Virtual Reality (VR) provides a promising medium to enrich robot assisted rehabilitation. VR applications present the opportunity to engage patients in therapy and control participation. The aim of this study was to investigate two strategies to control active participation of a stroke patient focusing on the involvement of the paretic leg in task solution. A subacute stroke patient with a severe hemiparesis performed two experiments on the driven gait orthosis Lokomat. Patient activity was quantified by weighted interaction torques measured in both legs (experiment A) and the paretic leg only (experiment B). The patient was able to successfully implement both the bilateral and unilateral control modality. Both control modes increased the motor output of the paretic leg, however the paretic leg control mode resulted in a much more differentiated regulation of the activity in the leg. Both control modes are appropriate approaches to enhance active participation and increase motor output in the paretic leg. Further research should evaluate the therapeutic benefit of patients with hemiparesis using the unilateral control mode depending on the severity of their impairment.