CHAPTER 7:

ALL ABOUT FLYING LINE

Selecting the Right Line

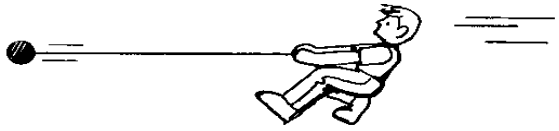
Some fighter kites come with line included. Most do not. Sooner or later, however, you'll probably end up buying more line, either because the original line broke, because you want more variety, or because you want to experiment with different types of line handling.

Fighter kites will fly on almost any old "kite string". As you might expect, proper handling takes something a bit more specialized. Here are a few things to think about when you go line shopping:

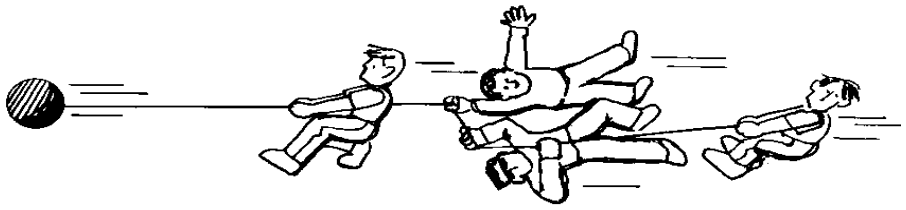
Strength - Fighters require lighter line than most kites and a line that's too heavy will weigh-down an otherwise active kite. On the other hand, bigger kites and stronger winds also require relatively stronger line.

Stretch - In order to control your kite, you need to be able to send it signals. But if you pull on the line and that signal is "absorbed" by line stretch, then you won't have much control. So the less your line stretches when you pull, the more precise your control will be.

Diameter - Diameter makes drag, and drag makes sag. Sag degrades control. And here's a sad fact of life, aerodynamically speaking:



If the line diameter doubles ... the drag increases <u>four</u> times!



Since round objects produce more drag for their thickness than streamlined ones, the line can actually produce more drag than the kite itself!

Increased line drag shows up generally in lower performance such as slower kite speeds or higher wind requirements

Handling - Thin or abrasive lines sliding through your fingers can be tough on your hands. Cutting line can be downright destructive.

Slippery lines are, by definition, hard to hang onto. Wax coated lines, on the other hand, are easy to grip quickly. When you go shopping for line, remember what you plan to be doing with it.

Durability and Cost - Some types of line last longer. Others will fray or wear faster depending on the conditions they're used in. Continued exposure to the sun can also reduce a line's strength.

You'll find a tremendous variation in the cost of lines available. Generally, if you're going to destroy line quickly in a cutting contest, use something inexpensive. Otherwise look for durable line which is easy to handle.

Color - Flying lines are now available in a variety of different colors. Color won't effect your flying but it may effect your satisfaction and state of mind. It may also help you sort out your own line in a crowded sky or messy tangle.

The ideal flying line would have zero stretch for responsiveness, be lightweight, be strong and durable to resist breakage, and cost next to nothing. And to make things even more difficult, it would be as thin as possible to minimize wind resistance, but also thick enough to be easily handled. What that means is that the "ideal" line isn't out there yet. But there are some alternatives that come close.

If you keep your eyes open, you'll find a lot of good lines for fighter flying. I like surgical suture thread which is excellent for small kites and almost essential on light wind days. It's strong and can be waxed to reduce tangles and increase control. Carpet thread is another readily available alternative.

Ric Merry
Seattle, Washington

Here is an overview on some basic types of commercial flying lines and some observations about their suitability for fighter flying.

Waxed Linen Line - This may be the best option in terms of handling, cost, and safety. Stiff enough to avoid tangles, it is still thin enough to minimize drag. The wax coating is also a major plus for quickly pulling in line. Twisted carpet thread is another good and less expensive option, but it lacks the benefits of a wax coating.

Cotton and Nylon - Less expensive but not necessarily the best for fighter flying. Nylon will stretch like a rubber band and many cotton lines, when you can find them, aren't much better. Twists, tangles and burns on you fingers and palms are also a problem with thinner lines. Specially made glazed cotton line is often used in Asia and India because it is broad enough to not cause as many burns.

Stunt Kite Line - Special lines like Spectra™ and Kevlar™ which were developed for stunt kite flying might initially appear useful for fighters as well. They are strong and are engineered for minimal stretch. Of course, any stunt flier will also tell you that they are pretty darned expensive and seldom come in lengths over 300 feet. The biggest problem, however, is that most are so thin and slippery that they may cut your hands.

My favorite line is waxed polyester/cotton thread Number 12 that has been flown and handled a fair bit.

Waxed line is very tacky when new and doesn't run out smoothly. But when excess wax has rubbed off, you are left with a line with no fuzzy bits, minimum drag for its size, and that you can grip easily with no string burns.

Martyn Lawrence
Gwynedd, Wales, United Kingdom

Cutting Line - Glass coated line is traditionally made by coating string in a paste made from powdered or ground bottle glass and wheat-flour glue. Egg whites and starch can be used instead of glue. According to Indian legend, wealthy fighters mixed diamond dust into their cutting paste.

Two kinds of cutting line are produced in India - single coat and double coat. The single-coated line cuts only from one direction, while the double-coated line will cut from either direction. This means you can pull to slice or let out line to cut by force. Designed to be sharp and abrasive, the line requires special precautions and special handling.

Glass line isn't dangerous if you handle it right. Just remember to pull in or let out line hand-over-hand. Don't let it slide through your fingers. That's how you get cut.

I use glass which has been ground up and then strained through an old sock. That way, you get only glass powder and not larger pieces. The powder can then be attached to your line using glue or egg whites for a good, stiff finish.

Al Chang
Honolulu, Hawaii

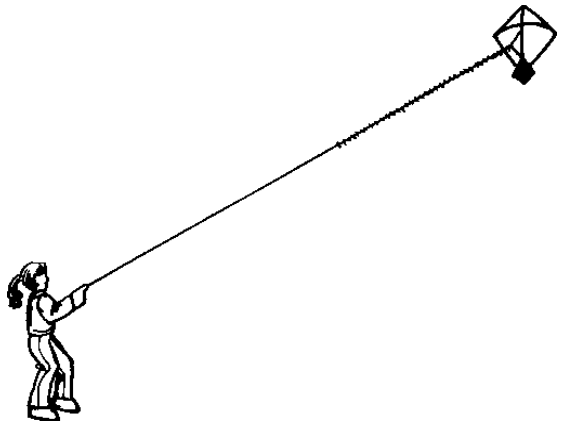
Caution cannot be over emphasized when cutting line is in the air or on the ground. Be absolutely certain that spectators are off the field, and that non-combatant kites are not in the fighting area. Flying glass line among other kites - even among other fighters - is a quick and easy way to become quite unpopular. Make sure that everyone involved understands and agrees before you begin any "cutting combat".

In addition to cutting down other kites, glass line can also quickly cut your hands if you aren't careful. Experienced fliers often coat their fingers with tape so that they can maintain tension and control without sustaining unnecessary injuries.

You cannot effectively fly fighters wearing gloves, so if you use cutting line, be prepared to shed a little blood. In India, cut fingers are accepted as part of the game. Cuts heal "in a week or so", we are assured by master fliers.

Mel Govig
Randallstown, Maryland

To avoid cuts, an easy thing to do is simply limit the amount of cutting line to a small section up near the kite. You can then fly and control the fighter on “regular” line.



Not only is more skill needed to make contact on the shorter piece of coated line, but the hands are also spared the injuries caused by handling the cutting surface.

Besides, frequent contact with the line wears the glass coating off and makes it less effective. You’ll probably want to replace any “used” portions of your line after one or two good flights. Using smaller pieces means that you won’t wear out your entire line as quickly.

Another important thing to remember is to try and keep your line dry. The glue and glass mixture “melts” when wet and a large spool left in the rain will quickly become a sticky mess.

Don’t leave line unattended on the ground, and remember to pick up any stray or loose pieces you may have discarded. Leaving anything behind on the field is a bad idea, but cutting line can be particularly dangerous. Coated line is often hard to see and can easily cut the legs of people - especially children - and animals in the area.

Cutting line can be great and challenging fun. Improperly or carelessly used, it can also be extremely dangerous to you and to others. Be careful.

Line Weight

Because of the effects of gravity and drag, choosing the right weight line is almost always the difference between success and failure. Line that’s too light will break and you may lose your kite. Line that’s too heavy will keep the kite from performing well and may actually keep it from getting into the air at all.

> *When you shop for line, try the breaking strength on a short piece. The line should break before it hurts your hand. I am known in several shops in Paris for fiddling with the spools and breaking line. You will certainly get some remarks and be asked why you are doing this. Be prepared with your answers!*
>
> ***Philippe Gallot***
> ***Paris, France***

The best weight of line for a given situation depends on the size and type of kite used, the wind, the number of knots in the line, and on the length you plan to use. Recommendations vary from 10 to 30 pound breaking strength. The best answer is to carry a number of lines for use with different kites and wind conditions. Use the lightest and thinnest possible line that will support your kite in different circumstances for maximum performance.

Line weight and length are usually printed on the packaging. Don't forget to write these figures on your spool or reel before you throw the packaging away. Some fliers even keep track of the age of their lines since regular use and even exposure to sunlight can wear them out. You can try and remember mentally, but with several sets of line in your collection, it can become a bit confusing. Better to use that brain power learning flying skills than memorizing fly line statistics...

Spools and Reels

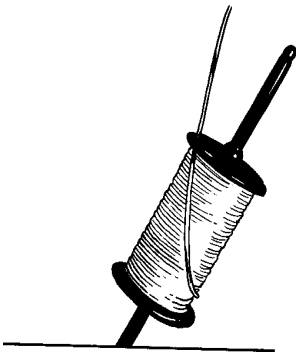
Proper line handling depends on a good, effective spool or reel. Different types of kite flying require different types of winders. Fighter flying is no exception.

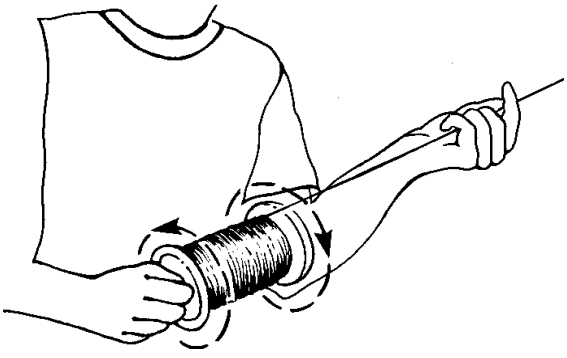
To fly fighters well, you need a device which will hold a good amount of line and allow you to feed that line out quickly without drag or tension which will upset your control of the kite.

Since you will usually finish your flight with a fair amount of line loose on the ground, you also need a winder which will collect slack line quickly.

Fighter kite fliers have developed several devices which seem to work pretty well.

Indian Spools: The most common line devices for fighter flying are the traditional Indian spools made from a revolving barrel and two long handles. When you're flying, you place one handle vertically into the ground so that the line rolls off quickly and smoothly. This frees both hands to work the line.



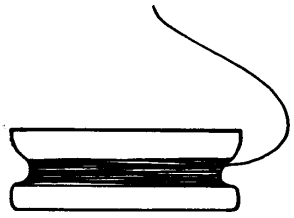


When you're ready to retrieve your line, you place one handle in the crook of your elbow and quickly rotate the opposite handle while guiding the line with your free hand. Thousands of feet of line can be collected in just a few minutes.

The most important quality of a good (Indian) spool is to pay out the line as quickly as possible without any friction. A well balanced spool, heavy and easy to spin, is crucial in order to give speed and good recovery of the feeding line. From a technical point of view, the greater the mass, the better the rotation. Rotation is accelerated with the weight, like a type of fly wheel.

Philippe Gallot
Paris, France

Halo Winders: Halo winders are a more contemporary winding device. Those that are best suited for fighter flying have an extended lip on one side that allows the line to roll off smoothly.



Halo Winder

To recover slack line, simply hold the halo in one hand and wind with the other.

Japanese and Korean Spools: These winders look a bit like Indian Spools except that they only have one handle. Rather than place the spool on the ground and manipulate the line with both hands, spool handlers control the line with one hand and deftly spin the winder with the other. They grasp the handle in their palm and rotate the barrel with their thumb.

Japanese spools are constructed with long handles. Usually the entire machine is finely crafted and decorated.

There are several different models of spools, each with different diameters. The larger the diameter you use, the more line you can maneuver. One turn of the spool will control a large length of line.

Makoto Ohashi
Tokyo, Japan

This type of flying is incredibly effective and amazing to watch. An expert using a Japanese or Korean spool is seldom beaten in competition.

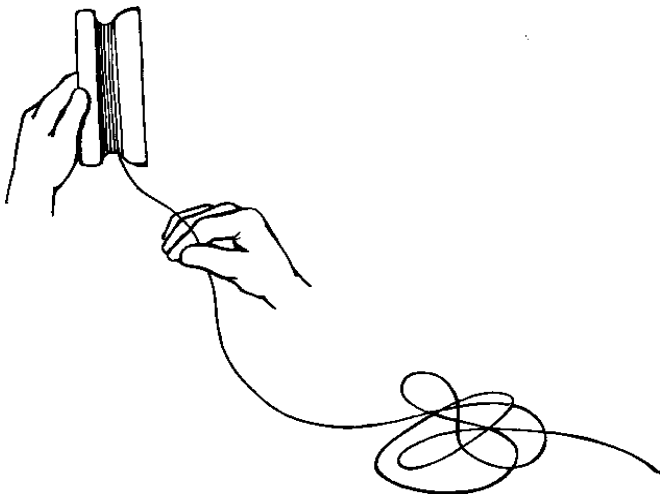
Baskets: Some fliers carry large, open baskets suspended from a strap over their shoulders. The basket hangs at their waistline and collects line as it is pulled in. In this way, a flier can move about the field without leaving a lot of line trailing behind. Tangles are minimized and as soon as they bring the fighter down, they are packed up and ready to go.

A flier with a fighting line basket looks a little odd, but you can't argue with success.

Whatever system you use, it's a good idea to practice unwinding and winding line to get the feeling of how it should work.

Generally, it's much easier to recover line which is laid out loose on the ground rather than try to collect taut line stretched out in the sky between you and your kite. Remember, winding in creates line tension which will effect kite performance. Some winders also have weaker cores which can collapse or be crushed by the cumulative pressure of many line wraps under tension.

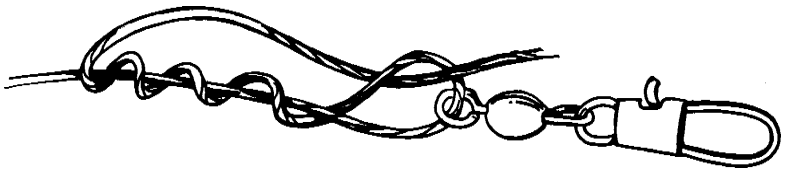
Another important thing to remember, is to disconnect the kite before retrieving your line. Use this as an opportunity to remove as many twists and tangles as possible. Fighter flying necessarily involves putting hundreds of twists in the line. At some point, you need to take those twists out in order to avoid tangles and minimize stretch.



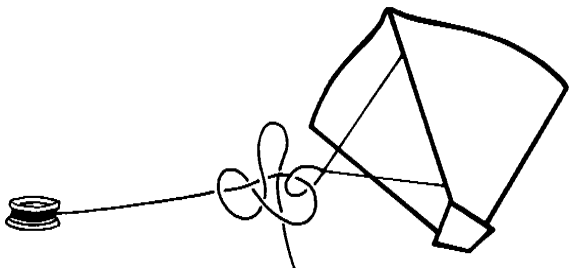
Simply hold the line between your fingers as you wind in and “push” the twists toward the end. By the time you finish collecting all your line, you will have “squeezed” out most of the twists.

Attaching the Flying Line

Many fliers use snap swivels or locks to attach the flying line to their kite bridle. Snap swivels make attachment and removal easy, and extend the life of the line by reducing twists.



You can also attach your kite using a quick-release knot.



The kite is attached securely to the bridle by holding the loop and pulling tight on the flying end of the line. To untie the line, simply pull on the lose end.

Practice using this knot, not only for attaching flylines, but also for bridle line adjustments. It's a convenient and easy way to connect -- and disconnect lines.

Flyline Troubleshooting

There are several things you can do to avoid flyline trouble. With proper care and attention, your fighting line will give you long and faithful service.

Avoid Tangles: The most common problem and by far the most aggravating, is getting your flyline all tangled up. A badly tangled line, covered with wax or worse yet, glass coating, can take hours to undo and can spoil your whole day. It’s far better to use some caution and stay clear of tangles in the first place.

When retrieving line, lay it at you feet in big, random loops. You don't need to pile it in a nice tight little circle. In fact, if you have room, move around a little as you pull in large amounts of line.

If you do end up in a tangle, don't pull on the ends of the line. That only tightens the knots! Instead, pull on the loops to loosen a snarl.

When you begin to replace the line on your winder, it sometimes makes sense to "reverse" the line. Start with the end that was closest to the kite and make a new pile with the loose end at the bottom. That way, when you start using your winder, you'll be retrieving line from the top of the pile rather than the bottom.

Keep "Twist" Out of the Line: Twist in the line is bad for two reasons. First, it coils the line like a spring. That lets it stretch more, making control worse when you fly.

Secondly, it encourages tangles whenever the lines are slack. You can demonstrate this yourself — Stretch a piece of line between your hands and roll some twist in one end with your fingers. Now release the tension on the line by moving your hands closer together. Watch the lines tangle around themselves!

As we said earlier, twisting the line is a fundamental part of fighter kite flying. But once your line gets badly twisted, it will try to tangle at every opportunity. You may reach for slack line while flying and find it unusable. Winding up will be much more difficult, And when your lines becomes tangled, it will be much harder to undo.

The easiest way minimize twist in your line is to use a good snap swivel while flying and to wind up carefully after each use. Squeeze the line between your fingers as you wind and push the twist out at the loose end.

Watch for Fraying: The more you drag your line across rocks or sharp objects, the more often you cross lines with other fliers, the more trees you eat, the quicker your line will fray. You can prolong the life of your flyline considerably just by being careful.

Be particularly careful about fraying close to the end of the line. This is one place that wear and tear tends to build up. Inspect your line occasionally, and if you see significant fraying, cut the ends off. You'll break fewer lines in the air that way.

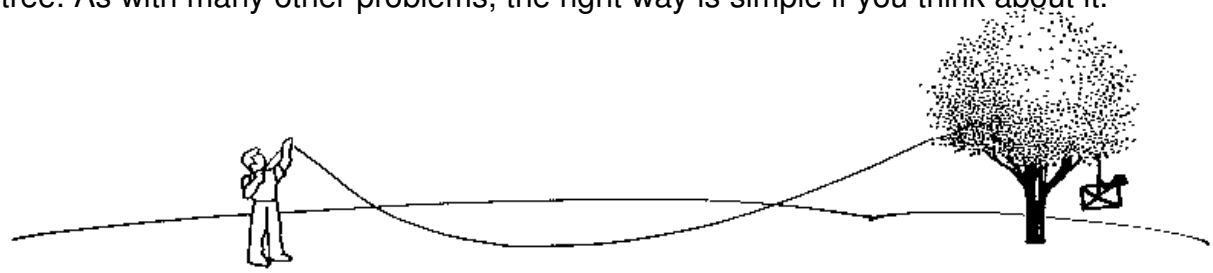
Minimize Knots: Knots are weak points in your line. Some studies report that a knot will reduce the strength of your line by as much as 60%! And as if that weren't bad enough, think about what happens to your line during a kite fight. Lines slide against each other and a knot provides a good "stopper" for your opponent's line to make steady contact and cut through.

The same thing happens on the ground when you try to wind up slack line. Knots prevent the smooth winding of line and together with twist, help tangle your gear.

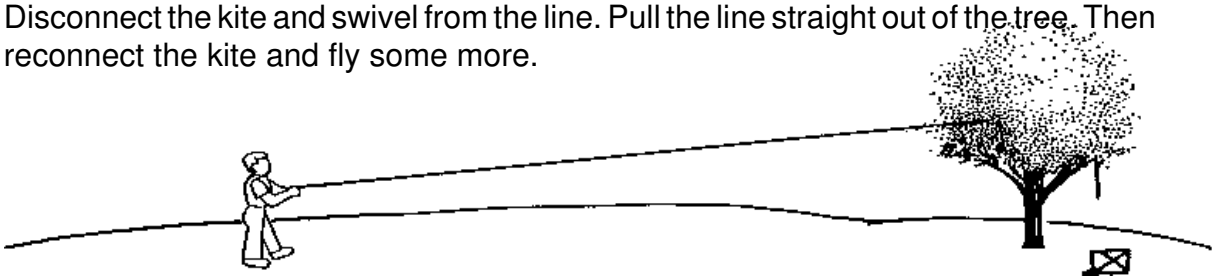
Now we're not saying that you should never tie a knot in your line. Knots are essential - especially if you want to place a short piece of cutting line into your main line. You also don't need to throw away a perfectly good flyline just because it got cut in the middle. But generally speaking, too many knots and too many twists are not good. Avoid using any overly twisted and knotted pieces. Damaged parts of the line should be removed.

Look Out for Obstacles: Finally, a word or two about kite obstacles.

We've seen fliers do some pretty amazing things to try and get their lines out of a tree. As with many other problems, the right way is simple if you think about it.



Disconnect the kite and swivel from the line. Pull the line straight out of the tree. Then reconnect the kite and fly some more.



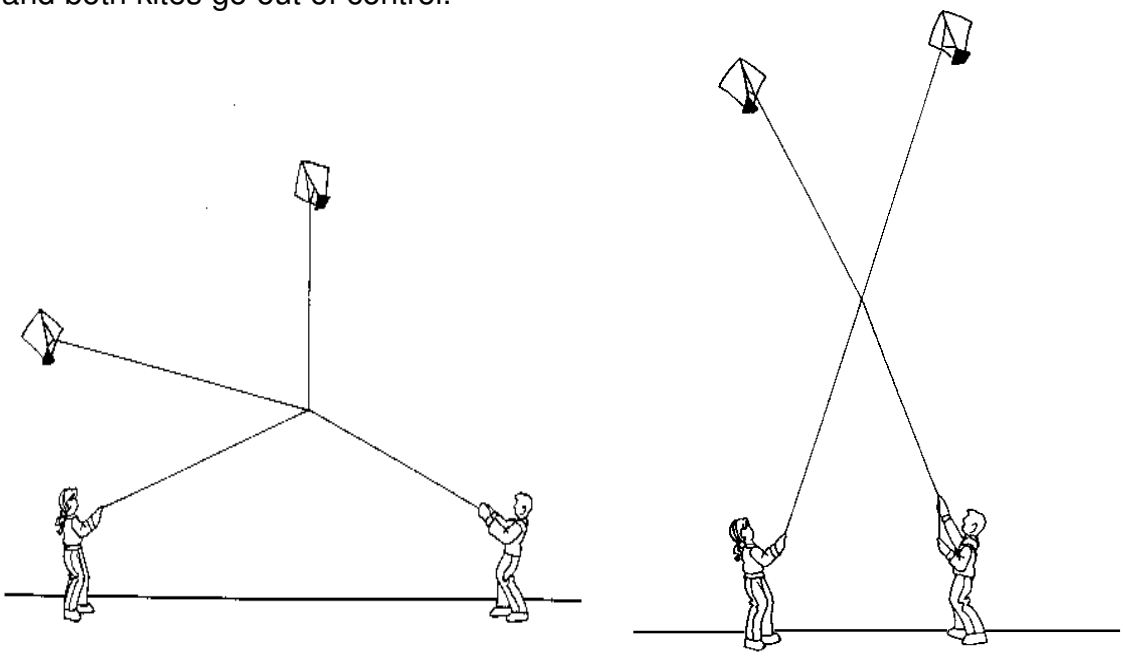
If the kite lands in the top of the tree, try pulling it out with the line. Even on lighter lines, your equipment will take a pretty hard pull before something breaks. And even if something does break, it's often better to lose a few yards of line than to have to climb a tree.

People are another kind of "obstacle" you should be careful of. Because fighters are maneuverable, they can take up quite a bit of air space and, eventually, will come in contact with other kites and their lines.

The simplest way to enjoy yourself safely is to stay away from other fliers. If you are using glass coated line, this is absolutely essential. Make sure you're far enough apart that your lines can't cross. Limit yourself to portions of the sky that aren't so congested. That way, you'll never have to worry about how to untangle your lines or explaining to someone that you really didn't mean to cut their kite down.

Of course, it takes a lot of space to fit very many fliers onto a field this way, and many fields are just too small. If you are flying with friends, you don't get to see much of each other. And besides, you may wander off so far that you won't be able to hear them call when lunch is ready.

For these and many other reasons, fighter fliers tend to cluster together. That's part of the fun. But if two fliers cross lines while standing some distance apart, they are almost always guaranteed to tangle and crash. The two lines "wind each other up" and both kites go out of control.



If your line crosses someone else's, the easiest way to fix things is to get right along side them and unwrap the lines. Cooperate! Communicate!! Flying with other people is always more fun anyway. Besides, before you know it, you'll be engaging in impromptu contests and battles that lead to more formal competitions and all the wonderful new kinds of aerial excitement that they offer.