Soon Lee's Loop Article on Loop mechanics

TEACHING LOOP DYNAMICS TO BEGINNERS

by SOON S. LEE

In teaching loop dynamics we are all thankful to have references such as the Gammels' dissertation "Essentials of Fly casting", Lovoll and Borger's video analysis "The Rod & The Cast", and Richards and Perkin's casting analyzer studies. These accounts afford us background information for mutual understanding of the topic. But much more studies need to be done. At the same time wider and freer discussions should be encouraged before prevailing wisdom is etched in stone.

One preliminary lament I have is that we are often encumbered by poor economy of words in discussing fly casting. The term "loop with parallel legs" has superseded "parallel loop" presumably because the latter does not give us a clue as to what the loop is parallel to. "Perfect loop" seems too presumptuous and arrogant for humble folks. "Tight loop" has the implication of narrowness. "Good loop" begs the question what is better. Yet "loop with parallel legs" is always a mouthful orally and cumbersome written. A loop of fly line has two legs. In this article I am humbly using the term "true loop" to indicate a loop with straight upper leg (as a contrast to a loop without straight upper leg). How this is preferable to "loop with parallel legs" apart from being a smaller morsel is open to debate. I may start off by observing that it is possible to manufacture a domed loop with parallel legs. Often, lovely wedge-pointed loops with straight upper legs stay wedge-shaped especially with short line carry, and their legs never become parallel. Anyhow to be per- snickety, shock waves on the lower leg are hardly paralleled by the upper leg. Lest I be reminded that legs need not be one above the other, I hesitate to use the terms "fly leg" and "rod leg" because they require another level of explanation for the un-initiated. Besides, doing so is unnecessarily fussy. It is like my telling the professor of medicine that the upper esophagus would not be so if the patient is standing on his head (the patient's head of course). And should I suggest that there be a pharyngeal esophagus and a gastric esophagus, the professor will surely want my head.

It is worthwhile here to list the main varieties of loops that we see. Firstly the classic "tight loop", with straight upper leg hugging closely a somewhat parallel lower leg, in essence a narrow true loop. Then there is the "wide loop" with straight upper leg separated by a greater distance from its somewhat parallel lower leg, an abbrevia- tion for wide true loop. The "tailing loop" has the upper leg crossing the lower. The "non-loop" is just fly line cartwheeling off the rod tip, scribing a dome with no discernable lower leg. Finally there is the hybrid, this quasi
wide loop, pseudo non-loop, with barely appreciable length of straight upper leg and a yawning wide front

(Continued on page 5) 4end, rolling over the rod tip with a short lower leg. This is an "open loop", demonstrated by some students as a wide loop, by others as a non-loop. In a sense the students cannot be faulted. There is a brief attempt at SLPhence the short length of straight upper leg. There is an exaggerated convex tip path developing the wide front end. The existence of a lower leg is only redeemed because of forward impetus supplied by the brief SLP at the start of the casting stroke.

Coming to the topic proper, I fear that our approach to loop dynamics is convoluted.

Teaching loop dynamics to the beginner has become very confusing. The use of SLP (straight line path of the rod tip) is fair enough, but the need to refer to RSPs (multiple rod straight positions), and maximum counterflex, and the moment loop is formed, with the attendant need for penciled diagrams and composite graphics, is an unwelcome complexity to the instructor. In my considered opinion, current definitions of "casting stroke" and "stop" are road blocks toward easier comprehension of the subject.

CASTING STROKE

In current usage, "casting stroke" begins at the start and ends when the rod comes to a stop, this stop variously said to end at RSP or maximum counterflex (only illustrating my complaint in the previous paragraph). We will visit "stop" again later.

I hope there is universal agreement that, thanks to the Gammels, casting stroke with straight line path of the rod tip (SLP) is a principal objective in fly casting. SLP produces true loop. The alternatives are concave tip path producing tailing loop and convex tip path producing non-loop/open loop. These latter loops may of course be employed in fishing situations, such as the tailing loop to present fly first, the non-loop for an under-powered curve cast, the open loop to lob a heavy fly. It is fair to say however that for distance, accuracy, utilitarian purpose and general aesthetics, the true loop is what we want our students to learn to throw.

The Gammels' "Essentials of Fly Casting" was a timely and worthy publication. The Gammels enumerate four essentials, namely elimination of slack, proper power application, appropriately sized casting stroke (they emphasizecastingarc),andpause.TheseessentialspromotethetenetofSLP.SLPresultsinthestraightupper leg of a true loop. The Gammels attribute SLP as the reason for the production of tight loop. But SLP is also the reason for the straight upper leg of wide true loop. Can we not equally say that SLP is the reason for wide true loop?

If we accept SLP to be the *raison d'etre* for tight loop, then by default convex tip path must be the reason for wide loop. The beginner who moves the fly rod with wrist action only with no rod loading (convex tip path) will not get a loop (hence non-loop). He is waving his rod, not casting. Only SLP can produce straight upper leg. Once the beginner learns to apply sufficient force to load the rod then he gets a loop of some sort. He subconsciously adapts his casting stroke with stealthy lengths of SLP to throw open loop. Eventually to achieve greater distance he lengthens SLP further until he eventually throws wide true loop. But this change in his casting stroke develops slowly over time and may not be realized by the student. Queried at instructor exami- nation, he cites by rote that convex tip path is the reason for his wide loop, but is unable to explain its straight upper leg.

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SLP is a highly regarded tenet in instructor education. Demonstration and explanation of loop control by the instructor candidate revolve around this maxim. We want the student to comprehend that a true loop has SLP, a tailing loop has concave tip path, a non-loop/open loop has convex tip path. But then we confound him by professing that SLP is actually just an abstract concept; that pure SLP does not exist in reality. All casting strokes end with convex tip path so that the line may overtake rod tip, otherwise the line would crash into the rod. Pure SLP through the entire casting stroke cannot throw a line. This brings up another consideration. Can pure concave tip path throw tailing loop?

The root of all this perplexity is the current definition of casting stroke. We should

remember that somewhere between the start and the end of casting stroke, fly line is launched. Line launch is a seminal event, the impor- tance of which has sadly not been appreciated. The point of line launch is more relevant in teaching loop dynamics than deciding when exactly loop is formed on a line graph. Line launch divides casting stroke into casting stroke before line launch (CS-BL) and casting stroke after line launch (CS-AL).

CS-BL can have different tip paths. SLP results in true loop, concave tip path results in tailing loop, and convex tip path results in non-loop/open loop. Unless we play havoc with the rod, CS-AL cannot alter the course of the launched line. CS-AL always has convex tip path. It serves a separate function (more later). We need new monikers for these unfriendly terms CS-BL and CS-AL.

Casting stroke as currently defined is a compound stroke, a sequence of CS-BL followed by CS-AL. We should not burden this term with two separate functions. We have always characterized casting stroke with a single function, e.g. to have SLP, or to have concave tip path. We refer to a casting stroke's length and its arc. Casting stroke sets up the line for launching. All these considerations fall in the domain of CS-BL. The term "casting stroke" should represent only CS-BL.

SUGGESTED DEFINITION: "Casting stroke" begins at the start and ends when line launches.

"STOP": I regret the allocation of the term "stop" to strictly mean "a time sequence beginning when angular rotation and
rod hand speed peak, and ending when the rod reaches RSP (reflects rod in first virtual rod straight position after unloading of line, definition preferred by Richards), or maximum counterflex (more closely related to RSP-2, second virtual rod straight position, definition preferred by Lovoll & Borger)". It is acknowledged that the act of stopping the rod is not one instant of time but a "sequence". I agree that "stop" is a phase. I only differ with the idea that "stop" merely represents the moments when the rod comes to a halt. "Stop" is more impor- tant than that.

"Stop the rod" is a traditional exhortation in fly casting. But it can discombobulate some. We would be better served if we prompt the caster instead to "let the line go" (just as we prompt the baseball pitcher to let the ball go at the end of his forward delivery rather than stopping his arm). Of course the two directives have the same intent, i.e., to launch line, but somehow the term "stop" has been usurped to idly define the distance between two points on a graph. Instead of its significance as an active verb it now is a sterile noun.

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We stop the rod by rod angular rotation to deviate the rod tip from SLP, letting the line overtake the rod tip.

Incontrasttothebaseballthrowhowever,theflylinelaunchesbutremains"tethered"totherodtip.

Abrisk/ short "stop" with quick angular rod deceleration results in a narrow loop. A gradual/lengthy "stop" with
continuedangularrodrotationandeventualdecelerationresultsinawiderloop.

Fora170degreecast,there may be continued rod angular acceleration for quite a bit before deceleration brings rod to a halt with rod near horizontal.

Apart from determining loop size, how the rod is stopped affects loop shape too. For example, a thrust along the rod axis at "stop" reduces rod bend and promotes a pointy loop apex. Scribing a vertical line with the rod tip at "stop" creates a boxy front end. We

should recognize that “stop” is the process by which we launch fly line, not just a physical state of cessation of motion. How we stop the rod affects loop size and shape. “Stop” represents CS-AL.
SUGGESTED DEFINITION: “Stop” begins at line launch and ends when the rod bends maximally as it comes to halt.
There is this notion of a “stopless” cast. The distance expert with a 170 degree cast brings his rod to rest at a location far removed from point of line launch. This remoteness, let’s say five feet, from line launch provides fodder for the claim that line is launched without the benefit of “stop”. I would ask what threshold distance for remoteness qualifies for this recognition: Four feet? Three feet? All this is moot if we define “stop” for what it is meant to be, to let the line go. The instant line launches, the process of “stop” has begun.
POST-”STOP” The entire cast can be conveniently divided into three parts for the purpose of discussion: casting stroke from start to line launch, “stop” from line launch to when the rod halts, and post-”stop” thereafter. At “stop” the rod at its maximum bend records the instant of time when the loop is at its widest (equivalent to maximum counterflex). After “stop”, vibration of the rod tip governs profile of the lower leg. Rod tip undergoes rebound and damping. The rod tip thereafter drops slightly. This drop appears to correlate with a renewed loading on the rod tip from the weight of the lengthened loop in front. It is at this juncture that major shock waves appear, always a significant distance away from the apex of the loop.

REVIEW

We should now re-visit the lessons we put our students through earlier. We teach that SLP is the reason for tight loop. Actually SLP only promotes straight upper leg, nothing else. Ironically it is the “inconsequential” miniscule convex tip path of the rod tip after line launch that is the reason for the narrow loop size. To be accurate we can say SLP is needed for tight loop but we cannot say SLP is the total reason for tight loop. For tight loop we have been emphasizing casting stroke without giving recognition to the role played by “stop”.
In the next lesson we teach that wide loop is produced by convex tip path. This convex tip path is actually the path traveled by the rod tip in a lengthy “stop”. Convex tip path before line launch will not produce straight upper leg. At best with surreptitious inclusion of SLP early in the casting stroke open loop may be achieved. Wide loop with straight upper leg requires significant SLP in the casting stroke. For wide loop we have been emphasizing the “stop” without giving recognition to the role played by casting stroke.
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Now that we define casting stroke as ending with line launch we find that SLP exists after all. It is not a phantom idea. Concave tip path for tailing loop is equally not a myth.
It is true that video data show rod tip path to exhibit a mild convex tip path prior to line launch even though the loop eventually produced has straight upper leg. Perhaps this is another reason to say that pure SLP does not exist. I believe that in practice we all learn to accelerate the rod a certain way to produce straight upper leg in front of us, something which we can verify visually. If there is a convex lean it is because as casters we eventually learn to compensate for the effect of gravity on the line when we cast. Indeed on video fly line behind the rod tip becomes straight through “stop”. Gravity continues to play a role so that the line following eventually trails below SLP.

To summarize loop dynamics with our new definitions for “casting stroke” (defined as beginning at the start and ending with line launch) and “stop” (defined as beginning with line launch and ending when the rod bends maximally as it comes to a halt):

- A tight loop has casting stroke with SLP for its straight upper leg, and a brisk “stop” with minimal convex tip path for its narrow loop size.
- A wide loop has casting stroke with significant SLP for its straight upper leg, and a lengthy “stop” with large convex tip path for its wide loop size.
- An open loop has casting stroke with brief SLP for its short straight upper leg, and a very lengthy “stop” with convex tip path for its widely open loop size.
- A tailing loop has casting stroke with concave tip path for its tailing upper leg, and a “stop” with convex tip path.
- A non-loop has convex tip path throughout the stroke, with no loop launched, only fly line cartwheeling off rod tip.
- Rod tip path may be SLP, or concave, or convex in casting stroke. • Rod tip path is always convex in “stop”. • SLP is not a phantom tenet. It exists in, and is a principal objective of, casting stroke.

TEACHING LOOP DYNAMICS

Teaching loop dynamics should be a less daunting task. Dividing the loop into three components, upper leg, body (size and shape) and lower leg, we can lay out a simple set of instructions on teaching loop dynamics to the beginner.

UPPER LEG: The casting stroke governs profile of the upper leg. SLP produces a straight upper leg. If the student fails to produce such, prod him to pay attention to the essentials. In harmony with the Gammels’ list of essentials I have a mnemonic for my students. Roughly in the order of sequence in a cast,

• S: slack, avoidance of; • P: power/force, proper application of; • S: “stop”, to launch line; • P: pause/drift;

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• S: stroke, arc and length supportive of line carry;

• P: position back-loop and fore-loop in line, at 180 degree separation;

• S: SLP, a tenet to observe by for true loop. BODY (SIZE/SHAPE): The “stop” governs loop size and shape. If the student’s loop size/shape control is poor, help him modify his “stop”. LOWER LEG: The rod after it comes to a halt governs profile of lower leg. With prominent shock waves the student should look into the reasons for excessive rod tip vibration.

Appendix: Ally Gowan’s superposition of Lovoll’s graphics (from Gordy’s master study group site):

Appendix II: The point of line launch is actually difficult to ascertain in the laboratory. For tight loop with quick rod angular deceleration one may locate a point when rod tip acutely deviates from SLP. For open loop where SLP blends into convex tip path this point of launch may not be easily identified. Actually in the field the caster knows quite well when line launches: when he deviates rod tip from SLP, the rod tip suddenly lightens up.