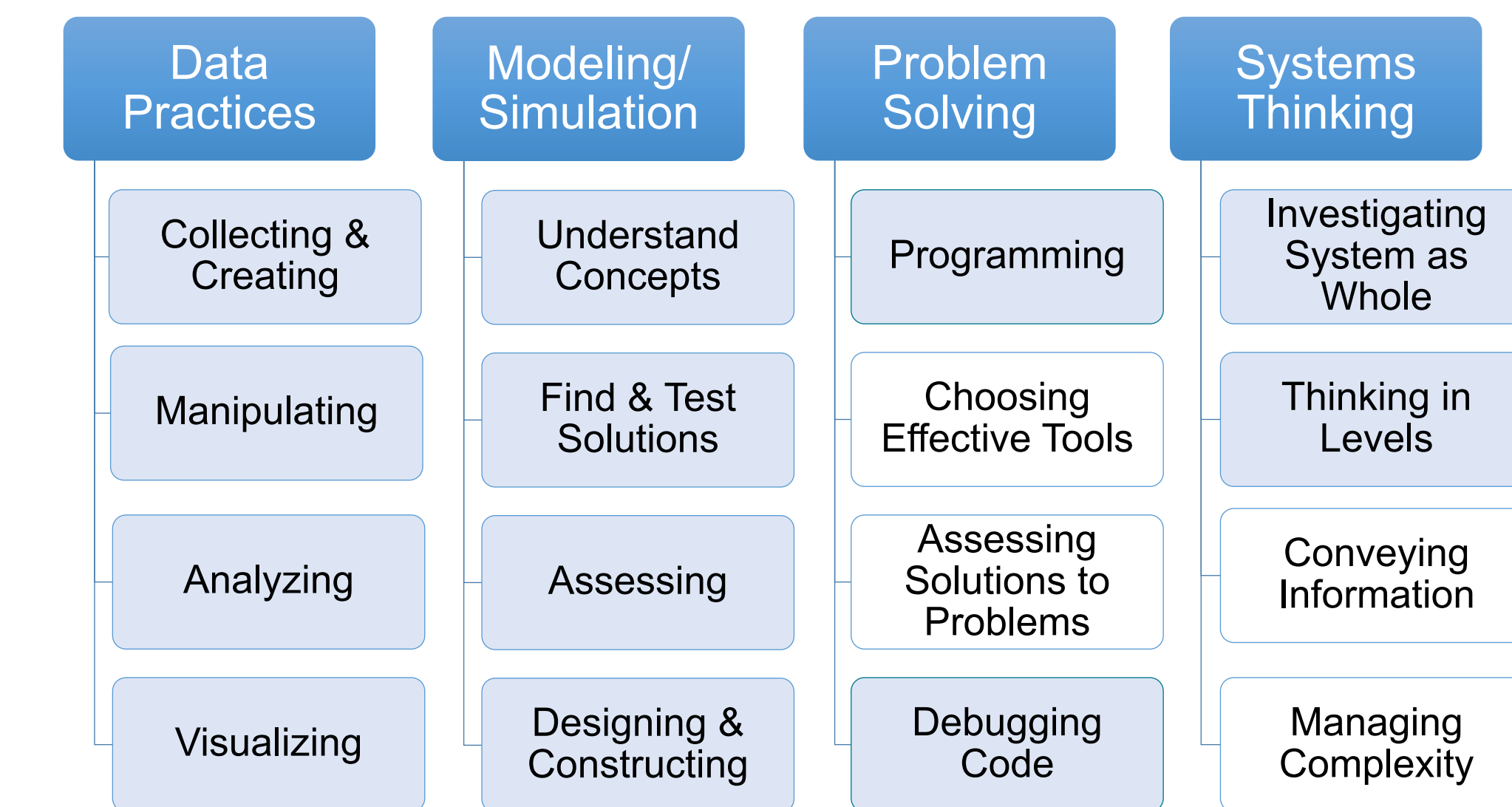


Analyzing Video Game Dynamics with Computation in Introductory Physics

James Newland Bellaire High School, Bellaire, TX, University of Houston, Houston, TX

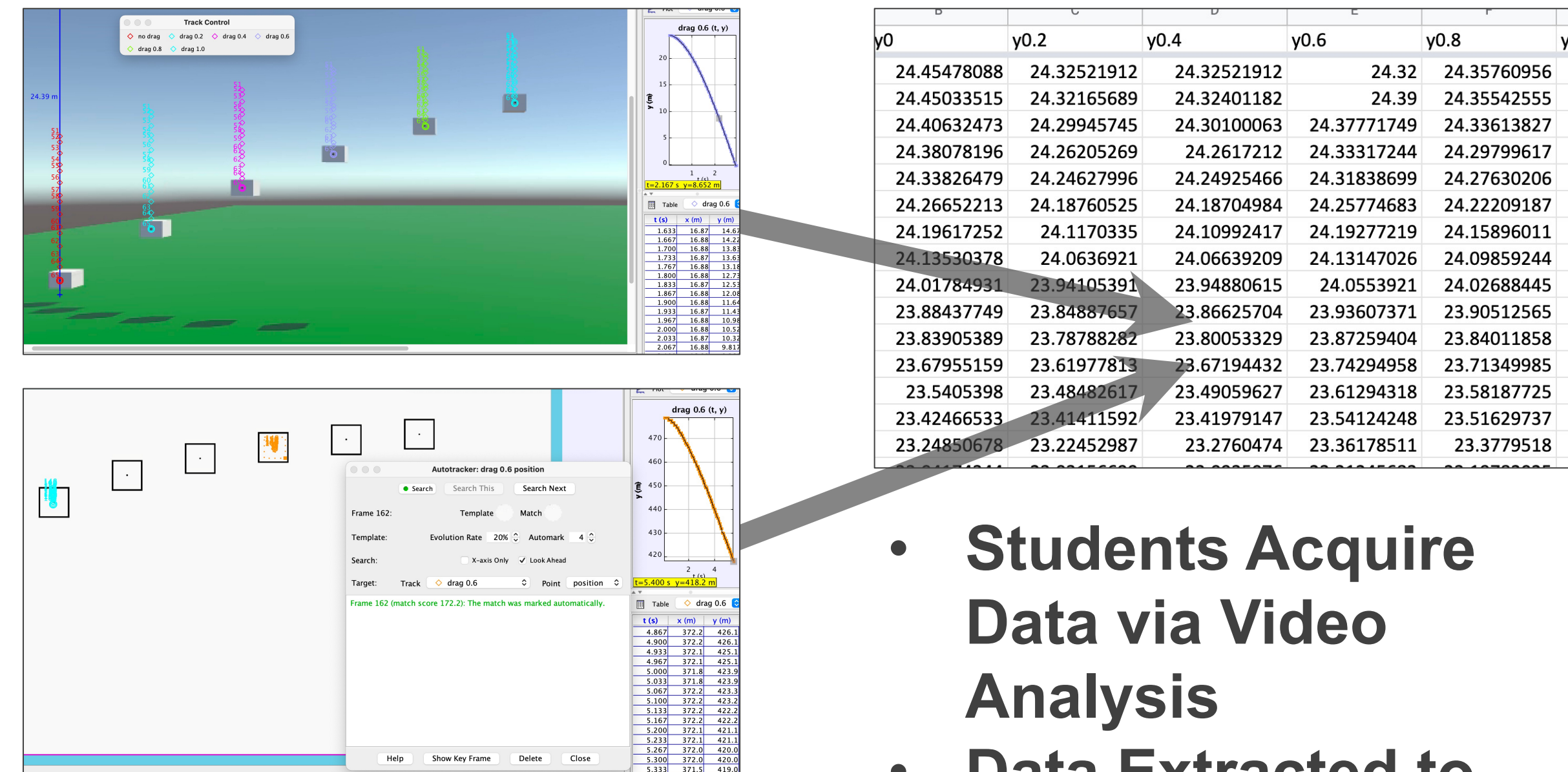


Computational Thinking in Physics



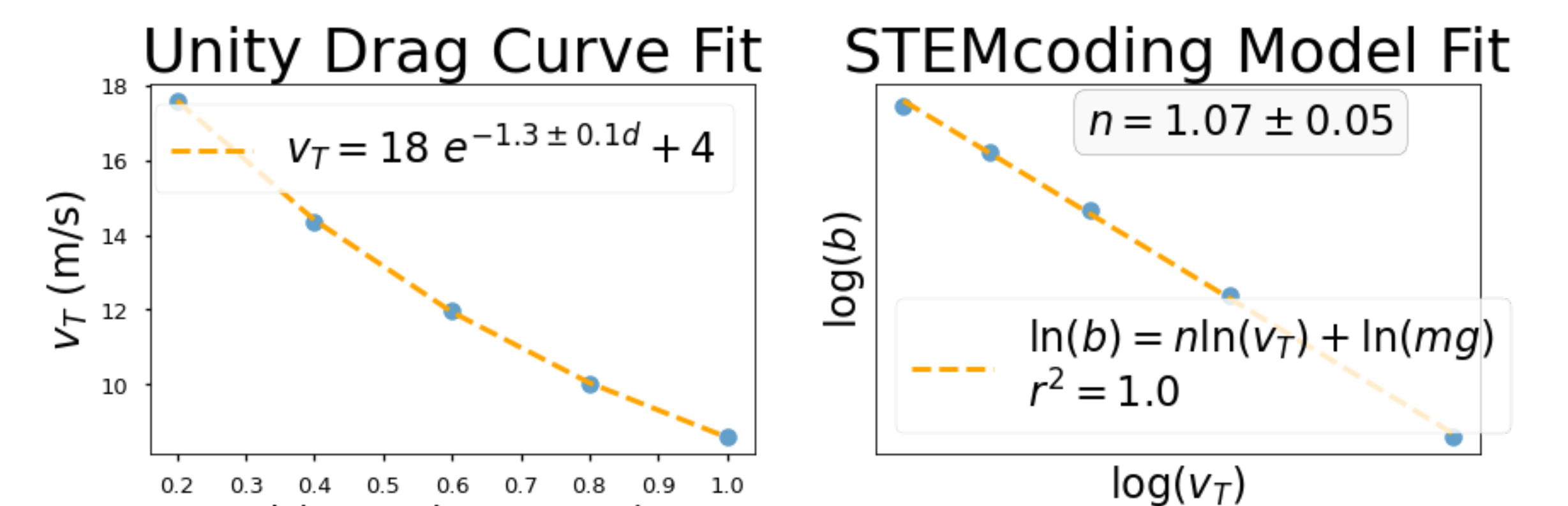
- Highlighted CT Elements Demonstrated¹
- CT More than Students Writing Code
- CT is Integral in Science Learning

Video Analysis Data Acquisition



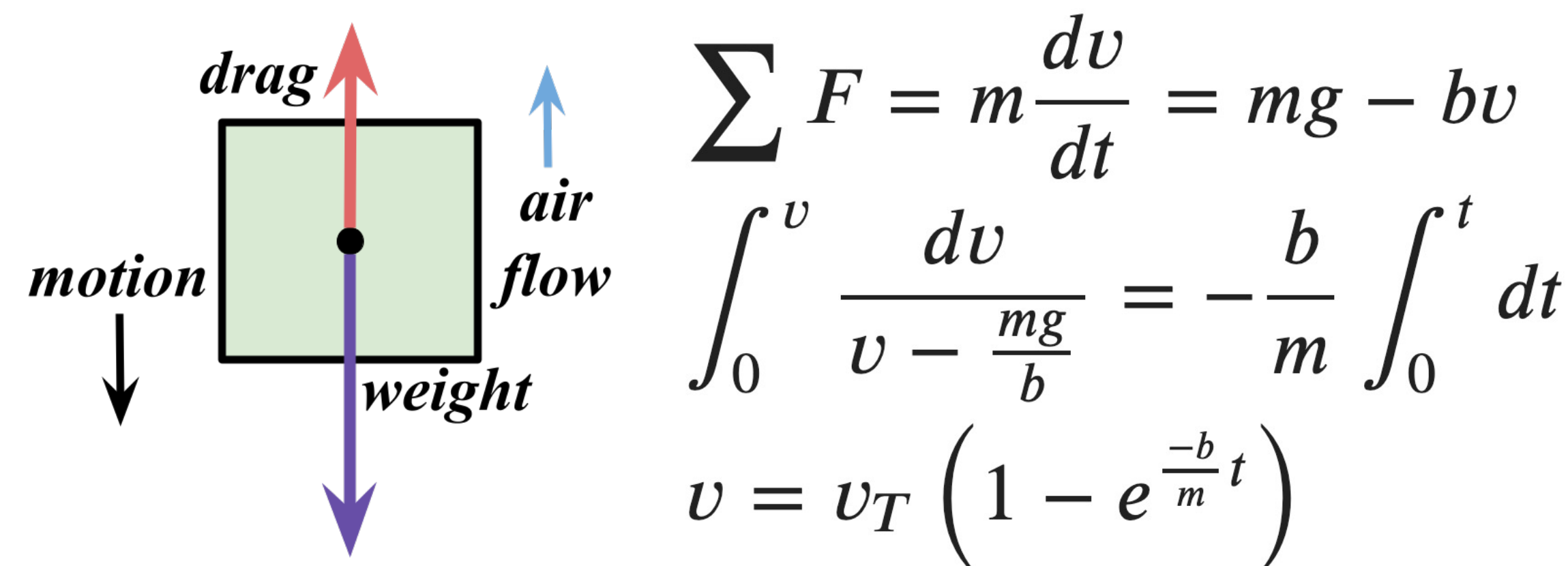
- Students Acquire Data via Video Analysis
- Data Extracted to Spreadsheet

Unity vs STEMcoding Results

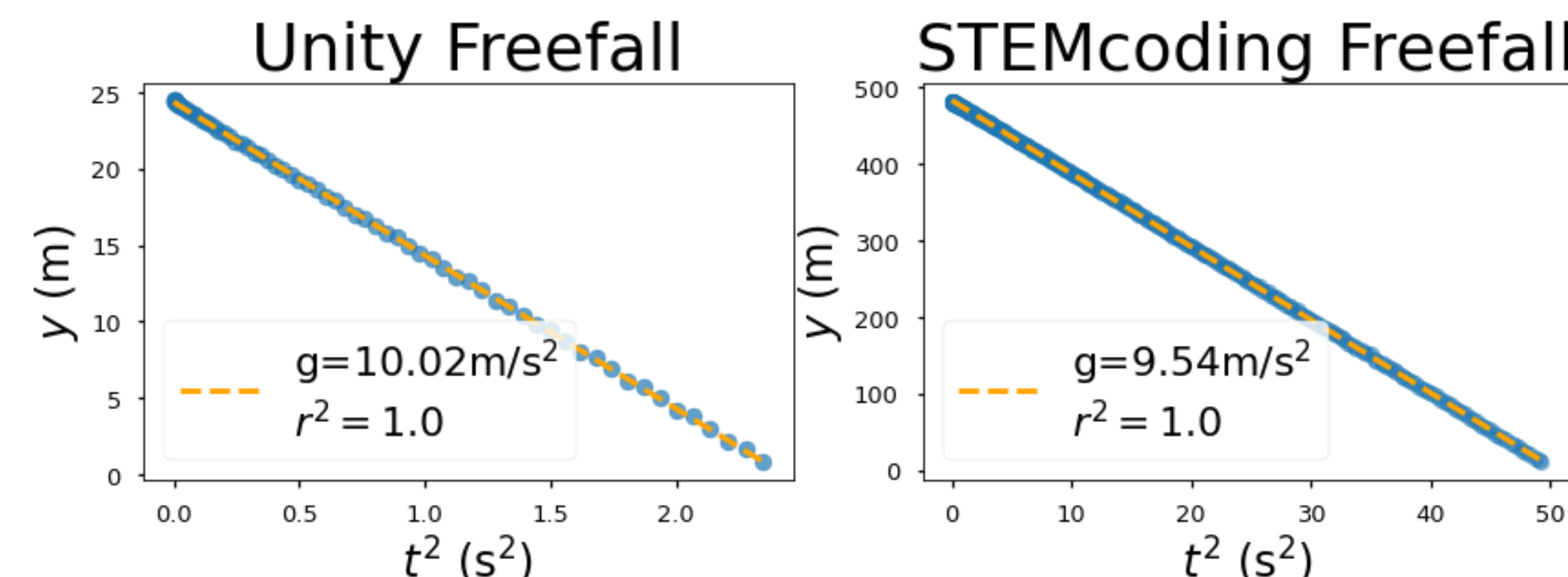


- Unity Drag Calculation Not Accurate
- Algorithm Unknown
- STEMcoding Model Accurately Shows Laminar Air Drag

Laminar Air Drag

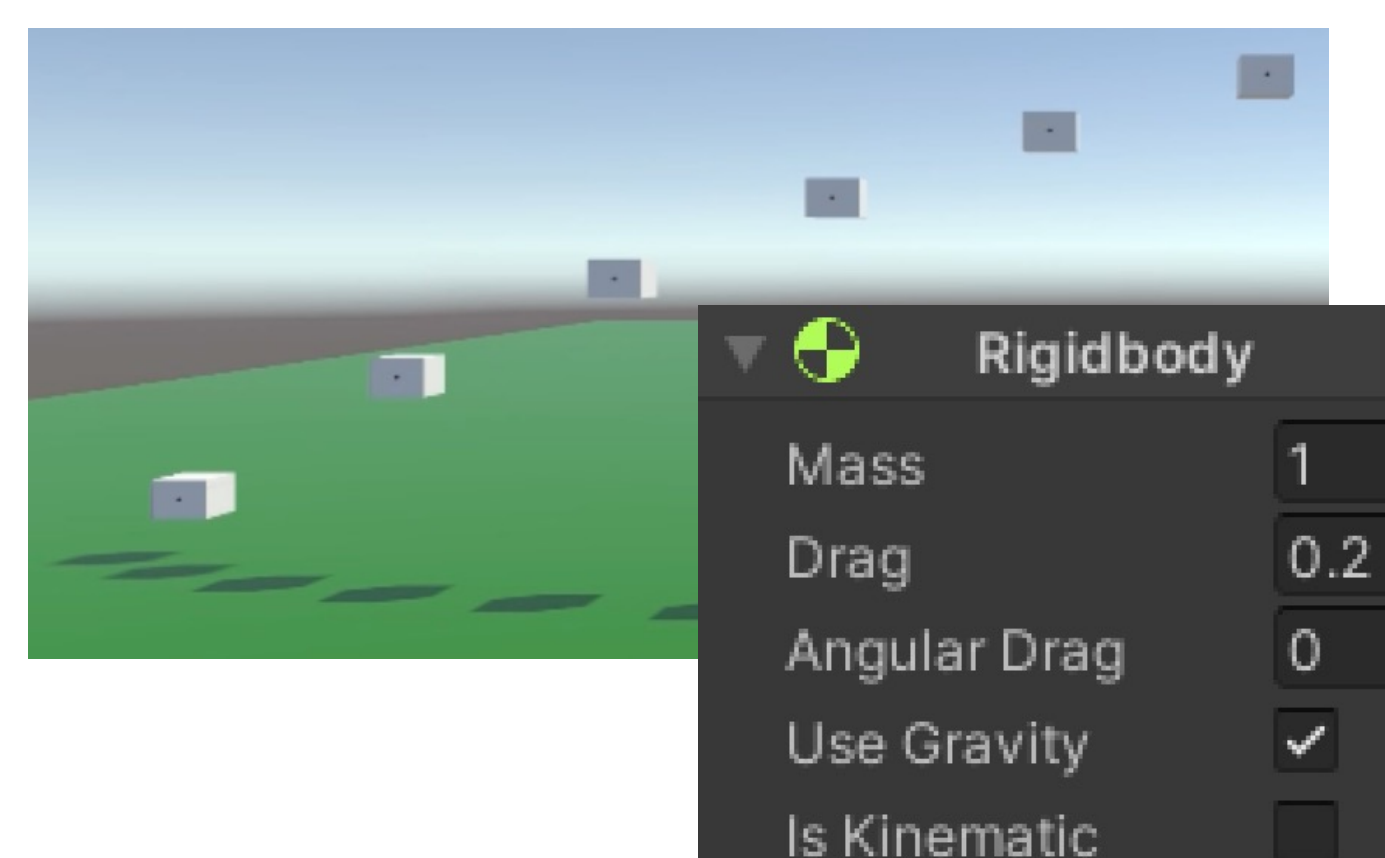


Data Reduction and Analysis

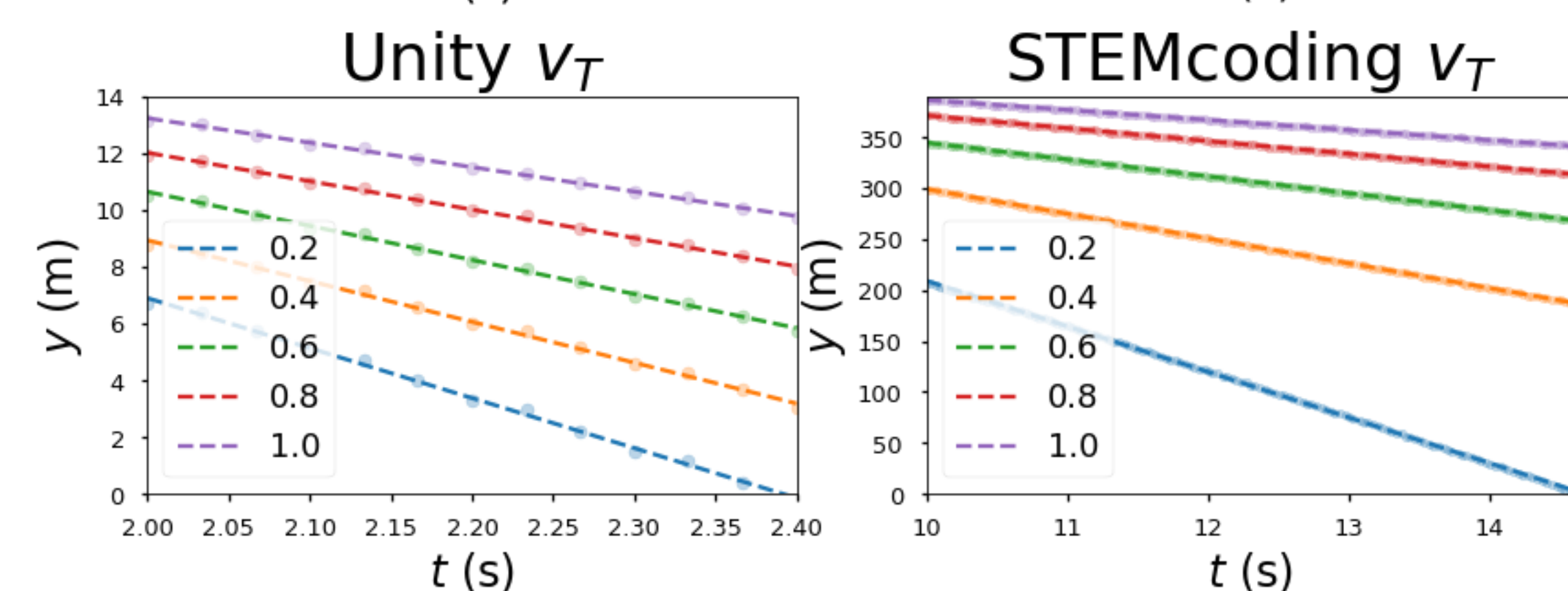
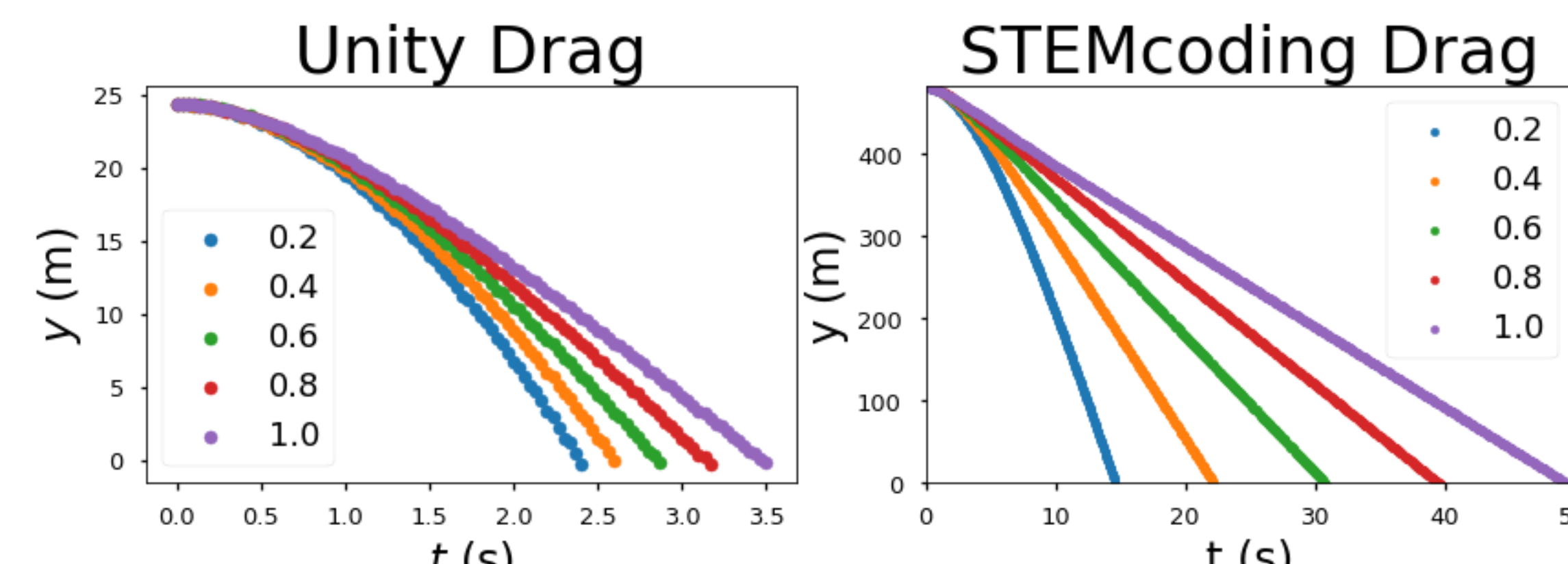


- Freefall Used as Control
- Both Systems Closely Matched Gravity

Unity Rigidbody Drag

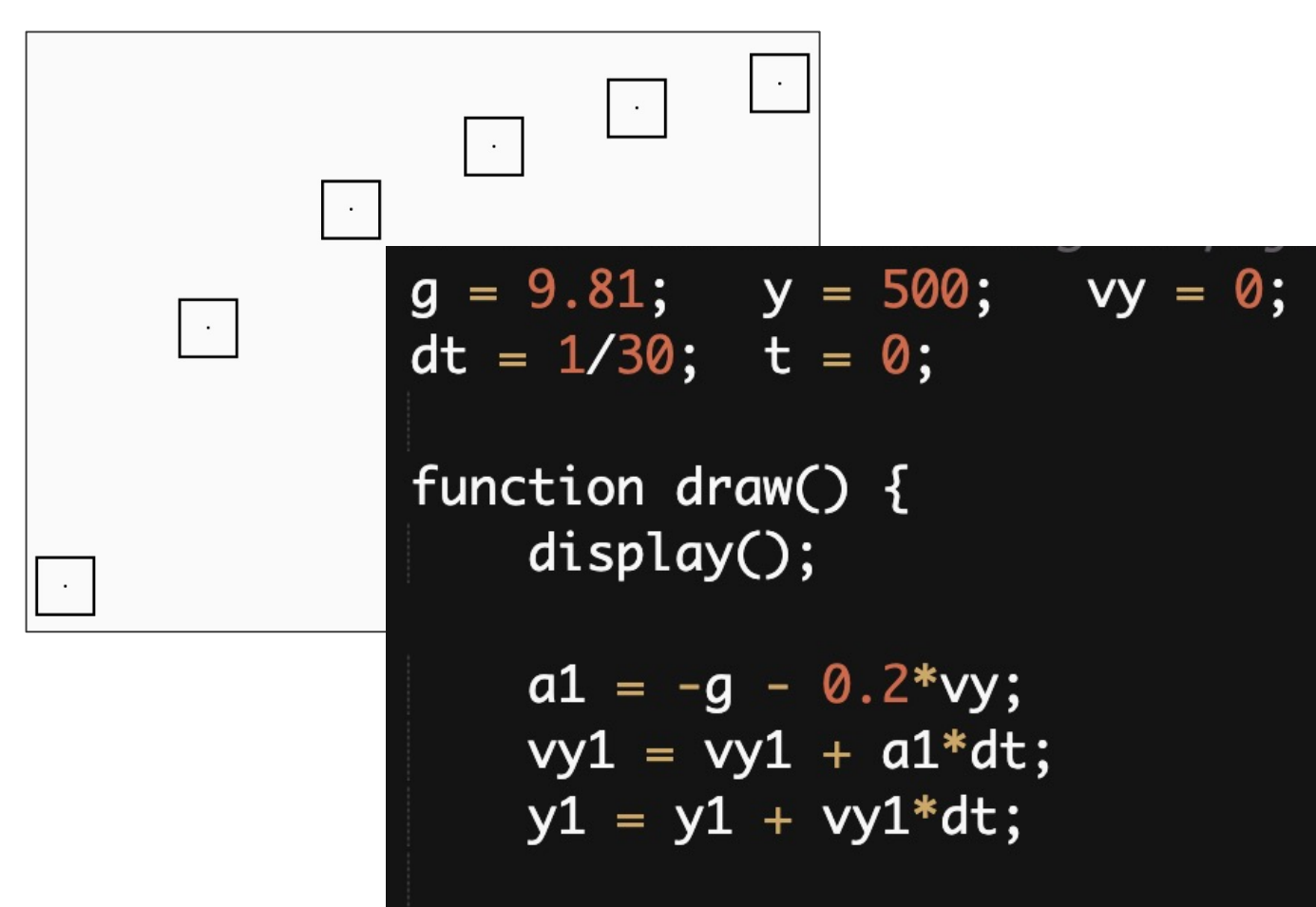


- Drag Not Mass Dependent
- Hidden Effect on Acceleration
- High Drag Makes Objects Seem Lighter²



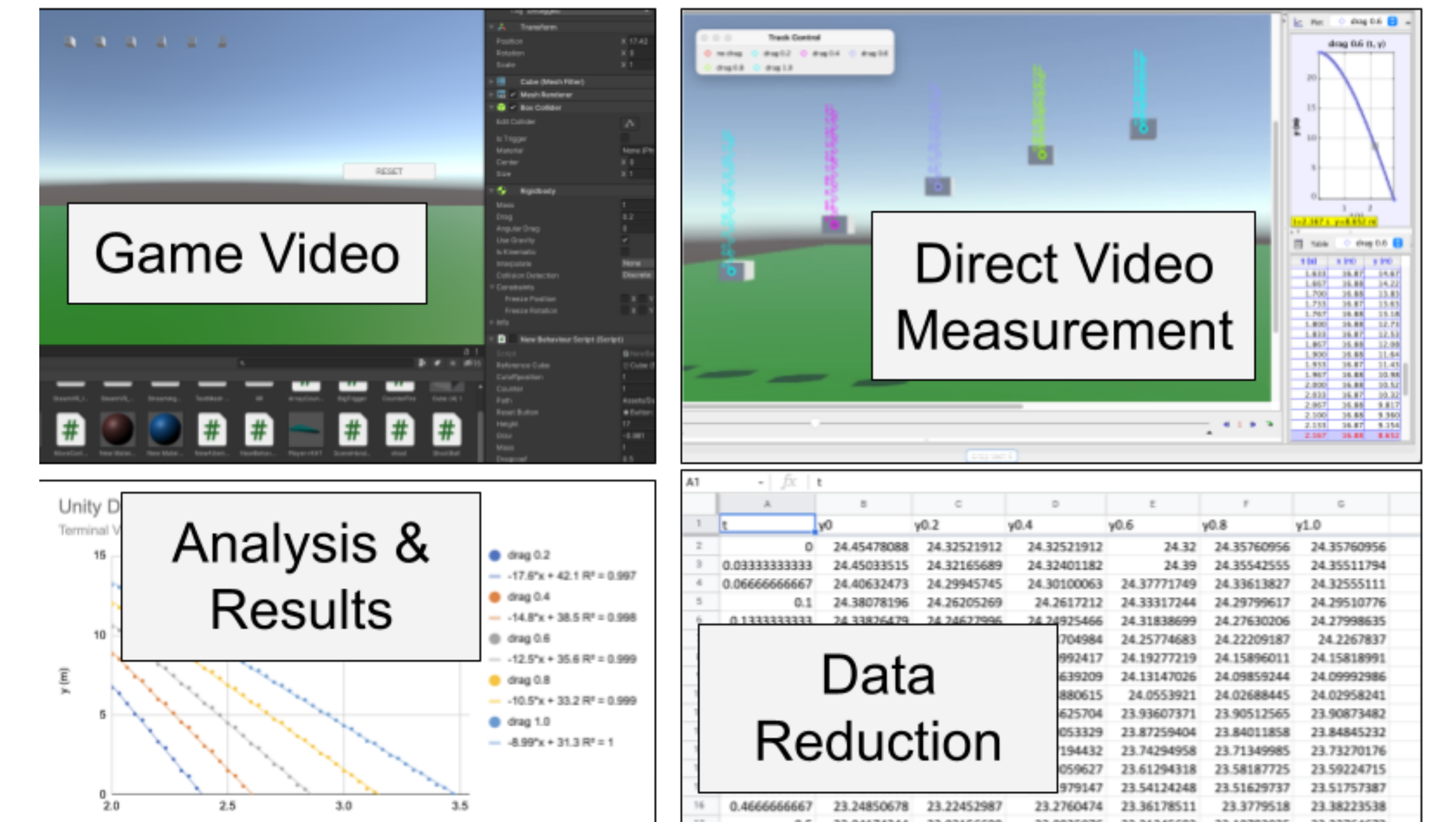
- Terminal Velocities found via Regression
- Same Variation in Model Drag Values
- Spreadsheet Could Be Used

STEMcoding Drag Model



- Student-Focused Platform
- STEMcoding uses Euler-Cromer Method³
- p5js Auto Iterates **draw()**

Model Building in Physics Class



- Students Have Agency
- Open-Ended Exploration
- Computational Thinking In Context
- Encourages Model Building

Acknowledgments

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