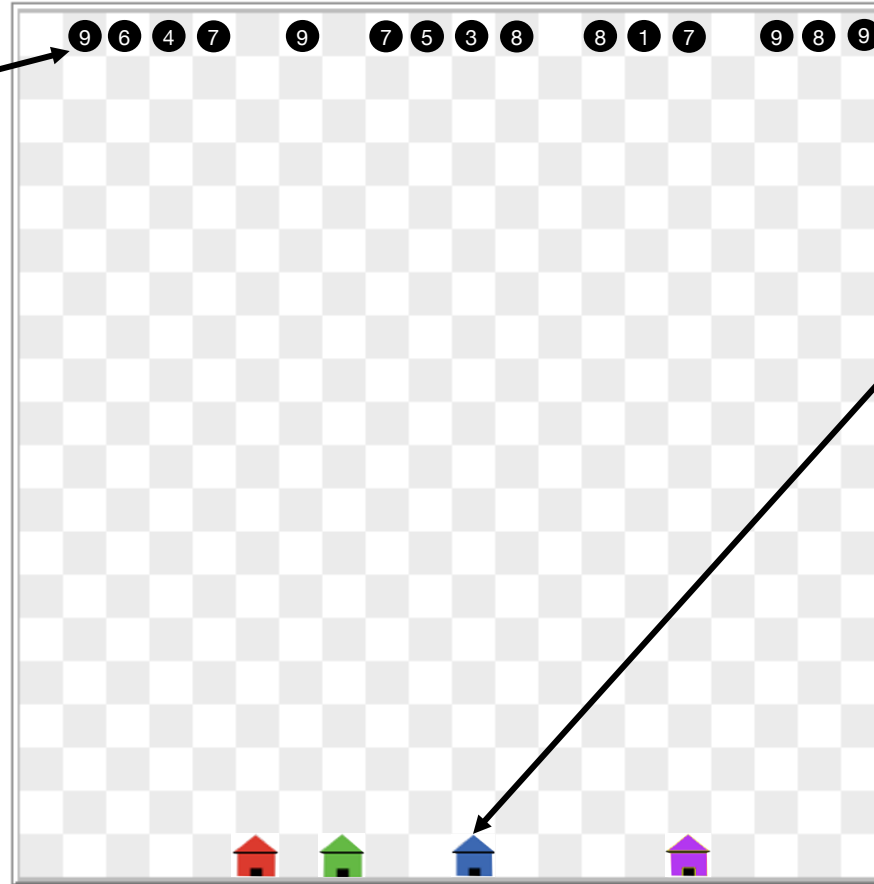
# Dimensions and setup

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## Consumers

- Heterogeneous preferences
- Unknown by producers -> market uncertainty

Technology level



## Producers

- Heterogeneous knowledge bases
- Heterogeneous strategies

Preference fit

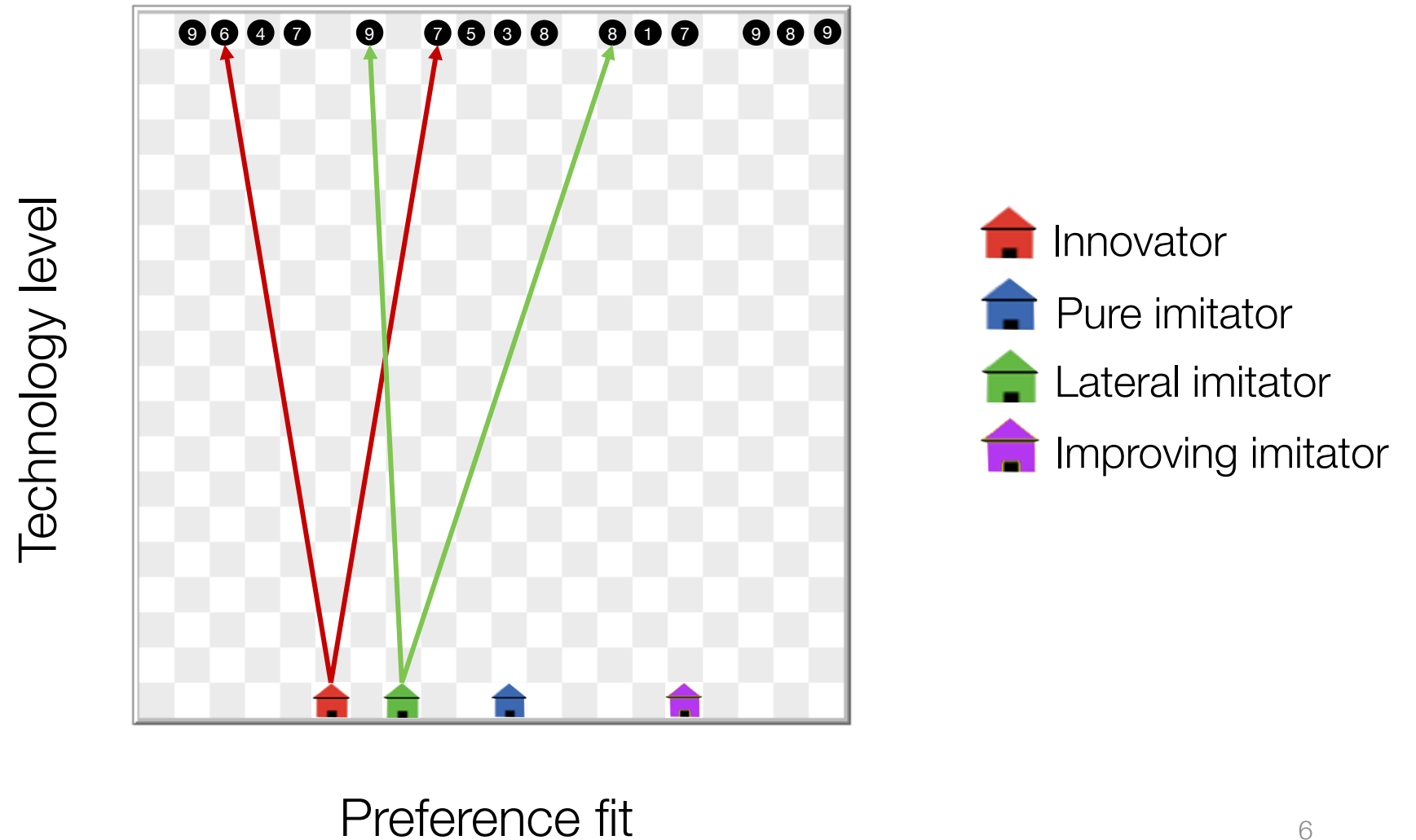
# Innovation and imitation strategies

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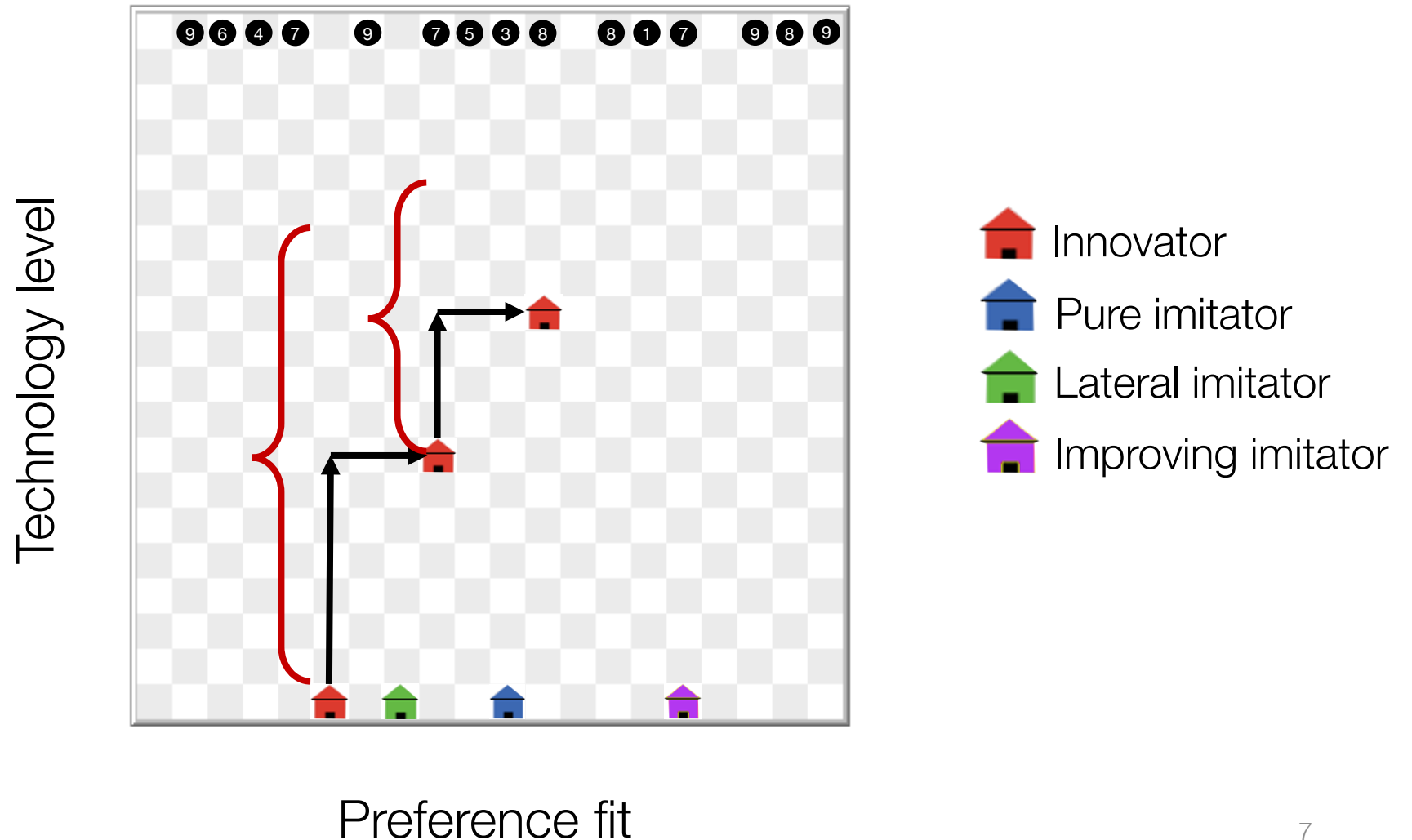
	Innovation	Pure imitation	Lateral imitation	Improving imitation
Technology level	Innovate	Imitate	Imitate	Imitate, then improve
Preference fit	Market research	Imitate	Market research, imitate, then reposition	Imitate

Based on the innovation and imitation strategy typologies by Pér  z-Luno, Carbrera and Wiklund (2007), Ulh  i (2012) and Valdani and Arbore (2007)

# Market research



# R&D, costs, learning and uncertainty



# Optimization

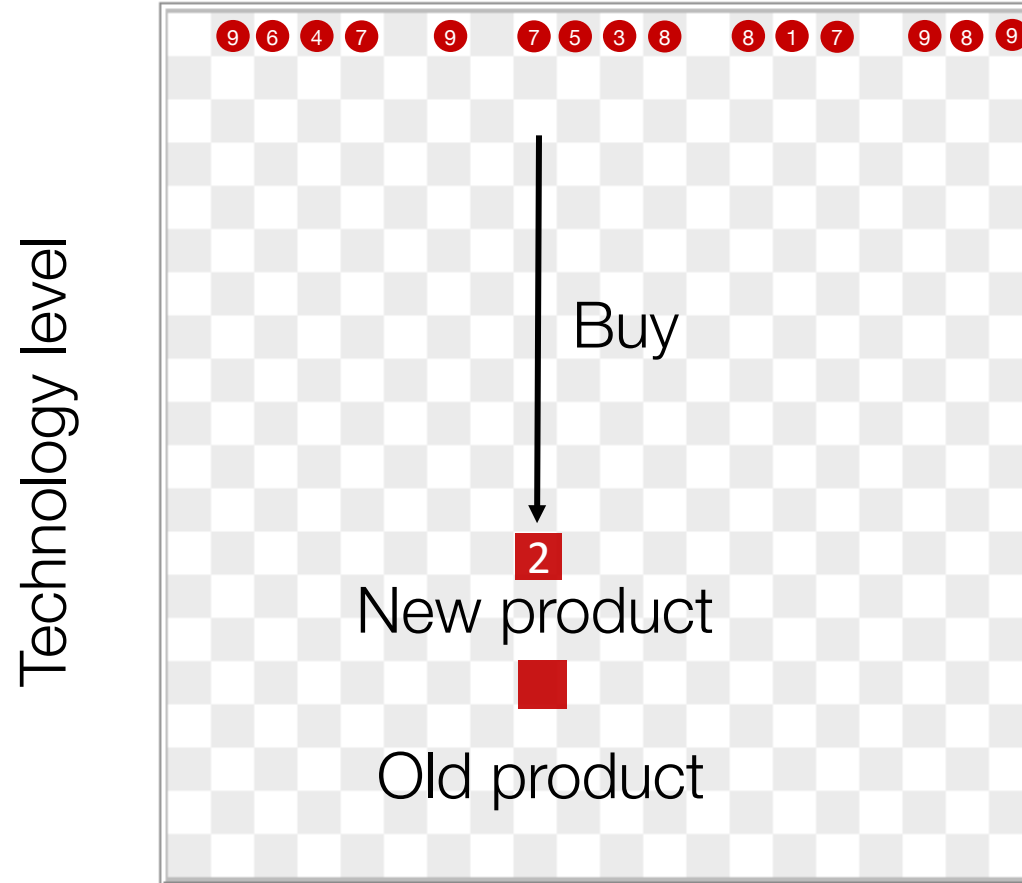
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- Maximize expected profit = price \* expected sales - costs
- Learn consumer positions and willingness-to-pay
  - through market research
  - or assume uniform distribution



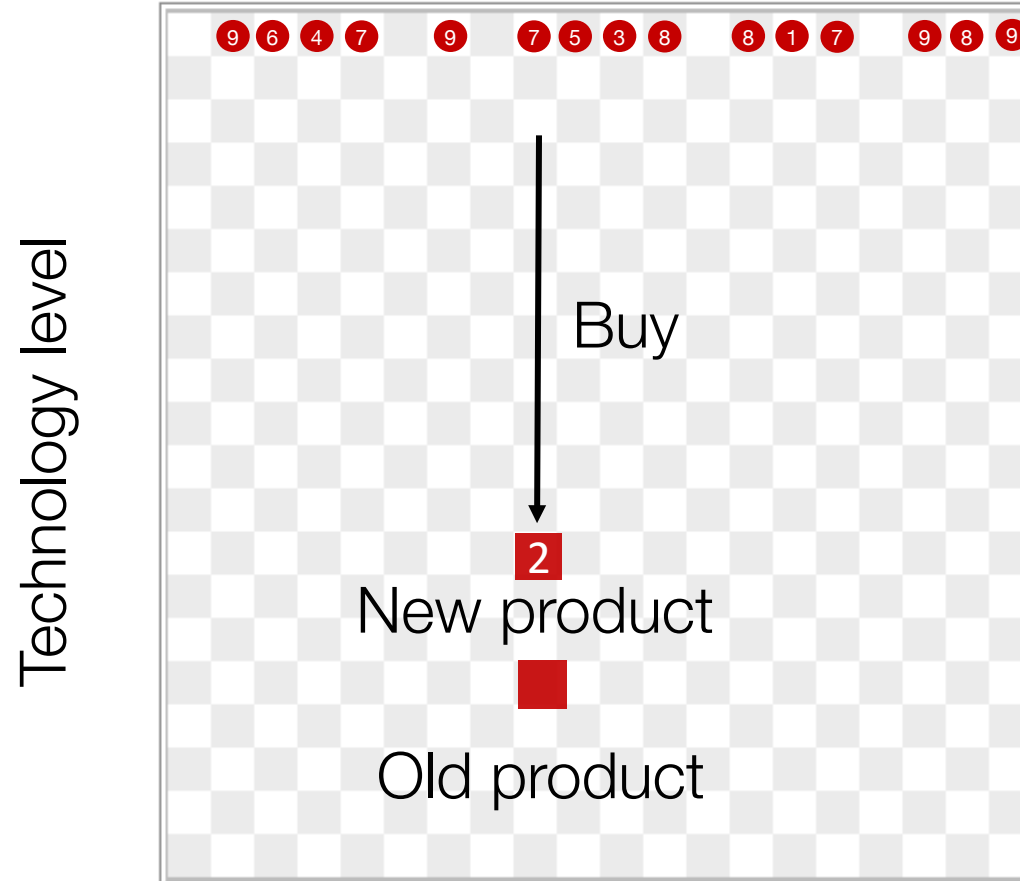
# Is the upgrade worth the price?

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Preference fit

# Waiting increases WTP



**Waiting** increases willingness-to-pay:

- 1 Round: +1 WTP
- 2 Rounds: +3 WTP
- 3 Rounds: +6 WTP
- ...

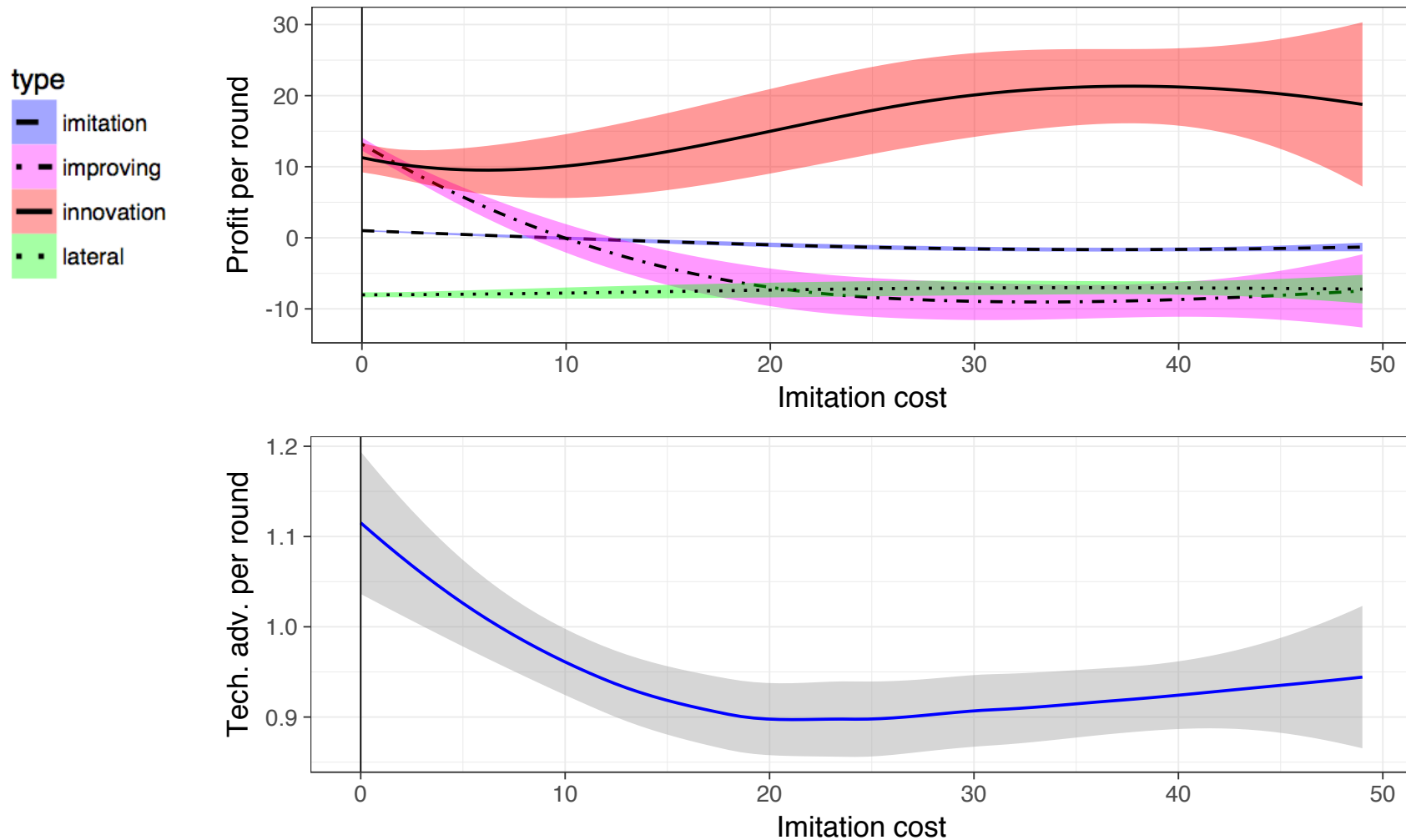
# Schedule

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**Repeat** while highest technology level is not reached

1. Consumers' WTP increases
2. Producers (random order)
  - Market research
  - Create product (innovation and imitation)
  - Set price
3. Consumers buy products if they are an upgrade and WTP is high enough

# Imitation costs are unnecessary



# Upgrading incentivizes innovation

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## **In a durable consumer goods market with upgrading behavior:**

- Pure imitation does not work
- Producers that focus on technological advancement succeed
- Costs of imitation from intellectual property rights may slow down investments in R&D, rather than incentivize them

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## Questions?