

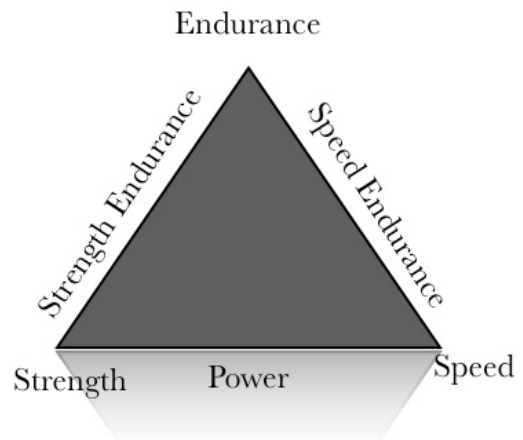
## Speed-Strength Challenge

Created by Jennifer Sage  
Training Type: HIT, Speed-strength  
Working HR Zones: Zone 3–5  
Total Class Length: 60 minutes

### Profile Objective and Intensity

The foundation of this profile is the understanding of the relationship between cadence and resistance, which you have learned in the Cause and Effect profile; hopefully you've already done that profile with your participants several times. In this profile, we will focus only on cadences above 80 rpm on up to 100 rpm, and spend longer at each one.

The training focus is a combination of the two base training elements of leg speed (cadence) and strength development, with a little endurance thrown in. The pure combination of speed and strength is power ( $P = \text{force} \times \text{velocity}$ , or in our case, resistance/gear  $\times$  cadence), which is manifested through explosive power. There are several ICA profiles that focus on explosive power; this one doesn't go quite to that level of intensity. During the highest-effort surges at the end of each song, we will keep intensity a little above threshold (less fit students might go even higher) and maintain it for 45–60 seconds. So we are also introducing a little bit of anaerobic endurance. In the image on the right, this would be represented by the center of the triangle, perhaps the lower half.



Similarly, muscular endurance (aka strength endurance) is a combination of strength and endurance. The cadences of 80–90 rpm will certainly be working on ME, but as we move into the higher cadences of 95–100 rpm against a resistance, that focus will shift to speed-strength-endurance, and the challenge to maintain it will greatly increase.

In this profile, riders will be asked to re-establish a base at a moderate intensity for each new faster song, just like in Cause and Effect. And then, little by little, you'll add more resistance until it becomes moderately hard; after that you'll ask for a truly hard surge, as long as it doesn't slow their legs down. This will be the true test of their ability and fitness. They will most likely be begging for mercy as their fast-twitch muscles go into high gear.

Some of your riders may reach a cadence they cannot maintain for long (95 rpm and above are particularly challenging). These students cannot help but slow down the legs and it's up to you,

their coach, to let them know this is OK, and to encourage them to try the higher cadences in intervals. This doesn't mean failure; it simply means they've revealed an area of their fitness that could use a little more focus.

### **Profile Layout**

The way this profile works, during the first half you will be working up a cadence ladder from 80 to 85 to 90 to 95 to 100 rpm. At the end of each song, you will push them really hard (leg speed + resistance = speed-strength development). The most important point to remember is that they are to find the highest resistance they can push *at that cadence* that does not slow the legs down. If it does slow the legs down after only 10–20 seconds, they added too much. Coach them to back it off slightly.

The songs are one after the other without a “recovery” song in between, so you will ease back to a moderate level (Zone 3) at the beginning of each song. Newer or less fit students can choose to recover lower. At this time you allow the heart rate to come down a bit while you establish the new cadence and connect with it. Then, you will build both the resistance and intensity back up.

In all but the highest cadence, you'll stand for about 30 seconds in the middle of the song, and then again at the beginning of the final surge for 10–15 seconds. It's important to stress to your riders that standing at high leg speeds is very, very challenging for all but the most skilled cyclists. Their number one goal is *form first*. If form falls apart and they have to rely on leaning on their hands, the risk is to high. The best option is to either slow down the legs when standing, or just avoid the standing parts altogether. It's their choice.

You'll also give them the opportunity to stand in a jog during the first minute of each song when they recover. In this case, it's optional, but if they do stand, they'll slow down the legs to about 80 rpm so the heart rate is not spiked (yet). One of the objectives is to keep the cadence from dropping below 80 rpm the entire class.

After the cadence ladder, the second half of the profile will put the previous efforts to practical use. You will simulate a paceline at increasing cadences by dividing the class into three groups and alternating who is in the lead. (Note: For a detailed description of how pacelines work, please see the ICA profile Tour de France 2011, Stage 2, Team Time Trial. There is an audio as well as written description of how to conduct a paceline in your classes. Also, if you have purchased the 2013 Tour de France package, Bryon Black has some very different powerful coaching cues for the Stage 4 Team Time Trial profile that are worth interjecting in your paceline coaching. I will describe pacelines here, but not in as much detail as these time trial profiles.)

The rider in front will be experiencing the greatest wind resistance, which of course translates to the most effort. Your role as the coach will be to encourage them to keep their cadence high when pulling in front. While pacelines can be done at lower intensities, our goal is to simulate a race pace paceline, and will be something that a cyclist might experience in the real world. Standing during the paceline work will be limited. You'll have to judiciously encourage riders to stand for short periods (5- to 10-second breaks) if needed when they aren't at the front of the paceline, or during the beginning of each new song before you return to your circling. Your avid

cyclists won't mind not standing, but it's important to not alienate your non-cyclist students and make sure to give them breaks. This will depend entirely on if your students (and the population of your club) have been exposed to classes with fewer transitions in and out of the saddle.

**Warning:** This is not a good workout for beginner students without considerable modifications. Riders must first establish skills needed to pedal quickly, strength development through lots of lower cadence work, and the ability to endure longer periods in the saddle in other classes. However, as is the case with any indoor cycling class, you can ask those newer or less fit students to take more breaks and to keep their intensity below threshold. You can let them explore the higher cadences, but make sure they do it in short increments and focus on form over fitness. By doing this, they will still reap some of the same benefits of the speed-resistance relationship, but ensure they will not push beyond their ability and risk injury and discouragement.

**The Warm-up****Warning Shots Feat. Sleepy Wonder and Gunjan, Thievery Corporation, 96 bpm, 5:02**

As you begin your warm-up:

*Over the next 5 minutes as you warm up, I'd like you to gradually raise your heart rate to Zone 2, allowing the muscles to progressively take on a little more resistance every few minutes.*

*We've done profiles that have focused on slow climbs in order to build the strength in your legs. In other classes, we've done profiles in which I've asked you to pedal quickly, sometimes over 100 rpm, to develop your leg speed. You've experienced the profile called Cause and Effect in which we examined the relationship between cadence and increasing resistance, at all different cadences from 70 to 110 rpm.*

*Today, we're going to combine all of those. It's going to get quite hard, and in fact, you just might be asking for mercy! I'm going to combine the two elements of speed and strength, which gives us what they refer to as "speed-strength" in cycling training parlance, but we're going to throw in longer periods, so it's not pure power. Naturally that means we'll need to pedal quickly, so our range today will be between 80 and 100 rpm. One of the challenges you'll face is to try to recover at higher leg speeds than you usually do. If you really need to slow the legs down for a brief rest, you can do so during the working recovery, but never below 80 rpm.*

*With each song, the cadence will get a little higher, 5 rpm at a time. We'll start off moderate for each song, then build to hard, then finish with a surge against a resistance that might just hurt a bit! That is where the "speed-strength" comes into play.*

*Yup, can't lie to you, it's going to hurt. With each new song, you will establish a good understanding of the cadence, relaxing your upper body so that when it comes time to combine that leg speed with strength and increase your power to push slightly beyond your threshold, you'll be much better equipped. For these surges, your mission is to find a resistance that challenges you, that makes your legs call out for mercy, BUT that doesn't slow you down. Got that? If it slows your legs down right away, you added too much. Take some off. At the speeds we'll be turning the pedals, up in the 90s and on to 100 rpm, you won't need much resistance to make a difference, so be careful about how much you add and how much you take off. It might be a millimeter or two.*

*This first song will be your test effort, at 81 rpm. We'll finish it with a surge, but I'd like you to stay below your threshold, perhaps high Zone 3 for the first one. Don't worry—you'll be taking my name in vain later on in the class, so try not to jump the gun to get the intensity in too early!*

*Midway through the song, I'll have you stand up against that cadence. This may spike your heart rate but we'll try to keep it under control. As we get faster, you'll stand up for shorter periods. If you really need a saddle break, you can take them during the recovery. Are you OK with that? I know some of you do like to stand up a lot more, but truly, it will do you no*

*good to stand up with fast legs and have your form fall apart. You won't get the benefit of this workout if that happens. So stick with me today and grin and bear it!*

**Song #2: Shaking the Tree, Peter Gabriel, 81 bpm, 6:25**

*Hear that beat? Grab it, and settle into it. It's an easy cadence, doable by everyone with good form. That is, if you focus. Think about being smooth and elastic. Relaxed, calm, but not passive. Add enough resistance so that over this first minute, you'll realize pretty quickly that you're moving your bike down the road. Not super fast, but not lagging behind either. Bring the intensity to moderate (low Zone 3).*

*2 minutes: Breathe into the pedal stroke. Absorb this cadence into your muscle memory. I want you to be able to reproduce it at any time, even if there was no music, nothing to tell you the beat. Memorize it. For the rest of today's ride, try not to drop below this cadence, even if you have to take a break from the higher-intensity work later.*

*3 minutes: Let's bring up the resistance a little bit, enough to raise the heart rate about 5–7 beats. Legs will wake up a little bit.*

*4 minutes: Bring it up a little more and stand up for 30–40 seconds. When you sit back down, see if you can hold the same resistance. Your feet will encounter a little push back. Reassure them that it's OK, they just need to respond with more effort. Your heart rate will respond as well, by ratcheting up a little more. Still in total control, still aerobic; in fact, we're still warming up. If your HR goes too high, ease off that little bit you added when you stood up.*

*5:30 minutes (Their heart rates will have had a chance to settle after standing): This time, add enough resistance to stand, but not enough to slow the legs down. Stand up for 30 seconds, then sit back down and maintain your effort, still in the aerobic zone.*

Hold this until the end, trying to stay in Zone 3, low Zone 4. As the song starts to fade, let them remove a little resistance, but keep the cadence.

**Song #3: Stay On, Bodeans, 85 bpm, 5:41**

*Right away, you'll hear the faster beat. It's only 5 rpm faster, and our resistance is sort of low right now, so let's give it a minute to settle the heart rate back to moderate intensity before we ramp back up.*

*1 minute: Add a little bit, we're on our way up.*

*2 minutes: Add a little more. Assess how your legs are responding, assess how your breath is responding to this increased effort.*

*3 minutes: Add enough to stand. Hold for 30 seconds if you can. Form comes first. Most of you can maintain good form while standing at 85 rpm. Heart rate will rise, though. When you sit back down, ease it back a bit if needed, but hold that cadence.*

4 minutes: *The real hard work is coming up. Ease a little more gear underneath your feet to make sure you are working close to “hard” right here. When there’s only 1 minute left, we’re going to put on enough to make your legs sting and sing while we take the speed-strength challenge. We’ll stand up again, for 20 seconds, then sit and hold it until the end. Are you ready?*

4:35 (Ready for the surge): *Turn it up and stand! Spin those legs; make sure the weight is not on the hands, but centered over the feet. (After 15–20 seconds sit back down.) Hold this gear if you can. It should feel very hard! Picture yourself in a racing situation; you’re leading an attack. Your legs have to keep pumping at this pace, no matter what.*

*I know it stings, but hold it! C’mon, knees pumping to the handlebars. Drive those legs.*

Back off when the song is over.

Instructors, if you did this with your students at the pace you’re asking of them (and yes, I do advise that occasionally you do push yourself to the high intensity that you’re asking for so you can make a point) then you will be breathless by the time the song ends. As we ease up when the next song starts, I will often point out to my students how I’m breathing and say something like:

*Can you (breath) hear me? If you don’t (breath) sound like this if you were to talk (breath), then you didn’t go hard enough! (breath) These surges should take you (breath) to the border of breathless.*

#### **Song #4: Arambol, Astropilot, 90 bpm, 5:46**

*Ease up; we’re going back down to moderate, mid-Zone 3. Then we’ll raise it back up to Zone 5 for another surge where we’re going to welcome the stinging legs once again. If you personally need more time standing, then take a saddle break now and slow the legs down. 30 seconds max.*

1 minute: *Add a little more. Build that road up underneath your feet, and let the heart rate creep up gradually.*

2 minutes: *A little more gear. Let’s greet that resistance with a smile—it’s what’s getting us more fit!*

3 minutes: *How you doing? Ready to stand up? For some of you, this cadence will be on the borderline where you cannot hold good form when you stand. Please know that’s OK! Just try it, and if you can’t hold it, your choices are to either slow the legs down or sit back down. But bad form is NOT an option!*

*Ready? Add a little bit and stand up. (Hold 20–30 seconds. Then sit back down and settle the heart rate, by now it should be close to “hard”.)*

4 minutes, prepare them for the speed-strength challenge: *So, we’ve got our surge just ahead. They are getting more and more challenging as the cadence increases. Intensity is hopefully the same; the challenge is in your body’s ability to push a higher cadence against a*

*resistance. Put this in your head once we start: imagine you've made a pledge to yourself that you will not, cannot slow down. This time it will be only 45–50 seconds. I think you can hold anything for that long, right? Make that pact with yourself. Another way to think about it is to imagine you're on a mountain bike on a steep single track in your granny gear (that granny gear allows you to pedal quickly even uphill). You can see the top but you've got to dig in because if you stop or slow down, you'll have to carry your bike to the top! And that's less fun than the stinging in your legs and the burning in your lungs. Ready?*

*4:45 (with 45 seconds left): Here we go, add just a hair (maybe a few millimeters) and stand up for 15–20 seconds. Form first!*

*Sit back down; ease up a little if needed, but otherwise hold hold hold. Drive once again. This is the speed-strength challenge in full force right here. Your legs are learning to combine those two skills!*

*You've got this! C'mon...3-2-1, phew! Back it down a bit.*

#### **Song #5: Kanji, Lemonchill, 95 bpm, 6:11**

*Ouch, that hurt, didn't it? Breathless? I hope so! You can hear the beat of this song right away. Ease up here, bring it back to moderate. We're going to do the same thing.*

Instructors, take them through the same drill, with a 15- to 20-second stand (OPTIONAL) in the middle (it's only for those students who really dislike sitting for so long). Gradually add little bits of resistance each minute or minute and a half. This song eases up and the beat disappears about 5:10, which is the time you'll use to recover for the next one. Therefore, for your surge above threshold, begin about 4:25 (stand for 10–15 seconds if desired), then at 5:10, ease up to recover. Remind them to grin and bear it through the challenge.

#### **Song #6: DDD (Dirty Disco Dub), The Orb, 100 bpm, 5:12**

Same thing for this song—you'll grab the beat (about 30 seconds into the song), start moderate, gradually add some resistance every minute. If your students need a break in the middle, stand up for 15–20 seconds, but know that few will be able to handle standing at 100 rpm, so let them slow the legs down to about 85 rpm. (This is optional)

More encouragement throughout:

*This is considered a fast cadence on a bike. Leg speed is a function of neuromuscular skill, very good technique with a smooth pedal stroke, and lots of practice. Relax, breathe, and let the legs work like they're supposed to*

Then with 50 seconds left, invite them to take the challenge:

*Ready for the surge? Oh man, I know you'll be wanting to throw darts at me. But you've really got this this time. You guys amaze me at your tenacity. Let's do this together. Ready?*

At 4:20 in the song, add resistance and stand for 10 seconds if needed. Otherwise, just churn and burn while seated!

**Pacelines****Song #7: Tight Flair, Tara Putra, 80 bpm, 8:36**

Use the first 3 minutes of this song to recover down to Zone 2 while you explain the next segment.

*Guess what? We get to pedal a lot slower for a little bit. It's going to feel sooooo slow! But remember, 80 rpm is considered a fast climb once you've got a bigger gear on there. Right now, enjoy an easier pace and recover while I describe what we're going to do next. This drill is going to be a practical application of the cadence drills we've just completed. We are going to do paceline work. You've done them with me before. I'll divide the class into 3 groups and we'll alternate who is in front. When you're in front, it's going to be harder because you have more of a headwind. You'll push hard, up to your threshold, for 30–40 seconds. Then when it's group #2, #1 will back off and #2 will hold the lead for 30–40 seconds. Then group #3 goes, and #2 eases up. Anytime you drop to the back, make sure not to ease up too much—this is not a full recovery. Reduce effort back down to moderate, but not below that. I want it to still feel like work. Otherwise, you'll get dropped off this paceline, and remember, this is a practical application of our cadence drills and surges. Which means it's a simulation of the real thing!*

*When the 3<sup>rd</sup> group goes to the front, group #1 moves up to the second position and adds a little bit more resistance so that the intensity rises to moderately hard, up to mid-Zone 4. So you can see, there are three levels of intensity in this paceline. Back = moderate. Middle = moderately hard. Front = hard. That means you won't get a whole lot of recovery.*

*We've got three songs for these pacelines. 80 rpm, 88 rpm, and 98 rpm. In the first one, you can stand when you first pull at the front, for 6–8 seconds. That's it. After that, if you need a standing break, we'll take it at the beginning of each song before restarting the paceline. In the faster songs, we won't stand at all during the paceline work, so if you absolutely need to stand, then do so now! (Let them jog for 30–60 seconds.)*

*OK, enough recovery! Let's get this party started.*

This is a long song, so during this discussion, they've been recovering. At 3:00, get them ready to go, and then alternate each group by pointing to them and calling out their number (you will have divided the class during the beginning of this song). If desired, you can use some of the descriptions for pacelines used in the Tour de France profile mentioned at the beginning of this profile. You, as the coach, can alter the length of the pulls, from 30 to 40 to even 20 seconds.

**Song #8: Dancing With Mephisto, Enigma, 88 bpm, 4:25**

This song is a lot shorter. Have them all stand up at the beginning for a break before continuing the pacelines where you left off. The beat picks up at :40 into the song.

*How's that cadence feel? This is 88 rpm. Do you like this? I do—it's fast, but totally doable. Remember, when you're in front, you've got riders behind you counting on you to shield them from the wind. Don't take that responsibility lightly! It won't be long before you'll be relying on them.*



Continue to coach them through the paceline.

**Song #9: Gunpowder and Gasoline, Hans Zimmer, 98 bpm, 4:32**

Again, use the beginning of the song to recover a little bit, and have them stand and jog if needed. This song gets going at :45. First grab the beat, then begin your pacelines back up where you left off the last one (group 1, 2, or 3).

*99 rpm, this is fast! Here's some trivia for you: Those Tour de France teams? They are probably pedaling between 90 and 100 rpm when in a paceline, especially at race pace in a team time trial. So THIS is what they are feeling. Let that knowledge sink in, let it help you drive your pedals. Commit. Commit. Commit!*

Rotate them through the circle, perhaps in shorter pulls of 20–25 seconds. When you reach the end, raise your hands up in celebration.

*That should truly have felt like a very hard workout, with **real** resistance against **fast** legs. You just took the speed-strength challenge, and you **ROCKED** it! Remember that workout. We'll visit it again!*

And then wink at them and smile as they groan!

**Stretch**

**Song #10: Moonlight Sonata, E.S. Posthumus, 5:30**

**Song #11: The Piano, Enigma, Voyageur 3:00**

During the cool-down, I like to remind my students why we do such a workout:

*If you are a cyclist, speed-strength training sessions are crucial for being able to climb faster, push bigger gears on flat roads, and perform well in a paceline at a fast pace. You work on leg speed to be more efficient and to train your aerobic abilities and slow-twitch muscle fibers. You work on leg strength and create adaptations in your fast-twitch muscle fibers through slow cadence climbs (I know, it sounds like a paradox, but it's true. Fast-twitch fibers are the power and strength fibers at slower cadences). And a workout like this pulls it all together.*

*But if you're not a cyclist, why are these workouts helpful? Well, for the same reasons a cyclist wants to do them—you'll be able to climb better and longer indoors, and you will be improving your threshold. And when that happens, you get that magical combination of high caloric burn and greater fitness. Also, at the intensities of most of the effort—that is, before we got to those surges (which were more anaerobic)—you were burning a higher percentage of fat calories, even though it wasn't easy. BINGO! We all want that, right?!*

Cool down and stretch, and enjoy the post-HIT afterglow!

# Speed-Strength Challenge

## Quick Profile

Created by Jennifer Sage

Training Type: HIT, Speed-strength

Working HR Zones: Zone 3–5

Total Class Length: 60 minutes

Section	Music	BPM	Time
Warm-Up / Intro	Warning Shots fest Sleepy Wonder and Gunjan, Thievery Corp	96	5:02
Cadence Drill #1	Shaking the Tree, Peter Gabriel	81	6:25
Cadence Drill #2	Stay On, Bodeans	85	5:41
Cadence Drill #3	Arambol, Astropilot	90	5:46
Cadence Drill #4	Kanji, Lemonchill	95	6:11
Cadence Drill #5	DDD (Dirty Disco Dub), The Orb	100	5:12
Recover & Paceline Drill #1	Tight Flair, Tara Putra	80	8:36
Paceline Drill #2	Dancing With Mephisto, Enigma	88	4:25
Paceline Drill #3	Gunpowder & Gasoline, Hans Zimmer, Dark Knight Remixes	98	4:32
Recovery/Stretch	Moonlight Sonata, E.S. Posthumus The Piano, Enigma		5:30 3:00

## Speed-Strength Challenge Playlist and Source

### Track, Artist, Album

### Source

Warning Shots feat Sleepy Wonder and Gunjan, Thievery Corp, The Cosmic Game  
eMusic and others

Shaking the Tree, Peter Gabriel, Shaking the Tree  
eMusic and others

Stay On, Bodeans, Go Slow Down

For some reason a downloadable mp3 is hard to find, not even iTunes carries this classic from the 1990's. The album is available on Amazon and other sources, very much worth the purchase (other great songs on the album too).

Arambol, Astropilot, Fruits of the Imagination\*  
eMusic and others

Kanji, Lemonchill, Sentant  
eMusic and others

DDD (Dirty Disco Dub), The Orb, DDD Remixes  
eMusic and others

Tight Flair, Tara Putra, Hidden Sense  
Free download available at [www.Ektoplazm.com](http://www.Ektoplazm.com)

Dancing With Mephisto, Enigma, A Posteriori  
eMusic and others

Gunpowder & Gasoline, Hans Zimmer & James Newton Howard, The Dark Knight Remixes EP  
Amazon

Moonlight Sonata, E.S. Posthumus, Makara  
eMusic and others

The Piano, Enigma, Voyageur  
eMusic and others

\* Originally for the 90 rpm cadence drill, I used the song Raumnot, by Sternenspringer on the album Kontakt. But it is very hard to find in the US, perhaps Europeans can more easily find this song.