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HyperJump: Merging Teleporting and Continuous VR Locomotion into one Paradigm

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Locomotion is essential for all mobile beings, and effectively moving through virtual environments is becoming increasingly important. While teleporting (instantaneously jumping to a new position) can help to reduce cybersickness and decrease travel time, it can negatively impact naturalism, presence, and spatial orientation. Conversely, continuous locomotion can support path integration, self-motion perception (vection), and thus continuous spatial updating, and provide a more real-life-like locomotion experience and higher accuracy, but can contribute to (cyber-)sickness especially when users cannot physically walk/move. Prior interfaces typically required users to switch between different locomotion control schemes, aiming for specific advantages. Here, we propose a hybrid Virtual Reality locomotion paradigm ("**HyperJump**") that aims to combine continuous and discontinuous locomotion into one seamless interface.

To investigate HyperJump, we designed an experimental paradigm combining locomotion through a series of waypoints in a naturalistic virtual city with rapid pointing to landmarks learned along novel paths (>300m length). Locomotion was controlled either via hand-held VR-controller (thumbstick-velocity-control with controller-directed steering) or a hands-free seated leaning-based interface ("HeadJoystick"). Continuous locomotion was compared with HyperJump, where intermittent jumps are automatically added whenever users reach a threshold velocity (here: 5m/s), beyond which cybersickness is more likely to occur. Results showed that adding HyperJump allowed for comparable spatial orientation performance as continuous locomotion, for both controller- and leaning-based interfaces. However, leaning outperformed controller-based locomotion by reducing both orientation errors and pointing response times. We are currently improving HyperJump based on user feedback and aim to test it for larger-scale environments.

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