

Fundamental Mechanics of Alpine Skiing Across Adaptive Disciplines



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THE LEARNING CONNECTION

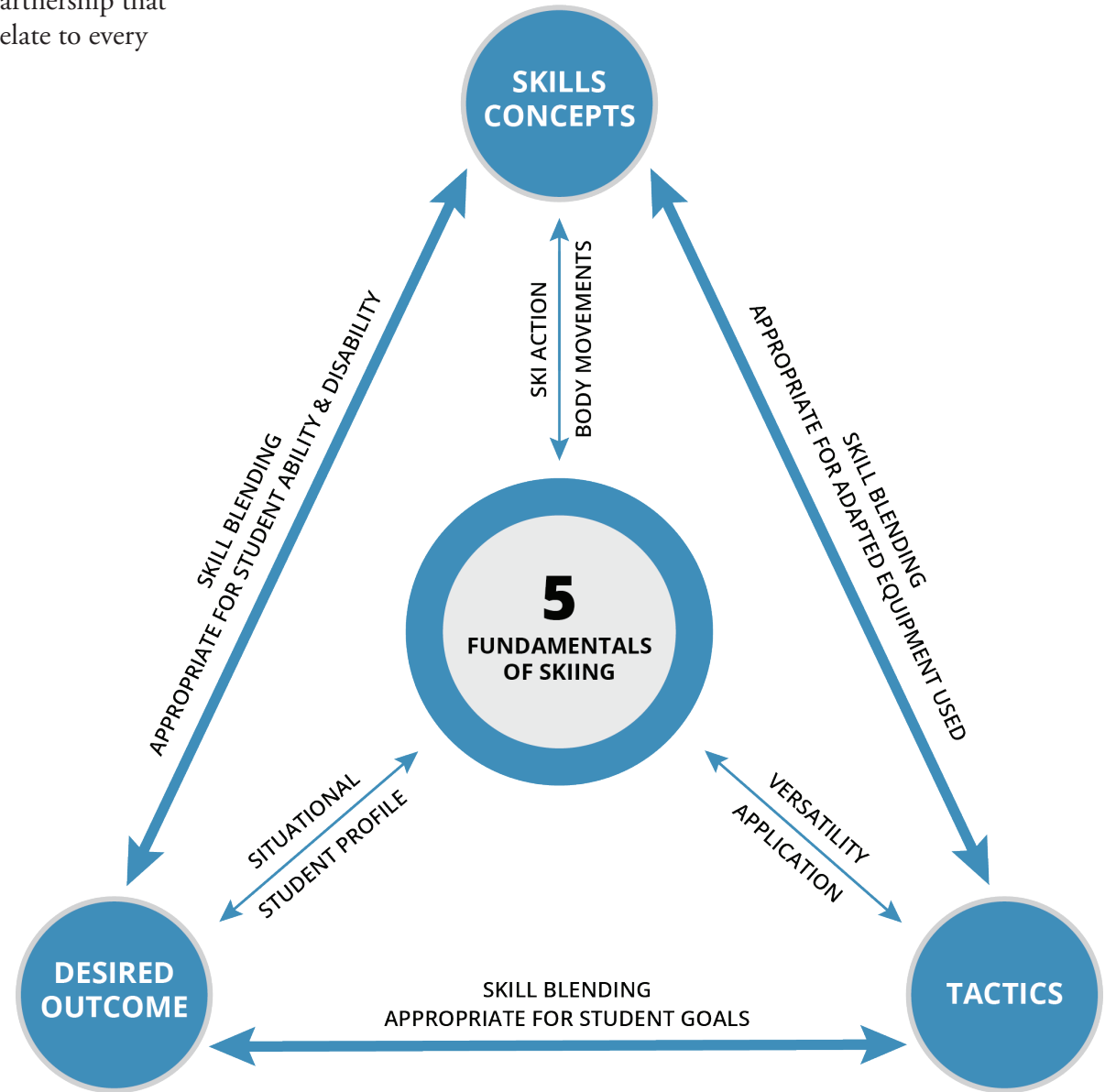
Developmental Framework and the Adaptive Alpine Fundamentals of Skiing



The American Teaching System is built on the principle of a student-centered learning partnership that adheres to a guiding set of skiing mechanics. There are five fundamentals of skiing that relate to every desired outcome for all students, including those using adaptive equipment.

The five fundamentals of skiing are:

1. Control the relationship of the center of mass to the base of support to direct pressure along the length of the skis.
2. Control pressure from ski to ski, and direct pressure to the outside ski.
3. Control edge angles with a combination of inclination and angulation.
4. Control the skis' rotation with leg rotation, separate from the upper body.
5. Regulate the magnitude of pressure created through ski-to-snow interaction.



Regardless of terrain, speed, adaptive equipment used, or the skier's intent, efficient skiing has certain similarities. The skier rotates and edges the ski(s) precisely, and effectively manages forces to attain the desired outcome.

Control the relationship of the center of mass to the base of support to direct pressure along the length of the skis.

Two-Track Skier

Uses flexion and extension to move the center of mass fore and aft.

Flexes and extends the joints evenly to keep the body weight centered and balanced over the balls of the feet.

Keeps the arms slightly raised, with the elbows in front of the body and the hands slightly farther apart than the elbows. The shoulders, hands, and hips are level.

Three-Track Skier

Keeps the hips and upper body centered over the boot and uses ankle flexion and extension to move pressure along the base of the ski.

Flexes and extends the joints evenly to keep the body weight centered and balanced over the ball of the foot.

Keeps the arms slightly raised, with the elbows in front of the body and the hands slightly farther apart than the elbows. The shoulders, hands, and hips are level. Outriggers have equal, constant, and light pressure.

Four-Track Skier, Able to Hold a Wedge

Keeps the hips and upper body centered between the skis and over the balls of the feet. The lowest useable joints flex and extend to move pressure along the base of the skis.

Flexes and extends the joints evenly to keep weight centered between the skis and over the balls of the feet. The center of mass may move slightly to the inside as the pitch increases.

Keeps the arms slightly raised, with the elbows in front of the body and the hands slightly farther apart than the elbows. The shoulders, hands, and hips are level. Outriggers have equal, constant, and light pressure.

Four-Track Skier, Unable to Hold a Wedge

Keeps the hips and upper body centered between the skis and over the balls of the feet. Controlled movement of the legs and torso fore and aft directs pressure along the base of the skis.

As possible, flexes and extends the joints evenly to keep weight centered between the skis and over the balls of the feet. May move the center of mass very slightly to the inside as the pitch of the slope increases.

Keeps the arms slightly raised, with the elbows in front of the body and the hands slightly farther apart than the elbows. The shoulders, hands, and hips are level. Outriggers have equal, constant, and light pressure.

Mono Skier

Flexes and extends the hips (if available) and spine to center weight over the middle of the ski, moving center of mass fore and aft.

Centers the hips and upper body over the midline of the ski.

Keeps the arms slightly raised, with the elbows in front of the body and the hands slightly farther apart than the elbows. The shoulders, hands, and hips are level. Outriggers have equal, constant, and light pressure.

The skier is in balance when he or she can access and affect any of the skills throughout a turn.



Control the relationship of the center of mass to the base of support to direct pressure along the length of the skis.

Two-Track Skier

Keeps the upper body more vertical than the lower body throughout the shaping and finishing phases of the turn, creating body angles to align the center of mass over the base of support.

The inside hand, shoulder, and hip lead through the turn relative to the pitch of terrain and turn shape and size.

Shoulders, hips, and hands are all parallel to the pitch of the hill.

Three-Track Skier

Keeps the upper body more vertical than the lower body throughout the shaping and finishing phases of the turn, creating body angles to align the center of mass over the base of support.

The inside hand, shoulder, and hip lead through the turn relative to the pitch of terrain and turn shape and size.

Shoulders, hips, and hands are all parallel to the pitch of the hill.

Four-Track Skier, Any Ability

Keeps the upper body more vertical than the lower body throughout the shaping and finishing phases of the turn, creating body angles to align the center of mass over the base of support.

The inside hand, shoulder, and hip lead through the turn relative to the pitch of terrain and turn shape and size.

Shoulders, hips, and hands are all parallel to the pitch of the hill.

Mono Skier

Extends the spine down and to the inside of the turn to regulate pressure, distributing weight along the length of the ski.

The inside hand, shoulder, torso, and hip (if available) lead through the turn relative to the pitch of terrain and turn shape and size. Brings the turning outrigger back toward the midline early in the shaping phase of the turn.

Shoulders, hips, hands and outrigger skis are all parallel to the pitch of the hill.

The movements a skier makes to manage pressure on the ski(s) also affect the momentary relationship between the center of mass and base of support.



Control pressure from ski to ski and direct pressure toward the outside ski.

Two-Track Skier

Distributes weight equally on both skis. Subtle shifts in balance and pressure from ski to ski introduce inclination and move the center of mass to the inside of the turn.

Starts the new turn by decreasing edge angles to release pressure and flatten the skis.

The upper body remains quiet and disciplined, and pressure movements are minimal.

Vision stays forward, looking ahead in the intended direction of travel.

Three-Track Skier

Hips and upper body remain centered over the midline of the ski. Subtle shifts in balance and pressure from ski edge to ski edge introduce inclination and move the center of mass to the inside of the turn.

Starts the new turn by decreasing edge angles to release pressure and flatten the ski.

The upper body is disciplined, and outriggers are close to the ski, shoulder-width apart, making contact with the snow between the binding toe and the ski tip to minimize pressure movements.

The head always faces the center of the new turn.

Four-Track Skier, Able to Hold a Wedge

Distributes weight equally on both skis to the extent possible. Subtle shifts in balance and pressure from ski to ski introduce inclination and move the center of mass to the inside of the turn.

Starts the new turn by decreasing edge angles to release pressure and flatten the skis.

The upper body is quiet and disciplined when not required for rotary input. Outriggers are close to the ski, shoulder-width apart, making contact with the snow between the binding toe and the ski tip to minimize pressure movements.

The head always faces the center of the new turn.

Four-Track Skier, Unable to Hold a Wedge

Equally distributes weight on both skis, to the extent possible. Subtle shifts in balance and pressure from ski edge to ski edge introduce inclination and move the center of mass to the inside of the turn.

Starts the new turn by using subtle movements of the hips and torso to decrease edge angles, release pressure, and flatten the skis.

Some upper body movements may be required for rotary input. The head, shoulders, and arms remain as disciplined as possible, and outrigger movements enhance what the legs are able to do. Pressure movements are minimal.

The head always faces the center of the new turn.

Mono Skier

The hips and upper body remain centered over the midline of the ski. Subtle shifts in balance and pressure from ski edge to ski edge introduce inclination and move the center of mass to the inside of the turn.

Starts the new turn by focusing on edge-release movements to decrease edge angles and flatten the ski.

Depends on the outriggers to develop rotational movement through friction. While the upper body should remain as disciplined as possible, it is more involved with turning than in other disciplines.

Facing the direction of travel introduces the essential sensation of countering, essential to the skier's success.

Limited pressure management is required at beginner/novice zone skiing speeds.



Control pressure from ski to ski and direct pressure toward the outside ski.

Two-Track Skier

Extends in the direction of the new turn to change edges.

Rolls the ankles, knees, and hips forward and laterally to move into the new turn.

When extending toward the new turn, begins to change dominant pressure from the old outside ski to the new outside ski.

The inside leg shortens as the outside leg lengthens, setting up alignment and balance with weight on the outside ski.

Flexion down and to the inside of the turn regulates pressure and is progressive through the turn.

Three-Track Skier

Moves the new inside outrigger in an arc toward the center of the new turn. The inside outrigger, arm, shoulder, torso, and inside hip move together through the turn as the upper body finishes the turn in a countered position.

Rolls the ankle, knee, and hips forward and laterally to move into the new turn.

When extending toward the new turn, begins to change dominant pressure from the old inside edge to the new inside edge.

The leg lengthens through the top of the turn and shortens through the shaping and finishing phases of the turn. The inside outrigger arm is bent more than the outside outrigger arm and may carry less weight.

Flexion down and to the inside of the turn regulates pressure and is progressive through the turn. As speed and pitch increase, outriggers become light.

Four-Track Skier, Any Ability

The new inside outrigger moves in an arc toward the center of the new turn. The inside outrigger, arm, shoulder, torso, and inside hip move together through the turn as the upper body finishes the turn in a countered position.

Rolls the ankles, knees, and hips forward and laterally to move into the new turn.

When extending toward the new turn, begins to change dominant pressure from the old outside ski to the new outside ski.

To address weaknesses, may extend both legs at differing rates to direct pressure from ski to ski.

Flexion down and to the inside of the turn regulates pressure and is progressive through the turn. As speed and pitch increase, outriggers become light.

Mono Skier

With improvement, increases the extension of the torso and new inside arm and outrigger to contact the snow farther away from the midline of the ski. The torso, arm, and outrigger are all involved in pointing the outrigger toward the center of the new turn.

Shifts the chest and spine forward and laterally to move into the new turn.

When extending toward the new turn, begins to change dominant pressure from the old inside edge to the new inside edge.

The inside outrigger arm is bent more than the outside outrigger arm.

Nearing the completion of the turn, the upper body is slightly flexed and countered in the direction of the new turn, leading to pressure dominance on the inside edge.



Transfer of pressure from one ski to the other (or edge to edge for three-trackers/mono-skiers) is one of the most fundamental aspects of alpine skiing.

Control edge angles with a combination of inclination and angulation.

Two-Track Skier

Exhibits the basic skills of skiing at slow speeds, emphasizing strong leg steering with limited edge movements to maintain turn speed and radius.

The ankles, knees, and hips show appropriate angles as the skier tips the skis onto their edges and maintains edge control throughout the turn.

Hips and torso remain centered between the skis; the skis remain fairly flat with edge angles developing in or after the fall line.

Three-Track Skier

Exhibits the basic skills of skiing at slow speeds, emphasizing strong leg steering with limited edge movements to maintain turn speed and radius.

The center of mass may move slightly to the inside of the turn on steeper terrain (terrain-dictated edging). Slight banking is acceptable to control the edge angle.

The hips and upper body remain centered over the ski, with the tips of both outriggers close to the tip of the ski.

Four-Track Skier, Able to Hold a Wedge

Exhibits the basic skills of skiing at slow speeds, emphasizing strong leg steering with limited edge movements to maintain turn speed and radius.

The center of mass may move slightly to the inside of the turn on steeper terrain (terrain-dictated edging). Slight banking is acceptable to control the edge angle.

The hips and upper body remain centered between the skis, with the tips of both outriggers close to the tips of the skis.

Four-Track Skier, Unable to Hold a Wedge

Exhibits the basic skills of skiing at slow speeds, emphasizing leg, hip, and/or torso steering (supplemented as needed by outrigger steering) with limited edge and pressure movements to maintain constant speed and radius of the turn.

The center of mass may move slightly to the inside of the turn on steeper terrain (terrain-dictated edging). Slight banking is acceptable to control the edge angle.

The hips and upper body remain centered between the skis, with the tips of both outriggers close to the tips of the skis.

Mono Skier

Exhibits the basic skills of skiing at slow speeds, emphasizing the rotary movements created by the outriggers, with limited edge and pressure movements to maintain constant speed and radius of the turn.

The center of mass may move slightly to the inside of the turn on steeper terrain (terrain-dictated edging). Slight banking is acceptable to control the edge angle.

The hips and upper body remain centered over the ski, and the skier keeps the tips of both outriggers close to the tip of the ski.

Effective edge control at low speeds and on flat terrain involves using only the amount of edge angle necessary to allow a gliding action of the skis.



Control edge angles with a combination of inclination and angulation.

Two-Track Skier	Three-Track Skier	Four-Track Skier, Able to Hold a Wedge	Four-Track Skier, Unable to Hold a Wedge	Mono Skier
<p>The skier controls edge angles through inclination and angulation.</p>	<p>Achieves edging movements by angulating the hips and knees while keeping the shoulders level to the pitch of the slope. Increased upper body countering encourages angulated edging movements.</p>	<p>Achieves edging movements by angulating the hips and knees while keeping the shoulders level to the pitch of the slope relative to the skier's physical ability and movement range. Increased upper body countering encourages angulated edging movements.</p>	<p>Achieves edging movements by angulating the hips, knees, and torso while keeping the shoulders level to the pitch of the slope relative to the skier's physical ability and movement range. Increased upper body countering encourages angulated edging movements.</p>	<p>Makes edging movements by angulating the hip and spine/torso, with the shoulders level to the pitch of the slope relative to the skier's movement range and physical ability. Increased upper body countering encourages angulated edging movements.</p>
<p>The skier releases and re-engages the edges in one smooth movement.</p>	<p>Asymmetrical outrigger steering aids extension in the direction of the new turn, and results in crossover or lateral movement of the center of mass and a change in ski edges.</p>	<p>Asymmetrical outrigger steering aids extension in the direction of the new turn, and results in crossover or lateral movement of the center of mass and a change in ski edges.</p>	<p>Asymmetrical outrigger steering aids extension in the direction of the new turn, and results in crossover or lateral movement of the center of mass and a change in ski edges.</p>	<p>Asymmetrical outrigger steering aids extension in the direction of the new turn, and results in crossover or lateral movement of the center of mass and a change in ski edges.</p>
<p>The skier uses tension of the inside leg to help maintain alignment. Flexion of the inside ankle directs movement forward and laterally for edge angle adjustments.</p>	<p>Flexion of the ankle directs movement forward and laterally for edge angle adjustments. The inside outrigger and rigger ski complement the actions of the dominant inside edge of ski.</p>	<p>Uses tension of the inside leg to help maintain alignment. Flexion of the inside ankle directs movement forward and laterally for edge angle adjustments. The inside outrigger and rigger ski complement the actions of the inside ski.</p>	<p>Maintains alignment by creating tension in the lowest functional body part (core, torso, and/or shoulders). Extension of the spine directs movement forward and laterally for edge angle adjustments. The inside outrigger and rigger ski complement the actions of the inside ski.</p>	<p>Maintains alignment by creating tension in the lowest functional body part (core, torso, and/or shoulders). Extension of the spine directs movement forward and laterally for edge angle adjustments. The inside outrigger and rigger ski complement the actions of the dominant inside edge of ski.</p>
<p>The shins make forward and lateral contact with the boot cuffs as the skier rolls the skis onto the new edges.</p>	<p>The shin makes forward and lateral contact with the boot cuff as the skier rolls the ski onto the new edge.</p>	<p>The shins make forward and lateral contact with the boot cuffs as the skier rolls the skis onto the new edges.</p>	<p>Hips, knees, and ankles work together to help the skier make forward and lateral contact with the boot cuffs and to roll the skis onto the new edges.</p>	<p>Forward and lateral contact with the seat and/or chest retention strap allows the skier to roll the ski onto the new edge.</p>

A progressive increase of edging in the turn reduces the amount of skid and helps shape the arc of the turn.



Control the skis' rotation with leg rotation, separate from the upper body.

Two-Track Skier

The legs turn underneath a quiet, stable upper body to help guide the skis through the turn.

The femurs turn in the hip sockets (instead of the entire hip coming around).

Turns the skis progressively to create a smooth, C-shaped arc in the snow.

Three-Track Skier

The leg turns underneath a quiet, stable upper body to help guide the ski through the turn.

The femur turns in the hip socket (instead of the entire hip coming around). The skier uses symmetrical outrigger steering to supplement the primary rotary power of leg steering.

Turns the ski progressively to create a smooth, C-shaped arc in the snow. Both outrigger tips point in the direction of the new turn and this movement is held through the shaping phase of the turn.

Four-Track Skier, Able to Hold a Wedge

Generates leg steering as low in the body as possible to guide the skis through the turn. The upper body is quiet and stable.

The femurs turn in the hip sockets (instead of the entire hip coming around). The skier uses symmetrical outrigger steering to supplement the primary rotary power of leg steering.

Turns the skis progressively to create a smooth, C-shaped arc in the snow. Both outrigger tips point in the direction of the new turn and this movement is held through the shaping phase of the turn.

Four-Track Skier, Unable to Hold a Wedge

Generates leg steering as low in the body as possible to guide the skis through the turn. Some four-track skiers will need to use upper body rotation to turn the skis.

The femurs turn in the hip sockets unless the hips are needed to develop the turn. The skier uses symmetrical outrigger steering to supplement the primary rotary power of the legs, hips, or torso.

Turns the skis progressively to create a smooth, C-shaped arc in the snow. Both outrigger tips point in the direction of the new turn and this movement is held through the shaping phase of the turn.

Mono Skier

Most turn the upper body independently of the lower body.

Uses symmetrical outrigger steering (at turn initiation both outrigger tips are pointed in the direction of the new turn) as the primary rotary force for guiding the ski through the shaping phase of the turn.

Emphasis is on producing a rounded, deliberate turn shape, maintaining the tips of both outriggers in close proximity to the front of the ski.

Limited pressure management is required at beginner/novice zone skiing speeds.



Turn the legs underneath, and in opposition to, the upper body.

Two-Track Skier

Leg rotation provides a constant source of rotational input throughout the turn.

Continues to turn the skis across the hill as the upper body remains facing down the hill, resulting in a countered relationship. The head, shoulders, torso, and hips are countered in the direction of the new turn.

As the skier becomes more efficient, the legs provide a wide range of rotational input to the skis, varying from a slow, consistent torque throughout the turn to quick, explosive rotational movements.

Three-Track Skier

Leg rotation provides a constant source of rotational input throughout the turn. The skier may use asymmetrical outrigger steering at turn initiation (pointing the new inside outrigger tip in the direction of the new turn) to enhance the rotary power of the leg.

Continues to turn the ski across the hill as the upper body remains facing down the hill, resulting in a countered relationship. The head, shoulders, torso, and hips are countered in the direction of the new turn.

As the skier becomes more efficient, the leg provides a wide range of rotational input to the ski, varying from a slow, consistent torque throughout the turn to quick, explosive rotational movements. The increased efficiency of outrigger use complements the action of the ski.

Four-Track Skier, Able to Hold a Wedge

Leg rotation provides a constant source of rotational input throughout the turn. The skier may use asymmetrical outrigger steering at turn initiation (pointing the new inside outrigger tip in the direction of the new turn) to enhance the rotary power of the legs.

Continues to turn the skis across the hill as the upper body remains facing down the hill, resulting in a countered relationship. The head, shoulders, torso, and hips are countered in the direction of the new turn.

As the skier becomes more efficient, the legs provide a wide range of rotational input to the skis, varying from a slow, consistent torque throughout the turn to quick, explosive rotational movements. The increased efficiency of outrigger use complements the action of each ski.

Four-Track Skier, Unable to Hold a Wedge

As much as is physically possible, uses leg rotation to provide a source of rotational input throughout the turn. The skier may use asymmetrical outrigger steering at turn initiation (pointing the new inside outrigger tip in the direction of the new turn) to enhance the rotary power of the legs, hips, and torso.

Continues to turn the skis across the hill as the upper body remains facing down the hill, resulting in a countered relationship. The head, shoulders, torso, and hips (if able) are countered in the direction of the new turn.

As the skier becomes more efficient, the legs and hips provide a wide range of rotational input to the skis, varying from a slow, consistent torque throughout the turn to quicker rotational movements. The increased efficiency of outrigger use complements the action of each ski.

Mono Skier

Uses asymmetrical outrigger steering at turn initiation (pointing the new inside outrigger tip in the direction of the new turn) to create the differential friction that provides a source of rotational input.

Continues to turn the ski across the hill as the upper body remains facing down the hill, resulting in a countered relationship. The head and shoulders (and upper torso if available) are countered in the direction of the new turn.

Increase efficiency of outrigger movements (caused by the increased distance between the outrigger tip and center of rotation) allows for a much earlier match of the inside/steering rigger and shorter duration of differential friction caused by outrigger tip-to-snow contact.

Progressive outrigger and leg steering combine to help produce constant speed throughout the turn.



Regulate the magnitude of pressure created through ski-to-snow interaction.

Two-Track Skier

At beginner/novice zone speeds, requires limited pressure management to maintain speed and turn shape.

Subtle flexing originates from the ankles and is supported by the knees, hips, and lower back.

Adjusts leg flexion and extension in response to the terrain and pitch of the slope.

Three-Track Skier

At beginner/novice zone speeds, requires limited pressure management to maintain speed and turn shape.

Subtle flexion originates in the ankle and is supported by the knee, hips, and lower back. The skier flexes and extends the arms and outriggers as needed to complement leg movements.

Adjusts leg flexion and extension in response to the terrain and pitch of the slope.

Four-Track Skier, Able to Hold a Wedge

At beginner/novice zone speeds, requires limited pressure management to maintain speed and turn shape.

Subtle flexion originates in the ankles and is supported by the knees, hips, and lower back. The skier flexes and extends the arms and outriggers as needed to complement leg movements.

Adjusts leg flexion and extension in response to the terrain and pitch of the slope.

Four-Track Skier, Unable to Hold a Wedge

At beginner/novice zone speeds, requires limited pressure management to maintain speed and turn shape.

Keeps all functioning body joints relaxed, allowing the feet, legs, and torso (if necessary) to be available for turning the skis. The skier flexes and extends the arms and outriggers to support leg movements.

The amount of flexion and extension of the functional joints in the legs and spine changes in response to the terrain and pitch of the slope.

Mono Skier

At beginner/novice zone speeds, requires limited pressure management to maintain speed and turn shape.

Flexes and extends the hips and lower back to regulate pressure through the ski. Flexing and extending the arms allows the skier to vary the amount of pressure applied through the outriggers to the snow.

Adjusts flexion and extension of the hips and spine in response to the terrain and pitch of the slope.

Accurate directional movements preserve strength and minimize extra movements that fatigue the skier.



Regulate the magnitude of pressure created through ski-to-snow interaction.

Two-Track Skier

Uses flexion and extension to resist or absorb forces and manage the increased pressures created by turning.

At the completion of the turn, assumes a slightly flexed stance, countered in the direction of the new turn, to distribute pressure between the skis and manage the forces built through the turn.

Swings the pole smoothly in the direction of travel.

Three-Track Skier

Uses flexion and extension of the ankle, knee, hips, and spine to resist or absorb forces and manage the increased pressures created by turning.

At the completion of the turn, assumes a slightly flexed stance, countered in the direction of the new turn, to distribute pressure along the inside edge of the ski and manage the forces built through the turn.

Movement of the new inside outrigger toward the center of the new turn complements the countered upper body at turn initiation and helps facilitate effective directional movement.

Four-Track Skier, Any Ability

Uses flexion and extension of all usable joints to resist or absorb forces and manage the increased pressures created by turning.

At the completion of the turn, assumes a slightly flexed stance, countered in the direction of the new turn, to distribute pressure between the skis and manage the forces built through the turn.

Movement of the new inside outrigger toward the center of the new turn complements the countered upper body at turn initiation and helps facilitate effective directional movement.

Mono Skier

Uses flexion and extension of the hips, spine, and arms to resist or absorb forces and manage the increased pressures created by turning.

At the completion of the turn, assumes a slightly flexed stance, countered in the direction of the new turn, to distribute pressure along the inside edge of the ski and manage the forces built through the turn.

Movement of the new inside outrigger toward the center of the new turn complements the countered upper body at turn initiation and helps facilitate effective directional movement.

The importance of a functional stance and accurate movements cannot be overstated; any movement that negatively impacts these elements will have an adverse effect on the skier's ability to regulate pressure effectively.



Bi-Skiing | Balance & Stance - Beginner/Novice Zone



Two-Track Skier

Moves the center of mass fore and aft using ankle flexion and extension.

Flexes and extends joints evenly to keep the body weight centered and balanced over the balls of the feet.

Keeps the arms slightly raised, with the elbows in front of the body and the hands slightly farther apart than the elbows. The shoulders, hands, and hips are level.

Bi-Skier, Rotary Prioritized, with Handheld Outriggers

Uses flexion and extension of the hips (if available) and spine to center the weight over the middle of the skis, allowing the skier to move the center of mass fore and aft.

The hips and upper body remain centered over the midline of the skis.

Keeps the arms slightly raised, with the elbows in front of the body and the hands slightly farther apart than the elbows. The shoulders, hands, and hips are level. Outriggers have equal, constant, and light pressure.

Bi-Skier, Edge Prioritized, with Handheld Outriggers

Uses flexion and extension of the hips (if available) and spine to center the weight over the middle of the skis, allowing the skier to move the center of mass fore and aft.

The hips and upper body remain centered over the midline of the skis.

The arms and elbows stay in line with the torso and hips. Outrigger pressure is constant and deliberate.

Bi-Skiing | Pressure Control - Beginner/Novice Zone

Two-Track Skier

Distributes weight equally on both skis. Subtle shifts in balance and pressure from ski to ski introduce inclination and moving the center of mass to the inside of the turn.

Starts the new turn by decreasing edge angles to release pressure and flatten the skis.

The upper body remains quiet and disciplined and pressure movements are minimal.

Vision stays forward, in the intended direction of travel.

Bi-Skier, Rotary Prioritized, with Handheld Outriggers

The hips and upper body remain centered over the midline between the skis. Subtle shifts in balance and pressure from old inside edges to new inside edges introduce inclination and move the center of mass to the inside of the turn.

Starts the new turn by decreasing edge angles to release pressure and flatten the skis.

Depends on the outriggers to develop rotary through friction. While the upper body remains as disciplined as possible, it is more involved with turning than in other disciplines.

Vision stays forward, in the intended direction of travel. This introduces the essential sensation of countering.

Bi-Skier, Edge Prioritized, with Handheld Outriggers

The hips and lower trunk remain centered over the midline between the skis.

Uses subtle movements of the upper body and shoulders across the skis laterally to introduce ski-to-ski pressure changes.

At turn initiation, increases pressure on the uphill outrigger to push off, creating an active crossover movement.

Vision stays forward, in the intended direction of travel. This introduces the essential sensation of countering.



Bi-Skiing | Balance & Stance - Intermediate/Advanced Zone



Two-Track Skier

Keeps the upper body more vertical than the lower body throughout the shaping and finishing phases of the turn, creating body angles that align balance over the outside ski.

The inside hand, shoulder, and hip (if available) lead through a turn relative to the pitch of the terrain and the turn shape and size.

Keeps the shoulders, hips, and hands parallel to the pitch of the hill.

Bi-Skier, Any Ability

Keeps the upper body more vertical than the lower body throughout the shaping and finishing phases of the turn, creating hip and spine angles that align balance over the inside edges of the skis.

The inside hand, shoulder, torso and hip (if available) lead through a turn with the turning outrigger moving back toward the inside ski early in the shaping phase of the turn.

Keeps the shoulders, hips, and hands parallel to the pitch of the hill.



Bi-Skiing | Pressure Control - Intermediate/Advanced Zone

Two-Track Skier

Extends in the direction of the new turn to change edges.

Rolls the ankles, knees, and hips forward and laterally to move into the new turn.

When extending toward the new turn, begins to change dominant pressure from the old outside ski to the new outside ski.

The inside leg shortens as the outside leg lengthens, setting up alignment and balance with weight on the outside ski.

Flexion down and to the inside of the turn regulates pressure and is progressive through the end of the turn.

Bi-Skier, Any Ability

With improvement, increases the extension of the torso, arm, and outrigger to contact the snow farther away from the midline of the ski. The torso, arm, and outrigger are all involved in pointing the outrigger toward the center of the new turn.

Shifts the chest and spine forward and laterally to move into the new turn.

When extending toward the new turn, begins to change dominant pressure from the old inside edges to the new inside edges.

Bends the inside outrigger arm more than the outside outrigger arm.

Nearing the completion of the turn, the upper body is slightly flexed and countered in the direction of the new turn leading to pressure dominance on the inside edges.



Bi-Skiing | Edge Control - Beginner/Novice Zone



Two-Track Skier

To control turn radius, shape, and speed, the skier uses edge control to direct the skis.

The ankles, knees, and hips show appropriate angles as the skier tips the skis onto their edges and maintains edge control throughout the turn.

The skis remain fairly flat in beginner/novice zone turns, with edge angles developing in or after the fall line.

Bi-Skier, Rotary Prioritized, with Handheld Outriggers

To control turn radius, shape, and speed, the skier uses edge control to direct the skis.

The hips and spine show appropriate angles as the skier tips the skis onto their edges and maintains edge control throughout the turn.

The skis remain fairly flat in beginner/novice zone turns, with edge angles developing in or after the fall line.

Bi-Skier, Edge Prioritized, with Handheld Outriggers

Uses a “push-off, drop, and block” technique to create turns using the design of the bi-ski and radical sidecut of its skis. (The skier pushes off the snow with the old inside outrigger to develop a crossover movement, and uses the new inside outrigger to control balance and manage the extent of edging.)

Moves the center of mass from the inside of the old turn to the inside of the new turn.

As the body moves across the skis, gravity pulls the torso and hips downhill and onto the new edges. The skier keeps both outrigger skis close to the hips.

Bi-Skiing | Rotational Control - Beginner/Novice Zone

Two-Track Skier

The legs turn underneath a quiet, stable upper body to help guide the skis through the turn.

The femurs turn within the hip sockets (instead of the entire hip coming around).

Turns the skis progressively to create a smooth, C-shaped arc in the snow.



Bi-Skier, Rotary Prioritized, with Handheld Outriggers

Most will turn the upper body independently of the lower body.

Uses symmetrical outrigger steering (at turn initiation both outrigger tips are pointed in the direction of the new turn) as the primary rotary force for guiding the ski through the initiation and shaping phase of the turn.

Emphasis is on producing a rounded, deliberate turn shape, maintaining the tips of both outriggers in close proximity to the front of the ski – slightly wider than shoulder width – and making snow contact between the binding and tip of the ski to create a smooth C-shaped arc in the snow.



Bi-Skier, Edge Prioritized, with Handheld Outriggers

Uses a “push-off, drop, and block” technique to create turns using the design of the bi-ski and radical sidecut of its skis. (The skier pushes off the snow with the old inside outrigger to develop a crossover movement, and uses the new inside outrigger to control balance and manage the extent of edging.)

At turn initiation, increases pressure on the uphill outrigger while pushing off to create an active crossover that guides the bi-ski into the new turn.

The outriggers make constant contact with the snow in line with the skier’s hips to help guide the bi-ski through the turn, maintaining a smooth C-shaped arc in the snow.



Bi-Skiing | Edge Control - Intermediate/Advanced Zone



Two-Track Skier

Controls edge angles through inclination and angulation.

Releases and engages edges in one smooth movement.

Uses tension in the inside leg to help maintain alignment. Flexion of the inside ankle directs movement forward and laterally for edge angle adjustments.

The shins make forward and lateral contact with the boot cuffs as the skier rolls the skis onto the new edges.

Bi-Skier, Rotary Prioritized, with Handheld Outriggers

Makes edging movements by angulating the hip, spine, and torso, with the shoulders level to the fall line relative to the skier's movement range. Increased upper body countering encourages angulated edging movements.

Asymmetrical outrigger steering aids extension toward the new turn, and results in crossover or lateral movement of the center of mass and a change in ski edges.

Maintains alignment by creating tension in the lowest functional body part (core, torso, and/or shoulders). Extension of the spine directs movement forward and laterally for edge angle adjustments. The inside outrigger and rigger ski complement the actions of the dominant inside edges of skis.

Forward and lateral contact with the seat and/or chest-retention strap allows the skier to roll the skis onto the new edges.

Bi-Skier, Edge Prioritized, with Handheld Outriggers

Makes edging movements by angulating the hip, spine, and torso, with the shoulders level to the fall line relative to his or her movement range. Increased upper body countering encourages angulated edging movements.

Continues to use the outriggers to push off, drop, and block. The lower body drops onto the new inside edges and the upper body is blocked by the new inside outrigger, controlling the movement of the center of mass and creating a change in ski edges.

Maintains alignment by creating tension in the lowest functional body part (core, torso, and/or shoulders). Extension of the spine directs movement forward and laterally for edge-angle adjustments. The inside outrigger and rigger ski complement the actions of the dominant inside edges of skis.

Forward and lateral contact with the seat and/or chest retention strap allows the skier to roll the skis onto the new edges.

Bi-Skiing | Rotational Control - Intermediate/Advanced Zone

Two-Track Skier

Leg rotation provides a constant source of rotational input throughout the turn.

Continues to turn the skis across the hill as the upper body remains facing down the hill, resulting in a countered relationship. The head, shoulders, torso, and hips are countered in the direction of the new turn.

As the skier becomes more efficient, the legs provide a wide range of rotational input to the skis varying from a slow, consistent torque throughout the turn to quick, explosive rotational movements.

Bi-Skier, Rotary Prioritized, with Handheld Outriggers

Uses asymmetrical outrigger steering at turn initiation (pointing the new inside outrigger tip in the direction of the new turn) to create the differential friction that provides a source of rotational input.

Continues to turn the ski across the hill as the upper body remains facing down the hill, resulting in a countered relationship. The head and shoulders (and upper torso if available) are countered in the direction of the new turn.

The increased efficiency of outrigger movements (caused by the increased distance between the outrigger tip and center of rotation) allows for a much earlier match of the inside/steering rigger and shorter duration of differential friction caused by rigger tip/snow contact.

Bi-Skier, Edge Prioritized, with Handheld Outriggers

Light differential friction resulting from asymmetrical outrigger steering and tipping – or turning the head in the direction of the new turn – aid in push-off, drop, and block and contribute to constant rotational input throughout the turn.

As the bi-ski skier completes the turn with the bi-ski across the fall line, the head and shoulders (and upper torso if available) turn to face down the hill, resulting in a slightly countered relationship.

As the skier becomes more efficient, managing edge angle through push-off, drop, and block – combined with steering of the inside outrigger – provides a range of rotational input to the skis and allows the skier to vary the radius of the turn.



Bi-Skiing | Directional Movements - Beginner/Novice Zone



Two-Track Skier

At beginner/novice zone speeds, requires limited pressure management to maintain speed and turn shape.

Subtle flexing activity starts in the ankles, supported by the knees, hips, and lower back.

Changes the amount of flexion and extension of the legs in response to the terrain and pitch of the slope.

Bi-Skier, Rotary Prioritized, with Handheld Outriggers

At beginner/novice zone speeds, requires limited pressure management to maintain speed and turn shape.

Flexes and extends the hips and lower back to regulate pressure through the skis. The skier flexes and extends the arms to vary the amount of pressure through the outriggers.

Adjusts flexion and extension of the hips and spine in response to the terrain and pitch of the slope.

Bi-Skier, Edge Prioritized, with Handheld Outriggers

At beginner/novice zone speeds, requires limited pressure management to maintain speed and turn shape.

Must make subtle lateral movements to regulate pressure from ski to ski.

Flexes and extends the hips and torso (as able) to absorb changes in terrain and pitch.

Bi-Skiing | Directional Movements - Intermediate/Advanced Zone

Two-Track Skier

Uses flexion and extension to help manage the increased pressures created by turning.

At the completion of the turn, the skier has a slightly flexed stance, countered in the direction of the new turn, to distribute pressure between both skis and manage the forces built through the turn.

Swings the pole smoothly in the direction of travel.

Bi-Skier, Any Ability

Uses flexion and extension of the spine to resist or absorb forces.

At the completion of the turn, the torso and shoulders are countered in the direction of the new turn, distributing pressure across both skis and allowing the skier to manage the forces built through the turn.

Movement of the new inside outrigger toward the center of the turn complements the countered upper body at turn initiation and helps facilitate effective directional movement.





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