

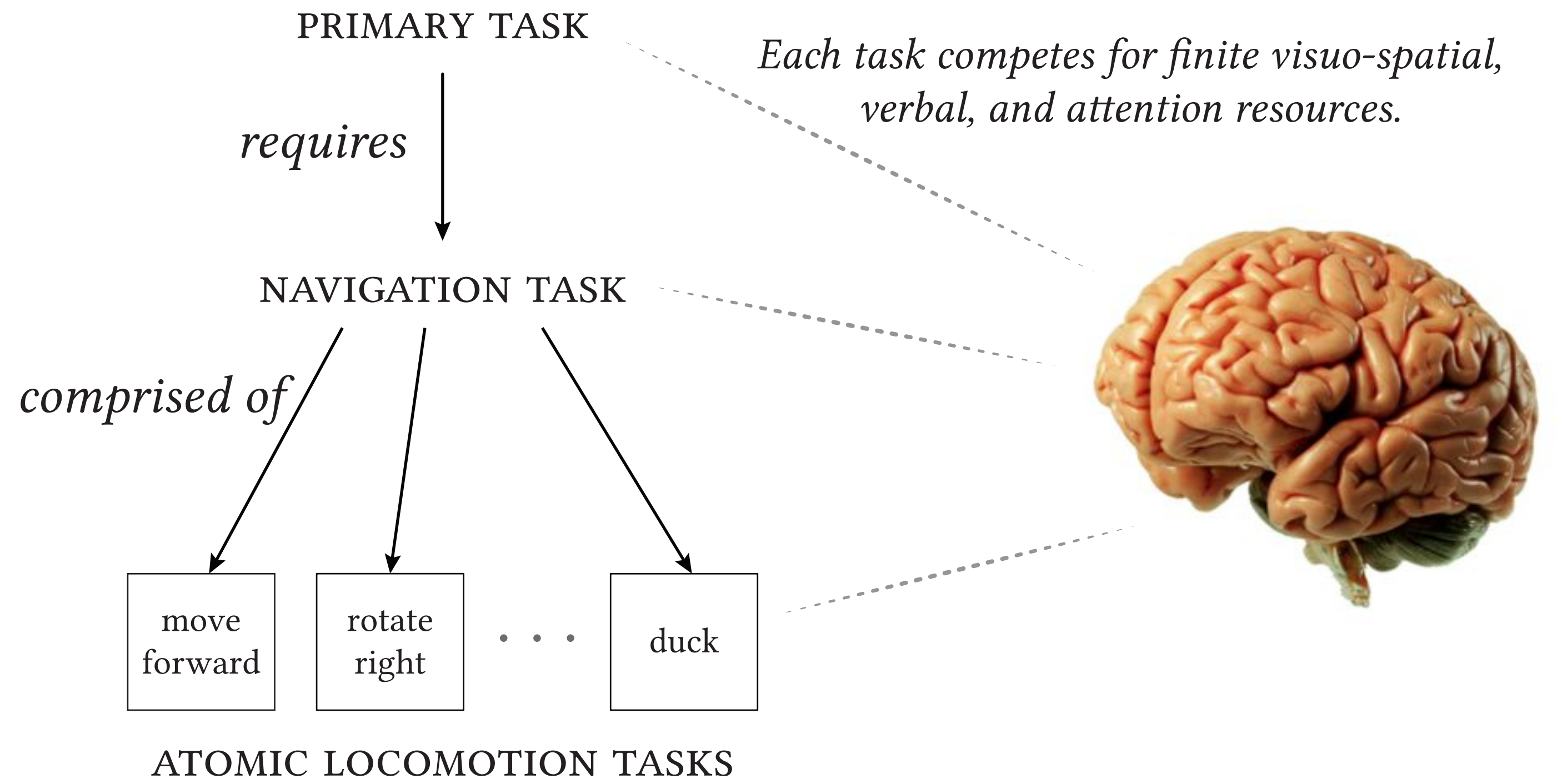
The Cognitive Implications of Semi-Natural Locomotion

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LOCOMOTION

Natural locomotion in a virtual world is hindered by physical constraints (e.g., tracking, walls). Many locomotion interfaces have been conceived to accommodate these limitations.

Reduced resolution and a restricted field of view (FOV) limit the amount of visual feedback available during locomotion. Humans use optic flow to guide movement, so this could be costly if more cognitively demanding strategies are used.

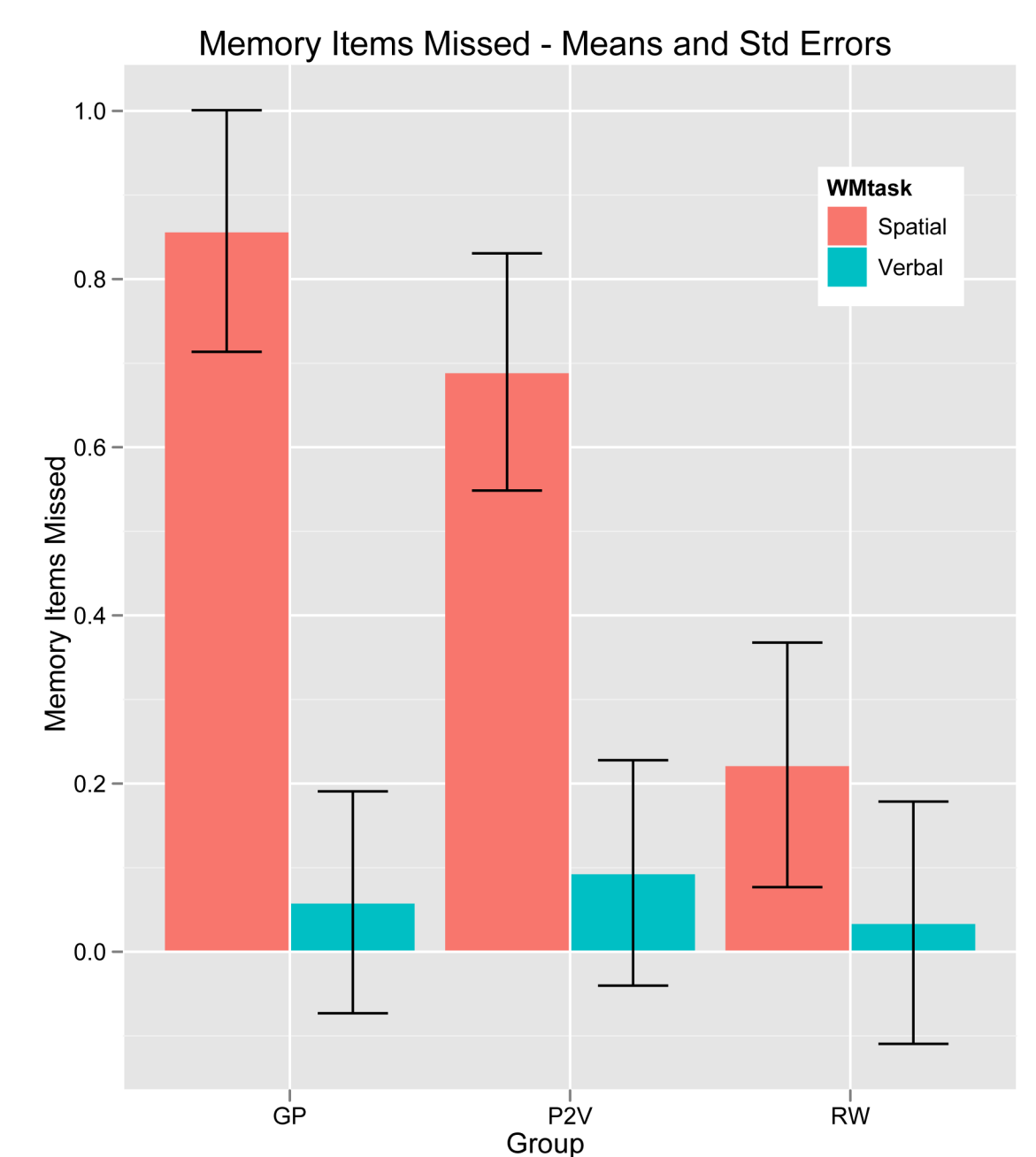


STUDY 1

What is the impact of performing three types of cognitive tasks while simultaneously completing movements?

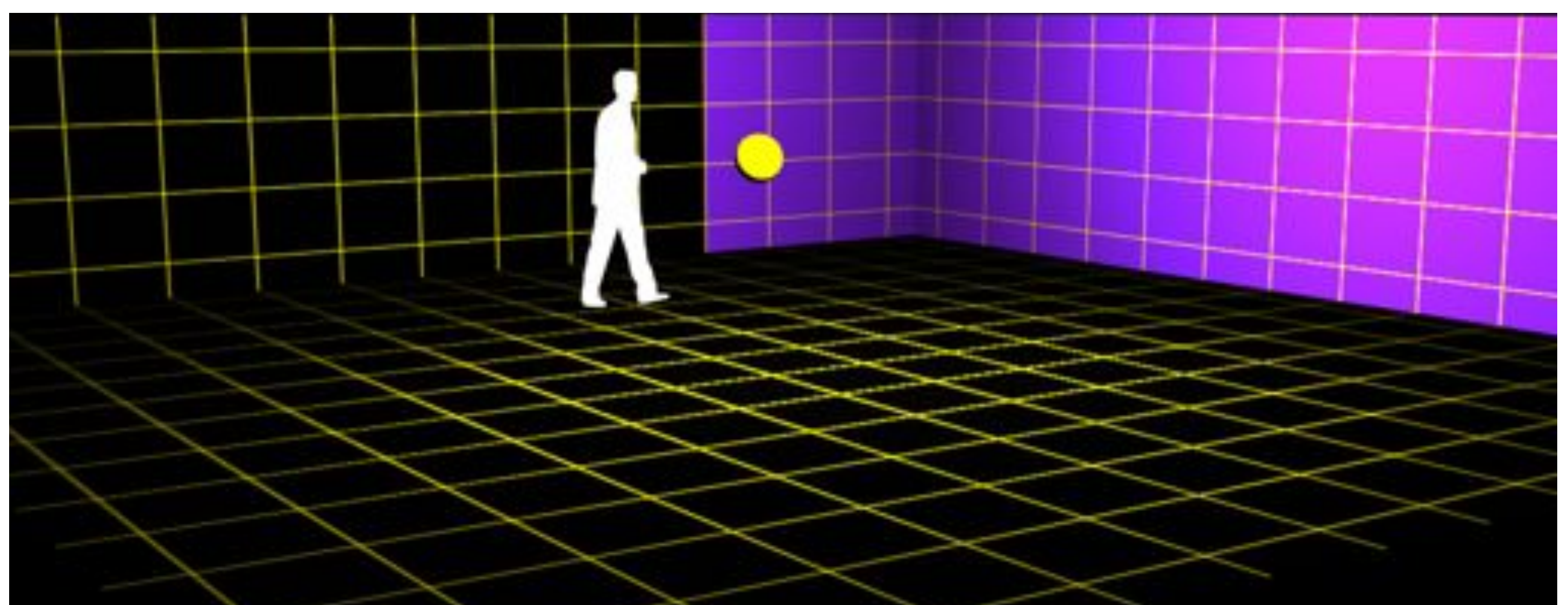
Three locomotion techniques were used (body-based, gamepad, and real-world). We measured several aspects of locomotion performance (starting time, stopping time, task time, and distance travelled) as well as accuracy on the memory tasks.

Results show that users have trouble remembering a spatial sequence while concurrently using a semi-natural interface to perform locomotion tasks. Additionally, a simultaneous spatial task seems to negatively affect a user's ability to stop moving using an unnatural interface or duck to avoid obstacles using any interface.



STUDY 2

A study is currently underway to investigate the impact of limited field-of-view on working memory demands. If users with a restricted FOV have trouble completing simultaneous memory tasks, we can conclude that they resorted to more cognitively demanding strategies in the absence of complete visual feedback.



INTERFACES

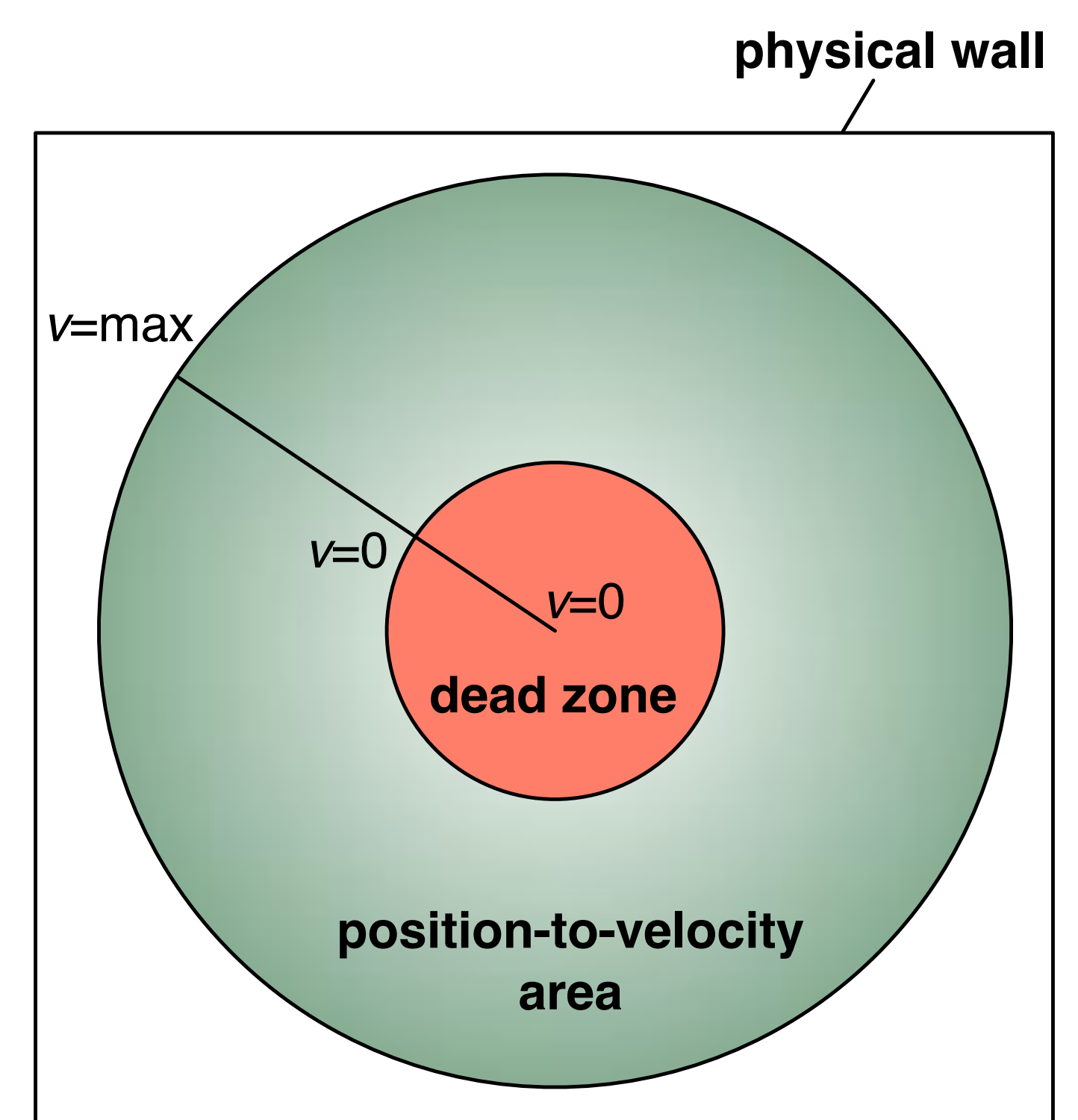


Traditional gamepad interface

Gamepad (GP). This is most common interface so it is an appropriate baseline interface.

Body-based (p2v). Movement near the origin is completely natural. Once outside this "dead zone," the user's position is converted to a velocity vector.

Real-world (RW). Movement is 100% natural but virtual action is constrained by physical boundaries.



Top-down diagram of body-based interface