Switch-Kick Locomotion

A first classification of bilateral alternating propulsion on wheeled platforms

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This paper proposes the first formal classification of switch-kick locomotion—bilateral alternating propulsion on wheeled platforms—as a distinct locomotor class. To the author's knowledge, no existing biomechanical, sports science, or physical literacy literature has formally defined bilateral alternating propulsion on wheeled platforms as a distinct locomotor class with necessary and sufficient constraints. The paper defines five such constraints: a wheeled platform not fixed to the feet, propulsion by intermittent ground contact of a free limb, bilateral alternation of propulsion roles across movement cycles, glide phases supported by rolling contact rather than continuous thrust, and no continuous crank, blade, or edge engagement. By these criteria, three activities constitute the switch-kick locomotor family: scootering, skateboarding, and SpikeBoarding skiing.

The paper documents what appears to be no systematic or formalized switch-kick instruction in global skateboarding pedagogy. Skateboard instruction, where it exists, focuses on trick execution, park riding, or basic balance skills. The refined bilateral propulsion technique that enables distance skating and commuter use has no established curriculum, no pedagogical tradition, and virtually no instructional materials. The paper suggests that much of the existing literature may have characterized novice unilateral propulsion rather than refined bilateral alternation—analyzing the phenomenon without reference to expert technique.

Terminology

This paper uses *stance-preferred* and *kick-preferred* rather than dominant/non-dominant.

Stance-preferred refers to the limb a rider preferentially selects for single-limb load-bearing stabilization during glide. During the glide phase, this limb supports nearly the entire body mass, except for the brief interval in which the contralateral limb is in ground contact during propulsion.

Kick-preferred refers to the limb preferentially used for intermittent propulsive ground contact. These labels are descriptive and observational. They do not assume hemispheric motor dominance or claim correspondence with upper-limb lateralization patterns described in motor neuroscience.

In refined switch-kick practice, propulsion impulses are brief and largely interchangeable across sides once basic competence is established. What appears more consistently lateralized is sustained single-limb stabilization during glide, where the stance limb manages full-body load, center-of-mass control, and continuous micro-adjustments through the hip–knee–ankle chain. Stance preference, rather than kick preference, is therefore the primary axis of lateral asymmetry observed in this locomotor class.

Methodological approach

This paper employs a constraint-based classification methodology drawn from comparative biomechanics and locomotor taxonomy. Locomotor classes are conventionally defined by identifying the necessary and sufficient mechanical conditions that distinguish one movement category from another. Walking, running, crawling, and swimming are recognized as distinct locomotor classes not because they differ in context but because they differ in the mechanical constraints governing propulsion, support, and recovery.

The five defining constraints presented in Section 2 were derived through systematic comparison of wheeled and non-wheeled human-powered activities. Each constraint was tested against a range of activities to determine whether it correctly included members of the proposed class and excluded non-members. The exclusion analysis in Section 2.2 documents this process.

Observational claims regarding technique, stance preference, stabilization demand, and platform geometry derive from three sources: the author's practitioner experience across twenty-five years of transport sport practice encompassing cycling, skating, and skiing; instructional contexts in which switch-kick technique was taught to novice and intermediate riders; and video analysis of expert distance skateboarders and scooter commuters in urban environments. These observations are presented as structured hypotheses for empirical investigation rather than as experimentally validated findings.

This approach is consistent with established precedent in locomotor science. Formal gait classification preceded instrumented gait analysis by decades. The recognition that walking and running constitute distinct locomotor modes did not require force plate data; it required the identification of mechanical criteria that separated one from the other. Classification is the necessary precondition for measurement. This paper applies the same classificatory logic to a locomotor domain that has not previously received formal taxonomic attention.

1. Introduction: the misclassification

Skateboard propulsion has been studied as a unilateral pushing action. The literature describes a single leg providing intermittent thrust while the other leg maintains balance on the deck. Biomechanical analyses measure force output, joint angles, and metabolic cost of this single-leg pushing pattern. The resulting portrait is of an inherently asymmetric, fatiguing, and inefficient locomotor mode—suitable for short distances, dangerous for commuting, and fundamentally limited by its unilateral character.

This portrait is accurate for novice skateboard propulsion. It is not accurate for refined skateboard locomotion—a technique that can be observed in expert distance and commuter practitioners. This interpretive focus may have obscured both the technical sophistication of refined skateboard locomotion and the existence of a learnable, teachable skill progression that could transform skateboarding from an activity associated with youth recreation and injury risk into a legitimate transport modality.

The fact that a movement is practiced informally does not negate the value of formal classification; walking existed long before gait analysis.

The central claim of this paper is straightforward: skateboarding, scootering, and SpikeBoarding constitute a single locomotor family unified by a propulsion pattern we term switch kicking. This pattern is characterized by alternating bilateral push-off with weight transfer and glide, rather than repeated use of a single leg. The implications of this classification extend beyond taxonomic clarity. Recognition of switch-kick mechanics reveals why novice skateboarders experience high fatigue and injury rates, why certain practitioners achieve remarkable efficiency over long distances, and why the skill has remained largely unteachable despite decades of skateboarding's cultural presence.

2. Defining the switch-kick locomotor class

2.1 The five defining constraints

A switch-kick sport requires all of the following conditions to be satisfied simultaneously:

1. The activity involves a wheeled platform not fixed to the feet.
2. Propulsion is generated by intermittent ground contact of a free limb.
3. Propulsion roles alternate bilaterally across movement cycles.
4. Glide phases are supported by rolling contact rather than continuous thrust.
5. There is no continuous crank, blade, or edge engagement that would convert propulsion into continuous or edge-mediated thrust.

This five-constraint definition is deliberately restrictive. Only when all five conditions are present does an activity qualify as a switch-kick sport. The definition excludes many superficially similar activities through specific mechanical criteria, not arbitrary boundaries.

2.2 Systematic exclusions

Walking and running fail constraint four: no platform, no glide phase supported by rolling contact. The foot strikes and lifts. There is no rolling glide between propulsive cycles.

Cycling fails constraints one and five. The feet are fixed to the platform via pedals, and propulsion is generated through continuous crank engagement. Cycling is rotational. Switch kicking is alternating linear.

Ice skating, inline skating, and roller skating fail constraint one. The skate is fixed to the foot. There is no free limb making intermittent ground contact. The skater pushes laterally against the surface through edge engagement—a fundamentally different mechanical action from the switch kicker's vertical ground strike.

Swimming fails constraints one and four. No platform. No rolling contact.

Roller skiing fails constraint one, despite sharing the skiing kinetic chain with SpikeBoarding. The boot is fixed to the ski via a binding. Roller skiing shares the contralateral propulsion pattern but differs in the critical relationship between foot and platform.

Nordic walking fails constraints one and four. The walker carries poles but propels by striking the ground with the feet in a walking gait. There is no wheeled platform and no glide phase supported by rolling contact. The poles augment a walking pattern; they do not produce the intermittent push-off-and-glide cycle that defines switch kicking. Despite sharing a superficial upper-body pole action with SpikeBoarding, Nordic walking is mechanically a walking variant, not a switch-kick sport.

Stand-up paddleboarding fails constraints two and five. The paddler stands on a floating platform not fixed to the feet, satisfying constraint one, but propulsion is generated by a paddle engaging water rather than by intermittent ground contact of a free limb. The paddle stroke is continuous and unilateral for multiple cycles before switching sides, producing a drag-based aquatic propulsion pattern that differs fundamentally from the ground-strike impulse of switch kicking. The platform glides on water, but the propulsive mechanism belongs to a different mechanical class.

2.3 The three switch-kick sports

By the five-constraint definition, three activities constitute the switch-kick locomotor family:

Scootering: The foundation. A wheeled platform with a handlebar. One foot on the deck, one foot pushing against the ground. Bilateral alternation—switch kicking—is the refined form. This is the entry point into transport sport physical literacy, available at age three.

Skateboarding: A wheeled platform without a handlebar. Both feet on the deck during glide. One foot drops to push, then returns to the deck. Bilateral alternation—switch kicking—is the refined form that transforms skateboarding from a short-distance recreational activity into a viable transport modality.

SpikeBoarding: A wheeled platform with a hand-held pole tool—the SkateBoard Spike. The addition of the pole extends the kinetic chain to include the upper body, producing three novel locomotor modalities: Stand Up Spike (SUS), Cubi-X-Cross (CXC), and Inside Cubi-X-Cross (ICXC). These modalities differ in stance and cross-lateral emphasis but share the skiing kinetic chain delivered on pavement. SpikeBoarding is the most kinetically extended member of the switch-kick locomotor class.

3. The pedagogical vacuum

No widely recognized, standardized, or systematically disseminated switch-kick pedagogy appears to exist in global skateboarding culture. This is an empirical observation. Skateboard instruction, where it exists, focuses overwhelmingly on trick execution: ollies, kickflips, grinds, transitions. Park riding and ramp skills dominate curricula. Basic balance and pushing technique receive cursory attention. The bilateral alternation pattern that distinguishes refined skateboard locomotion from novice pushing is not taught, not named, not analyzed, and not promoted.

A tiny minority of skateboarders practice switch kicking. The majority of the skateboard canon is acrobatic theater, and endurance skating is not something the canon has much use for. Skateboarders master a few switch kicks to add before a trick or during a trick. Ask them to switch kick cleanly for twenty-five miles on a five-to-ten cadence count and vanishingly few practitioners can do it.

The consequence is a global population of skateboard users who push with one leg, fatigue rapidly, develop asymmetric musculature, and regard skateboarding as inherently limited in range and duration. The transport potential of the platform remains unrealized because the bilateral technique that unlocks it has never been systematically taught.

4. The technique: centerline, shoulder drop, and cadence

The existence of stable technical markers further supports the claim that switch-kick locomotion constitutes a coherent locomotor class rather than an ad hoc variation. Switch-kick technique is organized around three principles:

The centerline: Nose over knee, knee over toes. This is the glide position—the fundamental postural alignment shared by all skating and all skiing. The switch kicker maintains this alignment on both sides: when the left foot is on the deck, the left knee tracks over the left toes with the nose aligned above; when the right foot is on the deck, the same alignment holds on the right side. This bilateral centerline discipline is what transforms one-sided pushing into symmetric locomotion.

The shoulder drop: As the kicking foot drops to the ground, the same-side shoulder dips slightly. This is not a conscious instruction but an emergent property of correct weight transfer. The shoulder drop indicates that the full body is participating in the propulsive cycle, not merely the leg. When the shoulder does not drop, the push is isolated in the lower limb and the torso remains rigid—a sign of incomplete technique.

The cadence: Refined switch kicking operates on a count—typically five to ten pushes per side before switching. This cadence is self-regulating: fatigue in one leg triggers the switch to the other. Over distance, the cadence becomes rhythmic and automatic. The practitioner no longer counts but feels the switch point—a proprioceptive marker of fluency.

The instructional progression follows a specific sequence: first, master slow-speed balance on the deck with both feet. Second, practice the push with each leg independently—"how slow can you go" drills that prioritize control over speed. Third, begin alternating sides at low speed. Fourth, gradually increase speed and distance as the bilateral pattern consolidates.

4.1 Platform geometry and stabilization demand

Stance difficulty is modulated not only by limb preference but also by platform geometry and the presence or absence of external stabilization. On a scooter, the support foot is centrally placed on a short platform (approximately 12–18 inches), and a handlebar provides external upper-body stabilization. This configuration substantially reduces anterior–posterior torque differentials and overall postural demand. Under these externally stabilized conditions, the instability response typically observed when switching to the non-preferred stance limb is attenuated, allowing muscular loading and motor familiarity to develop progressively.

Skateboarding removes external stabilization and introduces longitudinal stance asymmetry on a longer platform (approximately 28 inches). The rider must adopt either a front or rear stance orientation. Practitioner observation suggests that rear stance positioning imposes greater posterior chain loading, yaw stabilization, and fore–aft torque control demands than front stance positioning. As a result, non-preferred rear stance represents the highest stabilization challenge within the switch-kick system.

These graded stabilization conditions produce a progression of difficulty: externally stabilized central stance (scooter), internally stabilized front stance (skateboard), and internally stabilized rear stance (skateboard). Stance preference—the primary axis of lateral asymmetry in this locomotor class—emerges most clearly under conditions of maximal internal load-bearing demand rather than during brief propulsion impulses.

Interestingly, placing the non-preferred limb in the front stance position appears less destabilizing than placing it in the rear. For the beginner, this suggests a counterintuitive but effective entry: take the non-preferred stance leg to the front of the board. This reduces the combined demand of unfamiliar laterality and high-torque rear positioning, allowing bilateral competence to develop under manageable conditions.

This graded difficulty also explains why novice propulsion is typically unilateral. If a rider is unstable in non-preferred stance, switching stance roles increases the probability of balance failure during the weight transfer phase. Unilateral pushing is a pragmatic stabilization strategy: the rider keeps the more stable limb on the platform at all times and uses the less stable limb exclusively for brief impulses. As stability improves, the constraint relaxes and bilateral alternation becomes feasible.

4.2 The switch-kick movement cycle

The switch-kick propulsion cycle can be decomposed into five discrete phases that repeat in bilateral alternation:

The glide phase begins when both feet are on the platform and the rider is coasting on rolling contact. Body mass is distributed across the platform.

The center of mass is aligned over the support base. This phase is mechanically equivalent to the glide phase in skating and skiing.

The weight transfer phase occurs as the rider shifts body mass onto the stance-preferred limb in preparation for the propulsive strike. The center of mass migrates toward the stance foot. The contralateral foot begins to disengage from the platform.

The propulsive ground strike is the brief interval during which the kicking foot contacts the ground and applies a rearward-directed force impulse. Ground contact time is short. The impulse is largely vertical with a posterior horizontal component. The stance limb maintains full body mass support throughout.

The limb recovery phase follows the ground strike as the kicking foot lifts from the ground and returns to the platform. Both feet are again on the deck. The rider re-enters glide.

The bilateral role reversal occurs after a cadence-determined number of cycles. The stance and kick roles switch sides. The limb that was stabilizing now kicks. The limb that was kicking now stabilizes. This reversal is the defining mechanical event of switch-kick locomotion and the feature that distinguishes it from unilateral pushing. Because the cycle is discrete and countable, each propulsion-and-glide unit can be treated as a trial for within-subject bilateral comparison in future instrumented studies.

5. The scooter-to-skateboard progression

Scooters are among the most common wheeled platforms in childhood, widely available across urban and suburban contexts. By age three, the child is performing the fundamental switch-kick pattern: one foot on the platform, one foot pushing, balance maintained during glide. If bilateral alternation is taught—if the child learns to switch the kicking foot regularly—the foundation of transport sport physical literacy is laid before the window of motor plasticity closes.

The natural progression is scooter to skateboard. The handlebar is removed. The balance demand increases. The proprioceptive challenge deepens. But the propulsive pattern—switch kicking—is identical. The child who switch kicks fluently on a scooter at age five transfers that bilateral competence directly to a skateboard at age seven.

What currently happens instead: the bicycle arrives and replaces the scooter. Bilateral alternation stops. Cycling reinforces symmetric but non-alternating rotational motion. Both feet remain fixed to the platform at all times. The alternating single-limb stance that switch kicking demands simply does not occur in cycling. By age ten, unilateral preference may already be strongly consolidated. The switch-kick foundation that was beginning to form is abandoned before it consolidates.

The parallel to language acquisition is not metaphorical. It is structural. Children acquire their first language without formal instruction, through immersion during a critical period of neural plasticity. Motor skill acquisition follows analogous developmental windows. The literature on sensitive periods in motor learning suggests that fundamental movement patterns consolidated before age seven become deeply encoded and resistant to degradation. Bilateral locomotor alternation, if installed during this window, becomes as automatic as native pronunciation.

The scooter-to-skateboard progression exploits this window systematically. The scooter provides a low-consequence environment for bilateral alternation: the handlebar stabilizes the upper body, the platform is close to the ground, and falls are minor. The child practices hundreds of propulsive cycles per outing without conscious effort. If switch kicking is named and encouraged from the beginning, the child arrives at the skateboard with bilateral competence already consolidated.

The skateboard then deepens the challenge. Without the handlebar, the proprioceptive demand increases substantially. The child must maintain single-limb stance on a longer, less stable platform while the contralateral limb executes the push. This is not a new skill but a progressive loading of an existing one. The bilateral foundation transfers. What changes is the stabilization demand.

The critical failure in current practice is the interruption of this natural progression. The bilateral alternation capacity that the scooter was building is precisely the capacity that field sports, martial arts, and dance will later demand. What is not consolidated during the critical period must be laboriously reconstructed later.

If the progression were maintained—scooter to skateboard to SpikeBoarding—the child would acquire the full skiing kinetic chain on pavement by adolescence. A locomotor language as permanent as any spoken language. A transport sport fluency retained for life.

6. The bilateral competence gap in field sports

Two-footedness at elite levels is consistently reported as uncommon in the football literature. This is not a natural limitation. It is a pedagogical failure. Decades of drills, cones, and weak-foot exercises have failed to solve the bilateral competence problem because they train outcomes rather than foundations. By the time specialized football training begins, unilateral preference is already neurologically installed. Football training starts too late to change it.

Switch-kick locomotion addresses this gap at the foundation. Unlike drills, propulsion forces alternation. You cannot travel without switching legs. Balance requires non-preferred leg support. Repetition is high-volume and intrinsically motivated. Training occurs during transport, not in separate sessions. This is foundational, not supplemental.

The bilateral competence gap extends across virtually every major sport. In tennis, the forehand dominates while the backhand remains defensive. In basketball, lay-ups and dribbling are heavily lateralized. In hockey, shooting and stickhandling favor one side. Olympic kayaking alternates paddle sides every stroke yet elite sprint kayakers exhibit significant asymmetries in stroke force and trunk rotation. Gymnastics requires bilateral execution for scoring yet gymnasts develop skills on one side first and laboriously mirror them.

Rowing presents a particularly instructive case. The sport appears bilateral: both hands grip the oar, the catch and drive engage both legs simultaneously. But competitive rowing at the highest levels reveals persistent lateral asymmetry in leg drive force, hip rotation, and trunk engagement. Sweep rowing is explicitly unilateral in its rotational demand. Even in sculling, where the motion is nominally symmetric, force plate data reveal measurable differences between port and starboard drive phases. The bilateral appearance of the sport masks the lateral preference operating beneath it.

Rock climbing demands bilateral trust in a uniquely consequential context. The climber must weight each limb fully and commit body mass to holds on both sides of the route. Lateral preference manifests as a reluctance to lead with the non-preferred hand or to commit to flagging and heel-hooking on the weaker side. At height, where the consequences of failed limb control are severe, bilateral confidence becomes a safety-critical competence rather than merely a performance advantage. Climbers who lack it either plateau or compensate with route selection that avoids their weak side.

In every case the pattern repeats: the bilateral gap is identified late, corrective training is applied after unilateral preference has consolidated, and the correction is slow and incomplete. Switch-kick locomotion offers an alternative: install bilateral alternation during the developmental window so the child arrives at specialized training with thousands of bilateral cycles already completed.

No longitudinal study has tested whether early bilateral locomotor training improves later field sport bilateral competence. The hypothesis is clear: children who maintain switch-kick practice through the developmental window will show measurably superior non-preferred limb capability by age twelve. The study has not been conducted because the category has not been named.

7. Implications for transport

Skateboard commuters exist. A substantial global population uses skateboards and longboards for daily transport. But virtually all of them push with one leg. They fatigue. They are limited in range. They are dismissed as fringe users of a children's toy.

Switch-kick fluency transforms the skateboard from a short-range recreational object into a serious transport platform. A practitioner who alternates legs can cover twenty-five miles without the asymmetric fatigue that limits one-sided pushers. The platform becomes viable for daily commuting—not as an inferior alternative to cycling, but as a distinct transport modality with its own advantages: portability, low cost, integration with public transit, and the glide-based kinetic pattern that connects directly to skating and skiing.

The addition of the SkateBoard Spike extends this further. SpikeBoarding adds the full upper body to the propulsive chain, producing the complete skiing kinetic chain on pavement. The switch-kick foundation makes SpikeBoarding accessible. Without bilateral competence on the platform, the SkateBoard Spike action is premature. With it, the transition is natural.

8. Asymmetric loading and injury risk

Unilateral skateboard propulsion produces a predictable pattern of asymmetric musculoskeletal loading. The stance leg sustains continuous weight-bearing stress during every glide phase while the pushing leg absorbs repetitive ground reaction forces during every propulsive strike. Over thousands of cycles, this asymmetry compounds: overuse injuries concentrate on the pushing side, compensatory postural adaptations develop in the lumbar spine and pelvis, and measurable strength differentials emerge between the two lower limbs. These are not injuries of impact or collision. They are injuries of repetition and asymmetry.

Bilateral alternation directly addresses this loading asymmetry. When the practitioner switches the kicking leg at regular cadence intervals, both limbs share both functional roles: propulsive ground contact and sustained stance stabilization. The cumulative load distributes across both sides of the body. Neither limb accumulates the disproportionate stress that unilateral practice produces. The musculoskeletal loading profile shifts from asymmetric overuse to distributed bilateral engagement.

This is not a theoretical benefit. Distance skateboarders who practice switch kicking report the elimination of the unilateral fatigue pattern that limits one-sided pushers. The capacity to sustain effort over long distances depends directly on bilateral load distribution. A practitioner who pushes with one leg reaches muscular exhaustion in that limb while the contralateral limb remains relatively fresh. A practitioner who alternates legs distributes fatigue symmetrically and extends range proportionally. The bilateral technique is not merely more elegant. It is mechanically necessary for sustained locomotion. If switch kicking were taught as the default propulsion technique from the beginning, the asymmetric overuse injuries endemic to skateboard commuters would be substantially reduced or eliminated.

9. Relation to motor lateralization research

Upper-limb motor lateralization research has described complementary hemispheric specializations for trajectory control and positional stabilization. Sainburg's dynamic dominance hypothesis proposes that the dominant hemisphere and limb system specializes in feedforward coordination of trajectory and dynamics, while the non-dominant system specializes in feedback-mediated positional control and stabilization. This framework has been supported by two decades of experimental work on reaching tasks.

Switch-kick locomotion differs mechanically from typical upper-limb reaching paradigms in a critical respect: it involves sustained axial load-bearing and whole-body stabilization during single-limb stance. The stance limb supports nearly the entire body mass during glide, managing an inverted-pendulum balance system under rolling conditions. Stabilization is continuous, weight-bearing, and whole-body rather than end-point-based and non-axial.

Whether lower-limb specialization under these load-bearing constraints mirrors, modifies, or reorganizes the trajectory and position distinction described in upper-limb studies remains an open empirical question. It is possible that stance preference in switch-kick locomotion corresponds to Sainburg's non-dominant positional specialization. This would be consistent with the observation that propulsion impulses feel interchangeable across sides while stance preference remains more resistant to change.

Switch-kick locomotion may therefore offer an ecologically valid paradigm for examining how impulse generation and sustained dynamic stabilization distribute across the lower limbs. Each movement cycle cleanly separates two control demands in an alternating, repetitive, and measurable structure. Force plates could capture ground reaction forces during the propulsive strike; inertial measurement units could quantify glide stability; electromyography could distinguish activation patterns during propulsion versus stabilization. The paradigm permits direct within-subject comparison of preferred and non-preferred sides under identical task constraints, with a single session generating hundreds of matched bilateral cycles.

Importantly, this paper does not assert that stance preference equals neural non-dominance. Rather, it identifies an observable behavioral asymmetry that may be relevant to existing motor lateralization frameworks. The empirical relationship between stance preference and hemispheric specialization remains to be tested.

10. Conclusion

Switch-kick locomotion—bilateral alternating propulsion on wheeled platforms—is a distinct locomotor class that has never been formally classified, systematically taught, or adequately studied. The literature analyzed novice unilateral pushing and concluded that skateboard propulsion is inherently asymmetric and inefficient. This conclusion is an artifact of studying the wrong technique.

Three activities constitute the switch-kick family: scootering, skateboarding, and SpikeBoarding. They share a single propulsive logic—alternating bilateral push-off with weight transfer and glide on a wheeled platform not fixed to the feet. They differ in platform configuration and kinetic chain extension, but the foundational pattern is one.

The scooter is the entry point. Age three. Bilateral alternation taught as fundamental from the beginning. The skateboard is the next stage. The SkateBoard Spike is the completion—the full skiing kinetic chain delivered on pavement.

No widely recognized or standardized framework appears to teach this. The classification offered here is intended to change that—to name a locomotor class so that it can be taught, studied, and scaled into the physical literacy of every child who already owns a scooter. The scooter is already in the garage. The technique is already latent. What has been missing is the name.

Declaration

To the author's knowledge, no peer-reviewed or formally documented instructional framework for switch-kick propulsion currently exists. This claim pertains to formal biomechanical pedagogy (peer-reviewed or standardized curricula), not to informal community practice. This paper documents that absence as a pedagogical gap rather than as a claim of exclusivity.

Limitations (position paper)

This manuscript does not present instrumented measurements, does not estimate effect sizes, and does not claim prevalence of refined switch-kick competence in the general skating population. This paper offers a classificatory and pedagogical framework; empirical testing—longitudinal studies of bilateral competence, biomechanical analysis of expert switch-kick technique, and controlled comparisons with novice unilateral pushing—is a necessary next step.

Additionally, the observational claims regarding stance preference, stabilization demand, and platform geometry derive from practitioner experience and instructional contexts rather than instrumented laboratory measurement. These observations are presented as hypotheses for empirical investigation, not as established findings.

Supplementary material

Supplementary Video S1 provides an instructional demonstration of switch-kick propulsion, illustrating centerline balance, bilateral alternation, glide-phase control, and cadence progression as described in Sections 4 and 5. The video is included for observational and pedagogical reference only and does not constitute experimental evidence. Its purpose is to document the existence, repeatability, and teachability of refined switch-kick technique, addressing the pedagogical gap identified in this paper.

Supplementary Video S1. Switch-kick instructional demonstration (Central Park Long Boarder). Available at: https://www.youtube.com/watch?v=R4ViqlFiEu8

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Works cited

Board, W. J., and R. C. Browning. “Self-selected Speeds and Metabolic Cost of Longboard Skateboarding.” *European Journal of Applied Physiology*, 114(11), 2014.

Carey, D. P., et al. “Footedness in World Soccer: An Analysis of France ’98.” *Journal of Sports Sciences*, 19(11): 855–864, 2001.

Crockett, B. A., and R. L. Jensen. “Kinematic Analysis and Muscular Activity of Skateboard Pushing and Riding.” Conference Proceedings, International Society of Biomechanics in Sports, 2007.

Cubillo, Enrique G. "Transport Sport Theory: The Categorical Distinction Between Sports That Transport and Sports That Do Not." Position Paper, SUSOIX, February 1, 2026.
Cubillo, Enrique G. "Skiing Somatics: The Eight-Thousand-Year Kinetic Chain as Somatic Practice and Intervention to Technological Disembodiment." Position Paper, SUSOIX, February 1, 2026.
Cubillo, Enrique G. "Liberation Without Reformation: The Convergence of Contact Improvisation Thinking and SpikeBoarding Skiing." Position Paper, SUSOIX, February 1, 2026.
Formenti, Federico and Alberto E. Minetti. "Human Locomotion on Snow: Determinants of Economy and Speed of Skiing Across the Ages." *Proceedings of the Royal Society B*, Vol. 274, No. 1611, 2007.
Sainburg, Robert L. "Handedness: Differential Specializations for Control of Trajectory and Position." *Exercise and Sport Sciences Reviews*, 33(4): 206–213, 2005.
Kitchen, N. M. et al. "The Complementary Dominance Hypothesis: A Model for Remediating the 'Good' Hand in Stroke Survivors." *The Journal of Physiology*, 603(3): 663–683, 2025.
Mickevičius, M., et al. "Riding a Mechanical Scooter from the Inconvenient Side Promotes Muscular Balance Development in Children." *Children*, 10(6): 1064, 2023.