

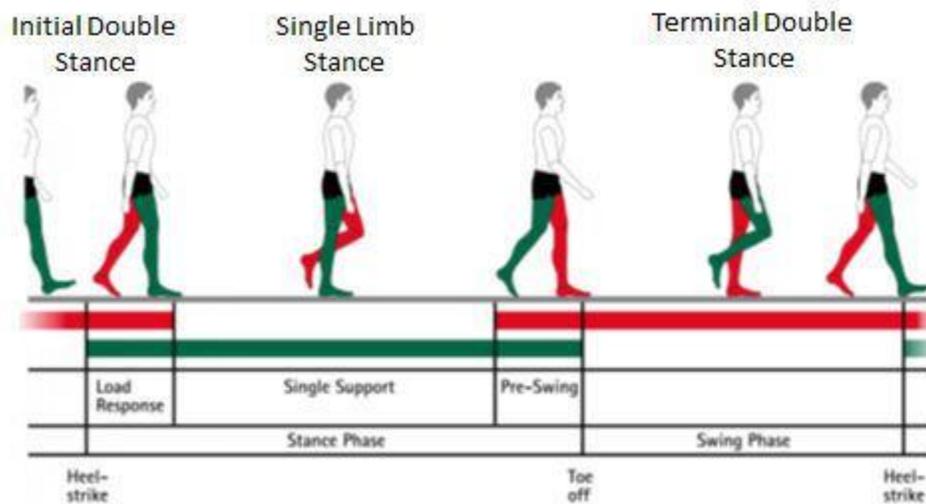
Computerized Gait Analysis

A Breakthrough Diagnostic Technology for Determining How You Walk, and What is Taking Place in Your Body with Each Stride

By Dr. Stanley H. Kornhauser, PhD

Gait may be described as the manner, or pattern in which one walks. “Gait analysis” is a popular method for examining the various “phases” for possible abnormalities within “The Gait Cycle”. Gait abnormalities are generally caused by injuries to the feet, ankles, legs, skull/brain, spine, inner ear (vestibular labyrinth), or by disease.”

Gait is complex and difficult to assess visually. The Gait Cycle, in its simplest form, is comprised of stance and swing phases. The Stance Phase is comprised of initial double stance, single limb stance, and terminal double stance. Each double stance accounts for approximately 10% of the Gait Cycle, while the single limb stance accounts for 40%. Usually, the limbs do not support the load equally during the double stance phases. The swing phase will account for the remaining 40% of the Gait Cycle. Therefore, a stride is equivalent to a complete Gait Cycle. The duration of a stride is the interval between sequential initial floor contacts by the same limb. A step is recognized as the interval between sequential floor contact by ipsilateral and contralateral limbs, and since two steps make up a Gait Cycle, it should be roughly symmetrical in individuals displaying normal walking and running gait.



Since visually similar gait patterns can be generated from a variety of underlying pathologies and compensatory movement patterns, the outcome of intervention can be disappointing and subject to error, without more specific information. A more scientific evaluation can be provided by the use of computerized clinical gait analysis, which provides quantified information on spatial and temporal gait parameters, center of pressure distribution, and postural assessment. Computerized clinical gait analysis combines expertise from orthopedics, physical therapy, and biomechanics to objectively evaluate walking and running patterns from children with gait disturbances to athletes seeking to improve their overall athletic performance. Gait Analysis is commonly used to help athletes run more efficiently and to identify postural or movement related problems in individuals with injuries.

Computerized clinical gait analysis includes the kinematic, kinetic, and neuromuscular activation components. The kinematic component analyzes the movement of the body and its segments by utilizing a 2D/3D video analysis and a complete report of gait parameters. The kinetic component analyzes ground reaction forces during walking and running by displaying pressure distribution, vertical force curve and gait line. Finally, neuromuscular activity in dynamic movements is measured by Surface Electromyography and other biomechanical sensors, like Accelerometers, Goniometers and Inclinometers.

The applications of computerized clinical gait analysis are endless. It is a powerful diagnostic tool in determining a patient's actual real-time gait, continuous patterns, separation of footsteps during any type of gait (i.e. running and shuffling), shock absorption, energy conservation, coordination, external forces, motor control, muscle activity, joint movement, mechanical and metabolic efficiency. This breakthrough technology not only gives a complete picture of how an individual walks, but what is taking place in the body during each stride.