A Glossary for Practical Knot Tyers

The principles that guided the compilation of this glossary, given at the end, may also explain some perceived limitations. Special thanks are due to Maurice McPartlan and David Pepper, Knotting Matters editors, who made many valuable contributions to the published form. Any errors that remain are the sole responsibility of the author. To remain useful, a glossary must evolve with accepted usage, and IGKT is well-placed to guide such a process. Perhaps IGKT members will contribute companion glossaries in other languages or knotting traditions, or deal with the many areas that broadly may be described as "decorative knotting".

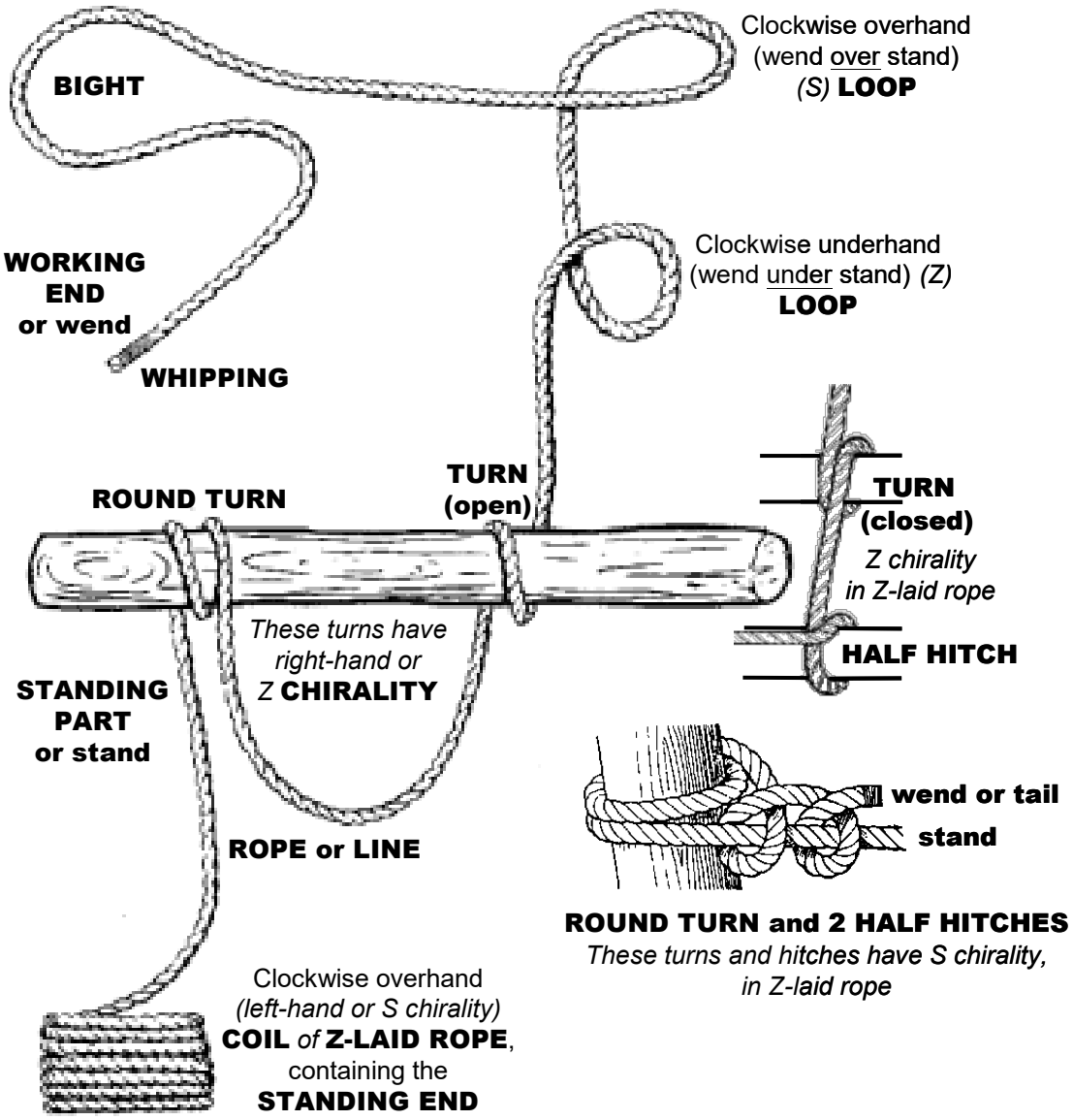
Typographic conventions applied in this glossary

Bold is used at first definition of a term.

Italic is used for a term defined elsewhere in the glossary. Italics are not used for such terms within common names for individual knots (which are generally followed by reference to an illustration number).

Greyed text is used for historical usage of a term with a different current use, or for a non-preferred synonym.

Underline is used for emphasis.



Historical terminologies had indistinct boundaries between knotting terms (Day, 1947) whereas the modern uses of *bight, loop, turn* and *half-hitch* as structural elements in knots, along with *eye knot* as a structural class, and *bend* and *hitch* as functional classes of knots, have very clear distinctions as presented here.

A **bend** is a *knot* that joins two or more *lines*, or that joins parts of one *line*; provided that it requires a structure such as a *bight* or *loop* in each of the *lines* or parts so joined. *Bends* are usually, but not necessarily, made near the *working ends* of the *lines*.

In historical usage the term bend has been applied more broadly, as (noun) a *knot* used to secure or bind a *line* to anything, or (verb) the act of securing a *line* to anything. The narrower usage is recommended, to distinguish *bends* from *hitches* as functional classes of *knots***.** Two *lines* may be **bent** together; or one *line* may be *hitched* to another; but by the recommended usage these terms are mutually exclusive.

This definition of *bend* as a functional class of *knots* implies that confusing names applied historically (in English) to a few *knots* should be corrected. The *knot* used to join *working ends* by a pair of overhand knots, each made around the opposing *standing part*, (sometimes called the fisherman's knot, *ABOK* #496, #1414) is better called the fisherman's *bend*. The *knot* modified from a round turn and two half hitches, by *tucking* the first *half hitch* under a *turn*, (sometimes called the anchor or fisherman's bend, *ABOK* #1723) is better called the anchor or fisherman's *hitch*. Similarly, the *hitches* that are historically called the studding-sail bend (*ABOK* #1678), and the topsail halyard bends (*ABOK* #1677, #1679) should be named as *hitches*. In some languages, these *hitches* have long been called just that.

The usage in knotting probably originated from the fact that a *line* must be bent (in the wider sense used outside of knotting) in order to form any *knot*. Bend and bind have shared derivation.

A **bight** is a curved length of *line*. It may be a **closed bight** (if the two arms of the *bight* touch each other without crossing), or an **open bight** (if the two arms of the *bight* do not touch each other). If the *line* crosses itself, the *bight* becomes a *loop*.

Historical usages of bight include: (a) any part of a *line* between the *standing end* and the *working end* (*ABOK* #29); and (b) an analogy in *cordage* to a geographic use of the term (a bay no narrower than a semicircle, *ABOK* #30). These historical usages are superseded in common current use by: (a) the *stand*; and (b) a widely open *bight*.

Some *knots* can be "**tied in the bight**", meaning without access to the *ends* (eg *ABOK* #1034-#1059, #1773, #1815). This usage is derived from deprecated usage (b) of bight, and it might be argued that a change should be urged to "tied in the *stand*". However, "*tied in the bight*" is part of the current widespread jargon of *knotting*, and the tying of *knots* in the bight does commonly involve the use of a *bight* in the sense recommended here (in *TIB* methods for the clove hitch, the *bight* very quickly becomes a *loop*). "**Tied with a bight**" has a different meaning: forming a doubled version of a *knot*, with the end of the *bight* emerging as the *tail*.

Bights are very important in *knotting*. For example, a reef knot (*ABOK* #1402) comprises two interlocking *bights* (*collars*).

A **block** is a device with an aperture, used to change the *lead* of a *rope*. *Blocks* may be compounded to increase the mechanical advantage of a **tackle** (a combination of *rope* and *blocks*). The simplest durable *blocks* are hard wooden thimbles or "fiddles". To decrease both friction and wear on the *rope*, most *blocks* include grooved wheels (pulleys, sheaves or shivs) which can rotate on an axle or bearing. *Blocks* and their wheels should be sized to suit the *rope*.

Blood knot is widely used for *knots* with multiple *turns* around a *standing part,* especially in fishing *line*. In the USA, these are commonly called **clinch knots** (when used to attach a *line* to an eye in a fishing hook or swivel as in *ABOK* #300; Day #140) by analogy to the starting structure in *ABOK* #1131, #1496; Day #87; or **barrel knots** in reference to their shape (*ABOK* #295, #1413; Day #45, #138). However, Platts (1938) clearly illustrates: (i) as the barrel *knot*, what today is often called the grapevine or double fisherman's *knot* (or *bend*) (*ABOK* #294, #1415); and (ii) as the blood *knot*, what Ashley calls the barrel *knot* (*ABOK* #295). Published use of (double) blood *knot* for *ABOK* #295 goes back at least to Chaytor (1910), who describes learning it in 1892. Ashley also gives a morose historical use of blood *knot* for a double overhand *knot* (*ABOK* #508). This is a reminder that the same *knot* is sometimes known by very different common names, and the same common name is sometimes applied to very different *knots*. Any doubts about a structure can generally be resolved with the aid of clear illustrations.

Braiding or **plaiting** (historically also platting) is the process of folding strands over each other, or of *tucking* successive *loops* in a single strand, to produce *cordage*, mats or other practical or decorative items. The product is a **sinnet** (sennit). The term *braid* was formerly applied primarily to flat *sinnets* (Ashley, 1944), or to crown *sinnets* with parallel surface strands (Warner, 1992); with *plait* sometimes restricted to variations on the round *sinnet* with crossed surface strands (Warner, 1992). However, this distinction has not been maintained, and the terms *braid* and *plait* commonly now are used interchangeably. While *braids* were greatly elaborated by past seamen (*ABOK* Chapters 37-39), their use as *cordage* was far less than spiral-*laid ropes* because *natural fibres* needed to be twisted together for *strength* of the resulting *cordage*. Following the advent of long *synthetic fibres*, machine-*braided cordage* predominates for many applications, particularly where either torsion or stretch under tension is undesirable, and where expense is not a primary consideration. Modern *cordage* commonly has several layers (as in double *braids*) and may have hybrid construction (as in *kernmantle ropes*).

To **capsize** (or flip) a *knot* is to alter its structure substantially, by pulling on one or more of the *lines* emerging from the *nub* of the *knot*. Sometimes *knot* elements are deliberately *capsized* as part of a way of tying, using, or *opening* a *knot*. In other cases, *capsize* results from inappropriate loading of the *knot*, and it is problematic if the *capsized* form is less *secure* or if it has less *strength* than the intended form of the *knot*.

Chirality is the property of a structure that can not be superimposed on its mirror image. *Laid ropes* and *loops* are *chiral*, as are human hands, feet, gloves and shoes. In physics, the *chirality* of a spiral or helix is designated according to the hand which, when grasping the helix with the fingers following the coils, points the thumb in the direction of progression of the helix. Thus a common bolt or screw thread has right-handed *chirality* (but bolts and screws with left-hand threads are made for special purposes). Spiral-*laid ropes* commonly have right-handed *chirality* in the final arrangement of twisted strands in the *rope*. This is also referred to as *Z-laid rope* because of the slant of the strands when the *rope* is held vertically. But left-hand (*S-laid*) *ropes* are also made for special purposes.

Because *loops* (and their derivatives including *coils*, *turns* and *half hitches*) have *chirality*, *knots* with a single *loop*, *turn* or *half hitch* (such as a common sheet bend or bowline) can be made in right-hand or left-hand *chirality*.

This is not the same as a confusing usage of "left-handed" to indicate a "perverted knot, tied contrary to the prevailing practice" (Ashley, 1944 Chapter 1) as in a "left-hand sheet bend" (*ABOK* #67) which has oblique *tails* or a "left-hand bowline" (*ABOK* #1034½) which has the *tail* outside of the *eye*. Indeed, views about what constitutes prevailing practice vary between *knot* tyers. The confusing usage is not recommended.

There is commonly a mixture of *chiralities* in multi-*loop knots*. The reef knot (*ABOK* #1402), cow hitch (*ABOK* #1673), and figure eight knot (*ABOK* #520) are among the simplest amphichiral *knots*; but even these exist in S/Z and Z/S forms if one is able to distinguish the order in which *loops* were tied (Chisnall, 2016).

It is generally agreed that in achiral or amphichiral *cordage*, *loop chirality* will have no substantial effect on *knot strength*, *knot security* or *rope* life. In spiral-*laid rope*, a particular *loop chirality* can increase friction and *security*, eg in a timber hitch (*ABOK* #1665, #1733) *dogged with the lay*. But there is little published evidence, and experts disagree, on any advantage in the *chirality* of single *loops* made in *knots* used in *chiral ropes* (reviewed in Warner, 1996). It is likely that any effect depends on the *rope* material, and the extent of tightening the *lay* during manufacture. Deep-water sailors in the age of tall ships were perhaps most alert to effects on the longevity of *rope* subject to frequent re-knotting, because at that time *rope* was relatively expensive and in limited supply on long voyages. They wove hide strips into *rope* to address chaffing in *nipped* areas of rigging (Alston, 1860). There is some evidence that they preferred S *chirality loops*, *turns* and *half hitches* in simple *knots* made in *Z-laid ropes* (Svensson, 1940); but this was evidently over-ridden by speed or convenience in casting a *knot*, eg by a right-handed sailor making the common bowline with Z *chirality nipping turn*.

Although some illustrators depict *knots* with seemingly random *chirality*, many *knot* tyers tend to stick with the same tying method (and thus the same *loop chirality*) for the *knots* familiar to them. This has some forensic applications (Chisnall, 2016).

The *chirality* of a *rope* also affects the optimal method for *coiling* that *rope*.

Classification of *knots*, or sorting into groups, is done in many ways according to the interest of the classifier. For the *knot* tyer to avoid confusion, it is most useful to consider whether a particular grouping is based on function, structure, or both. In this glossary, *bend*, *hitch* and *stopper knot a*re the main functional classes, but some structural features have been used to make these classes mutually exclusive. Other common functional groupings are generally self-explanatory: eg binding *knots*, button *knots*, occupational *knots,* decorative *knots etc.* By comparison, *eye knot, splice* and *sinnet* are defined in this glossary in structural terms. Other common structural groupings are generally self-explanatory: eg crossing *knots*, single-strand *knots*, multi-strand *knots etc.* As many *knots* have multiple structural elements and multiple potential uses, it is common for the same *knot* to fall into several such groups (exemplified by Ashley, 1944). Warner (1992) attempted a classification based on the distribution of *nip*, but admitted the difficulties and provided alternative groupings of knots in his compilation. Unlike the classification of organisms by biologists, based on the underlying principle of evolutionary relatedness; no dominant principle for the classification of *knots* has emerged to satisfy the diverse purposes of *knot* tyers.

A **coil** is a series of *loops*, which need not lie around a solid, and may be formed in hand or on a surface. *Coils* in *Z-laid rope* are commonly laid down clockwise (with S *chirality*) because in this direction the *lay* of the *rope* is best able to absorb the *kinks* that result when *line* is drawn off the *coil*. *Kernmantle rope* may have an achiral core (parallel untwisted strands), or an amphichiral core (mixture of *S-laid* and *Z-laid* components). *Braided ropes* are typically amphichiral (with an equal number of *braids* or *plaits* in each direction). Such *ropes* are best laid down in a way that does not introduce *kinks*: by **flaking** in a figure eight or in a zig-zag pattern (*ABOK* #3110-#3113), or by alternating overhand and underhand *loops* to yield an **alternating or kink-free coil** (Warner 1992, #23). Historically, the term flaking (or faking) was used for any kind of *coiling* (Ashley, 1944). *Coils* of *rope* may be left untied so that *line* can be drawn off, or they may be secured by various means for transport or storage.

Flemish coiling or **cheesing** is laying down a *rope* such that that the *line* never crosses itself to form a *loop*, but instead forms a spiral of ever-increasing diameter. If there are several stacked layers commencing alternately at the centre and the outside, the structure may be called a **French coil** (*ABOK* #3012-#3014). In either case it is a decorative form, less suited than either *flaking* or an *alternating coil* if *line* is to be drawn off quickly through a *block*.

A **collar** is a *bight* (usually a *closed bight* or a narrowly *open bight*) that passes around a solid, usually another part of the same *knot*. The term is sometimes used in a related sense for the region of a *bight* that is in contact with a solid around which the *bight* passes, or for the region where a *bight* (or even a *loop* or an *eye*) makes a *U-turn* around a solid. Then the *collar* may be distinguished from the arms (or legs) of the *bight* (or *loop*). For example, the *nub* of a common sheet bend (*ABOK* #1431) comprises a *half hitch* around the arms of a *bight*, with the *collar* of the *bight* around the *standing part* of the *half hitch*.

All of these uses are analogous to the meaning of collar outside of *knotting*, for a band that passes at least part of the way around a neck. Indeed, the part of a *knot* enclosed by a *collar* is sometimes called the neck (Warner 1992, #400). For other examples of uses of *collar* in *knotting*, see *ABOK* #2768 and Warner (1992, #38).

A *collar* is an important structure in many *knots* because: (a) it prevents the *knot* from being collapsed by a pull on both arms of the *bight*; (b) it adds to the friction that keeps the *knot* together in its intended use; and (c) it provides a structure that can be rolled over the *line* around which it passes to assist with *opening* of many *knots*.

Cordage is a collective term for elongated materials including *rope*, *small stuff*, and narrow webbing *tape.* Historically, before the common use of *braided* and *kernmantle ropes*, the term referred to *ropes* that were twisted or "corded" in construction (Ashley, 1944). The term is now generally restricted to materials of *fibrous* construction, to distinguish *cordage* from straps, cables, hoses and other elongated structures that are less pliable and therefore less suitable for *knotting*. To be useful in *knotting*, *cordage* must be much longer than it is wide. In this sense, *cordage* is sometimes regarded as essentially linear, whereas *knots* are made in two or three spatial dimensions (or more dimensions in theory). The composition and construction of *cordage* can greatly affect its properties, including the *security* of particular *knots* tied therein.

Dogging means taking one or more *turns* of a *line* around a solid to which it is *hitched*, in order to provide additional friction and prevent the hitch from slipping when there is a pull along the underlying solid. To maximise friction when the underlying solid is a *laid rope*, the *tail* of the initial *hitch* is always *dogged with the lay* of the underlying *rope*. In other words, the *tail* is wrapped in the same direction as a worming (*ABOK* #3337) would be applied to fill the grooves between strands of an underlying *laid* (twisted) *rope*. *Dogging turns* are perhaps best known in the timber hitch (*ABOK* #1665, #1733) and the tail block hitch (*ABOK* #1464, #1751).

Dressing a *knot* is working it into the desired shape. After the passages of *cordage* necessary to form any *knot* have been made, it is generally necessary to **dress** the *knot* and **pack** (or **snug**) the *knot* (hand tighten it after it is in the desired shape), to obtain the greatest *security*, *strength* and/or resistance to *jamming* in use of the *knot*. The term set has been used variously as a synonym for *pack*, or for both *dressing* and *packing*, and is therefore not recommended. *Knots* of more complex structure generally require more careful *dressing* and *packing*. Failure to complete this process may leave a *knot* that is prone to slip, *capsize* or *jam* under load. Therefore, careful *dressing* and *packing* are often as important in practical *knot* tying as the correct weaving of *cordage* to form the *knot*.

An **end** is either extremity of a *line*. Commonly, one *end* is fixed or distant from the *knot* tyer and is called the *standing end*, whereas an *end* engaged in the tying of a *knot* is called a *working end*. Some *knots* can be *tied in the bight*, without involving either *end*.

An **eye knot** is one which provides a *bight* of *cordage* (the **eye**) outside the *nub* of the *knot*. The *eye* may be **fixed** as in an angler's loop (*ABOK* #1017) or eye splice (*ABOK* #2725); or it may slip as in a **noose** or running *knot* (eg *ABOK* #1114). Some *knots*, like the crabber's eye knot *ABOK* #1987 may be *capsized* from a *noose* to a *fixed eye* by a sharp pull on the *tail*. More worryingly for some applications, some *fixed eye knots* (like the bowline *ABOK* #1010) can be *capsized* by inappropriate loading into *nooses*. Cyclic adverse loading may be most problematic.

Note that *eye knot* is a structural definition, and such *knots* may be used as *hitches* or to form *bends* (eg a bowline may be used as a *hitch* around a bollard *ABOK* #1783, #1787; and two bowlines may be interlocked to make a hawser bend *ABOK* #1455).

The term "loop knot" or merely "loop" historically has been used for such structures (*ABOK* #33). To avoid confusion with other uses of the term *loop*, it is preferable to use *eye knot*.

To **fair** a *knot* (particularly a *splice*) is to make it smooth or even in order to improve its appearance or function.

Fibres (or fibers) are the smallest components used in the manufacture of *cordage*.

> **Natural fibres** used in *rope* making have been mostly from plants (grass, palm, hemp, jute, sisal, flax, cotton, manila or abaca *etc.*), but *fibres* of animal origin (hair, silk, tendons, leather strips) have also been used. The *rope fibres* (slivers) obtained by rotting or drying and combing plant stems were generally vascular bundles comprising multiple "**ultimate fibres**" (elongated plant cells). *Natural fibres* have limited length, and must therefore be twisted together to obtain *cordage* of useful length and *strength*. In some plant species traditionally used for *rope* making the *ultimate fibres* have spiral thickening of the cell walls, with left-hand or S *chirality*. Although these cellulosic coils are only visible by microscopy, they can affect the direction in which *rope fibres* tend to *coil* or provide maximum *strength*. This may help to explain the traditional preference to spin the *fibres* into yarns with Z *chirality*, then form the yarns into strands with S *chirality*, and *lay* the strands into *ropes* with Z *chirality* (as alternating *chirality* at each level of construction results in a stronger and more stable *laid rope*).
>
> **Synthetic fibres** are solid but flexible man-made polymeric chemicals, first developed in the 1930s and now the major components for industrial *rope* making. These polymers can be extruded in very long filaments, so they need not be twisted if they can be held together by other means, such as a *braided* cover around parallel *synthetic fibres* in some *kernmantle ropes*. *Synthetic fibres* may also be chopped into convenient lengths (staple fibres) for the manufacture of *laid ropes*, where the *fibre* ends make an important contribution to the feel and surface friction of the *rope*. Sheets of synthetic materials have also been cut into thin strips (split film) for use in the manufacture of *cordage*.

The properties of *rope fibres* and the method of *rope* manufacture have profound impacts on *rope* characteristics that are relevant to *knot* tyers and users: including hand feel, *rope strength*, elasticity, stiffness, specific gravity, temperature (melting) resistance, surface friction, shrinkage when wet; and resistance to damage through tight turns, chaffing, sunlight and rot. Some *synthetic-fibre ropes* (eg unjacketed braids of high modulus polyethylene, HMPE, sold as Spectra™ or Dyneema®) are so strong and have such low surface friction that most well-known

knots will slip apart under tension far below the nominal breaking *strength* of the *line*. Special *splices* developed for such *ropes* are generally used instead of other *knots*.

The terminology of **hitches** (***stek*** in Dutch and Swedish, ***stich*** in German and ***stik*** in Danish and Norwegian) has been chaotic, despite efforts at clarification by several authors. The confusion stems from the use of the same term to describe a structure used in *knots* and a functional class of *knots*. This confusion with a structural element of the *nub* that is neither necessary nor sufficient to define the functional class does not arise in other functional classes of *knots*. Here is recommended a terminology for *hitches* that separates those purposes. It is intended to be logical and unambiguous while preserving insofar as possible the useful distinctions of the past.

In the functional sense, the term **hitch** has been applied to any *knot* that secures a *line* to a solid (and in this sense it includes many *knots* comprising multiple *bights, loops*, *turns* and/or *half hitches* as structural elements). It is recommended that this functional use of *hitch* be retained.

It is generally agreed that in this functional use, when the solid is another *line*, the *hitch* should be made entirely by one *line*, with the other serving only as a solid around which the *hitch* is made. This helps to distinguish *bends* from *hitches* as functional classes of *knots*.

The term hitch has sometimes been taken to exclude *knots* in which the solid is another part of the same *line*, or any *line*; and it has sometimes been restricted to those *knots* that fall apart on removal of the solid around which the hitch was made; but these restrictions are not implied in the recommended usage.

In the structural sense, the term hitch has been applied to a *turn* of *cordage* around a solid, with the *line* arranged to confer some *nip* or pressure on itself. It may be useful to note that just as a *turn* is a special class of *loop*, in this structural sense a hitch is a special class of *turn*.
It is recommended that the term *half hitch* be used for this structure. The term *half hitch* is widely used at the time of writing in this recommended structural sense.

In this context:

(i) A **half hitch** is a *turn* of *cordage* around a solid, with the *turn* arranged to confer some *nip* on itself. The underlying solid may eg be a spar, a *line* (including another part of the same *line*), or several *lines*. This is a structural term. Commonly, the *stand* nips the *wend* onto an underlying solid, trapping the *wend* so that the *half-hitch* structure remains (at least temporarily) when tension is taken off the *wend*. Exceptions include the first *half hitch* formed when tying an isolated clove hitch (*ABOK* #1176, #1777) or a buntline hitch (*ABOK* #1711) with the *end*. In such cases, the *wend* passes over the *stand*. This structure will slip instantly under any tension on the *stand* if the *wend* is released before it is trapped in the second *half hitch*.

A *half hitch* used alone is rarely *secure* as a functional *hitch* (which may explain the traditional qualification "half"). However, the *half hitch* is a very important structure in *knotting*, because *half hitches* are combined with other structures to form many *secure knots*. For example, the *nub* of a common sheet bend (*ABOK* #1431) comprises a *half hitch* around the arms of a *bight*, with the *collar* of the *bight* around the *standing part* of the *half hitch*.

(ii) The term single hitch has been used in various ways, sometimes for a version of a *half hitch*, comprising a single *turn* with the *working end nipped* against another body by the *standing part*. For reasons detailed in the box below, it is recommended that **single hitch** be reserved as a functional term: for variants on the *half hitch* structure under circumstances in which the *nip* that is caused by the *stand* pressing the *wend* against an underlying solid is sufficient to hold against a substantial pull on the *standing part*, in the absence of other complications involving the *stand* or the *wend*.

In all other circumstances it is better to use a structural description such as "a *half hitch* around the spar", "a *half hitch* around the intersecting *rope*", "a *half hitch* around the arms of the *bight*", "a *half hitch* around the *stand*", or "a *turn* around the spar and a *half hitch* around the *stand*".

Historical caution: In early publications, a structure is typically described by illustration or instructions for tying of the simplest or common use; with other versions shown later, if at all. A "half hitch" is described in some seamanship manuals of the 1800s as "the *end* of a *rope* taken around the *standing part* and passed through the bight", with only the illustrations to distinguish this from identical wording in the description of an overhand knot. Some of these manuals also use the term "*half hitch*" in a broader sense, eg in description of a timber hitch with a half hitch, or a sheepshank (eg Luce, 1863).

The term is defined in two ways by Ashley (1944): with (p 14), or without (p 283), a pass around another object. On p 283, Ashley proposes that a *turn* around the *stand* distinguishes "half hitches" (eg *ABOK* #50, #1662, #1663) as a class of "single hitches" (eg *ABOK* #49, #1594). Ashley cites Luce (1863) as the origin of "single hitch", but Luce neither defines nor illustrates a "single hitch". Texts by ship commanders in the 1800s gave no instruction on knots considered to be impractical, but such terms or structures may well have been known in the forecastle (Alston, 1860).

Subsequently, Ashley's proposal has not always been found useful (eg Warner 1992, #10). Even in *ABOK*, "half hitch" is widely used for the structure without a pass around another object, or without a *turn* by the *line* around its own *stand*. When Ashley describes a "half hitch" added to a clove hitch (*ABOK* #1671), backhanded hitch (*ABOK* #1725), water bowline (*ABOK* #1012), or timber hitch (*ABOK* #271); or when he describes two half hitches (*ABOK* #1781), a seized half hitch prepared in hand (*ABOK* #1780), bell ringer's knot (*ABOK* #1147), sheepshank (*ABOK* #1152), rope stopped to chain (*ABOK* #1516), or reeving-line bend (*ABOK* #1459); he uses for the added *half hitch* the sense recommended here.

Ashley's proposal for "single hitch" as a new structural term to be distinguished from "half hitch" met with three serious problems: (i) it was not always possible to discern the distinguishing structural feature (Day #13); (ii) it required a change to long-used knot names that have persisted to the current day (eg *ABOK* #1733, #1748, #3114); and (iii) even Ashley failed to apply it consistently. However, the proposal was accompanied by an important functional insight: a *half hitch*, in a rope with sufficient surface friction, can be useful as a functional *hitch*, if the *stand* presses the *wend* into a shoulder-like structure such as (a) a fork, peg, edge, groove or hole; or (b) other ropework on the solid. This function also usually requires that sufficient tension is maintained to lock the *wend* under the *stand*. Therefore, it is recommended that *single hitch* be reserved as a functional term, as defined above.

Although Day (1947) attributes the demarcation to Ashley (1944), there were earlier flirtations with "a single hitch" to mean something other than one *half hitch*. For example, Haslope (1891) says of "two half hitches" cast in hand (Fig #25, like a clove hitch tied in hand *ABOK* #1773), that the first half of the structure is "a single hitch: it is merely a loop formed in a rope". Of the killick hitch, Haslope (1891) says "After making a timber hitch and hauling it taut, a single hitch is made, and slipped over the end of the stone alongside of it" (Fig #28). The same structure slipped over the bights to form sheepshanks, he calls a "*half hitch*" (Fig #60). Ashley also describes the first half of a clove hitch as a single hitch, although it does not comply with the definition given for that term in *ABOK*.

Budworth (who edited the corrected edition of *ABOK* in 1993) shows 2015 as a "single hitch" the structure distinguished in *ABOK* as a "half hitch". There is similar inconsistency between authorities in naming of the structure added to a timber hitch to yield a killick hitch (*ABOK* #271, #1733). Adding to the potential for confusion, the *half hitch* structure, with or without the functional quality of a *single hitch*, is sometimes referred to as "a simple hitch" or simply as "a hitch". Even a narrow *bight* has been called a "simple hitch" (Burgess, 1884) and a *round turn* has been called "a single hitch" (*ABOK* #2019). To avoid confusion, these usages are not recommended in the naming of knots or knot structures. The current Glossary recommends definitions that avoid such confusion.

(iii) A clove hitch (*ABOK* #1670) comprises two *half hitches* made with the same *chirality* (ends emerge at about 180°). For enhanced *security*, the *tail* should be *locked*.

(iv) A cow, ring or girth hitch (*ABOK* #1673, #1859) comprises two *half hitches* made with opposite *chirality* (ends emerge at about 360°). It is *secure* if pull comes equally on both ends.

(v) A round turn and two half hitches (*ABOK* #1720) comprises a *line* that forms a *round turn* around any solid, followed by a clove hitch around its own *stand*, where the stand enters the *round turn*. The clove hitch must progress away from the solid, or result will be a form of buntline hitch (*ABOK* #1711), which is more liable to *jam*.

(vi) By analogy, the structure in *ABOK* #50, #1662, #1663 might be called a "turn and half hitch": it comprises a *line* that forms a *turn* around any solid, followed by a *half hitch* around its own *stand*, where the stand enters the *turn*. To remain in place, the *half hitch* must be formed with the *wend* toward the solid. This *knot* is insecure unless the *tail* is *seized* or otherwise *locked.*

There are many other functional *hitches*.

When a *line* is formed directly into a *half hitch* around its own *standing part*, the *half hitch* structure can be *capsized* to yield a thumb knot or overhand knot **(***ABOK* #46, #514-#515), which is the simplest *stopper knot* .When a *line* is first passed around a solid then formed into a *half hitch* around its own *standing part*, the *half hitch* structure can be *capsized*: (a) with the ends parallel to the *turn*, as a half knot (*ABOK* #47) which is the first half of a reef knot (*ABOK* #1402); or (b) with the ends at right angles to the *turn*, as a marline (marling) hitch used in some *lashings* (*ABOK* #2075, #3115, #3128). Of course, the converse also applies. For example, a thumb knot can be capsized to yield a *half hitch*. A *half hitch* (or indeed a *turn* that exerts no *nip* on itself) can be transferred (with the same *chirality*) between *lines* of similar diameter that are so connected, by changing which *line* is placed under tension (Day #13 C-D).

A *knot* is said to **jam** if it becomes difficult to *open* (untie) after loading. The difficulty in *opening* often increases with the load to which the *knot* has been subjected. **Jamming** (jambing in some older references) can be a desired feature to enhance *security* in a *knot* which is not intended to be heavily loaded, or not intended to be *opened* once made. *Jamming* tends to increase with decreasing diameter and stiffness of the *line*. *Small stuff* is generally cheap and disposable so it is cut rather than *opening* the *knots*, and *jamming* is not then an issue. However *ropes* are more expensive and *knots* made in them commonly need to be *opened* rather than cut out. Then resistance to *jamming* may become a very important feature in the selection of an appropriate *knot*. The susceptibility of any *knot* to *jamming* also depends on the composition of the *cordage*. In potentially tri-loaded *eye knots* such as the lineman's loop or alpine butterfly (*ABOK* #1053), it also depends on the direction of loading.

Kernmantle (core and sheath) *ropes* have a *braided* sheath around a core which may comprise either parallel *fibres* or a mixture of *Z-laid* and *S-laid* components. The term is sometimes restricted to specialized *ropes* used in climbing, caving and rescue work; to differentiate them from utility *ropes* which are not rated for life-support though they may have a similar cover-*braided* construction. In many kernmantle *ropes*, the core contributes most to *strength* and stretch characteristics; while the cover determines wear resistance and surface friction. Both parts may contribute to other properties such as *rope* firmness and specific gravity. The outer layer typically contributes more to the overall *strength* of double-*braid ropes*.

As an example of the ways that *rope* construction can alter important practical properties, *kernmantle* rescue *ropes* are typically much less weakened than *laid ropes* by tight turns (eg over a carabiner) but *knots* that were long considered *secure* in *laid ropes* may prove less *secure* in similar applications with stiff *kernmantle* (eg the common bowline without added *locks*).

A **kink** is a small *loop* or tight change of *lead* in a *rope* that prevents it from passing through a *block*, and that may weaken the *rope* by damaging its structure, eg by causing a **hockle** or unintended displacement of the strands.

A **knot** is any useful complication in a length of *cordage*. A complication that is useless, especially if formed unintentionally, is commonly called a **tangle** or **snarl**. In historical usage, the word *knot* is sometimes reserved for button-like knobs, sometimes for structures made in small *cordage* that is liable to *jam*, and sometimes for functions other than *bends* and *hitches*. In present common usage, it is a generic term including all of these things.

Laid (or spiral-*laid*) *rope* is typically constructed from *fibres* (either natural or synthetic), which are twisted (spun) into yarns, which are twisted (formed) into strands, which are twisted (*laid*) into *rope*. In some cases, additional stages are employed (eg *rope* yarns may comprise multiple threads or twines, each comprising multiple *fibres*). The direction of twisting typically reverses at each stage for maximum stability of the *rope*, and in most current 3-strand (plain- or hawser-*laid*) *ropes* the final direction is a clockwise (or right-hand) helix of strands. This is also referred to as **Z-laid** *rope* because of the slant of the strands when the *rope* is held vertically. Left-hand (**S-laid**) *ropes* and 4-strand *ropes* are made for special purposes. Larger (cable-*laid*) *ropes* may comprise three hawser-*laid ropes* arranged in a counter-clockwise (*S-laid*) helix. **Hard-laid** *ropes* have tightly spiralled strands, whereas **soft-laid** *ropes* have gentler spirals; which can affect *rope* feel, *strength* and durability. All *laid ropes* show *chirality*. The direction in which an apparatus is twisted during *rope*-making can be ambiguous, unless it is specified whether the view is from the front or rear of a bobbin or *rope*-crank. However, the *chirality* of the resulting *rope* is unambiguous, and the same when viewed from either *end*.

> "**With the lay**" should mean with the same *chirality* as the *rope* (in the same direction as a worming (*ABOK* #3337) would be applied to fill the grooves between strands of an underlying *laid rope*). Unfortunately, the phrase has not always been used this way (Warner, 1996). It is open to further confusion if *ropes* with different *chirality* are used together, or when used in reference to multiple *loops* which differ in *chirality*. The phrase is not recommended where ambiguity may arise; in which case it is generally clearer to specify the desired *chirality*.

Many *ropes* constructed from *synthetic fibres* are of either *braided* or *kernmantle* rather than *laid* construction. These construction methods as well as the properties of the *fibres* affect many important properties, including the elasticity and surface friction of the *rope*. Modern *ropes* are constructed differently for various applications. Such *ropes* are typically amphichiral, so they are less likely to twist under load. Ideally, they should also be *coiled* differently from *laid ropes*.

A **lashing** is a binding made with *rope*. *Lashings* commonly involve multiple *turns* of the *rope*. A distinction is commonly made between a *seizing*, made in *small stuff* around *cordage*, and a *lashing* made in *rope* around other objects such as spars. In a related usage, an object may be **lashed** down (by means of either *ropes* or straps passed across the object and secured to some underlying surface) to prevent movement (*ABOK* Chapter 28). The distinction between a *lashing* and a *knot* with multiple *turns* can be vague. For example, the "Hennessy hammock knot" uses multiple passes like a figure eight *lashing* around the *stand* to produce a result that does not *jam*, slip, or cause excessive wear under substantial loads in slippery *rope*. A "wedding knot" (*ABOK* #1513) is an elaborate *lashing* to join two *eyes*. A "loop lashing" (*ABOK* #1514, #2124) is a rope *tackle* commonly used with a single pass and known as a trucker's *hitch*.

Lead is a reference to the direction of a *line*, often the *stand* or sometimes the *wend* where they exit the *nub* of a *knot*. This may be important in applications where the *knot* is required to pass,

without snagging or undue resistance, through an aperture, through water, or over an obstacle (possibly in both directions). Reference to a *knot* having either a good or a poor *lead* is to be taken in the context of particular applications, though these are not always made explicit.

A **line** is a length of *cordage* (typically *rope*) that has some designated purpose.

A **lock** is a structure added to a *knot* in order to increase its *security*. Common *locks* include added *tucks*, *half hitches*, overhand *knots* or *seizings* that involve the *tail* of the underlying *knot*. Like their underlying *knots*, *locks* are a compromise between ease of making, ease of *opening* after a load, and duration of *security* against the conditions that threatened to loosen the underlying *knot*. The *knot* tyer must select which *knot*, and if appropriate which *lock*, to employ; depending on the characteristics of the *cordage* and the environmental conditions under which the *knot* is required to be *secure*.

Some *locks* that *tuck* the *tail* through the *nub* of the underlying *knot* may give an added advantage through gentler curves of *bights* or *turns* within the *nub*, which may increase breaking *strength*, reduce wear on the *line*, or improve resistance to *jamming*. On the other hand, ill-considered *tucks* through the *nub* can compromise the beneficial structure of a *knot* or render it more susceptible to unintended *capsizing*.

A **loop** is a structure in which a *line* crosses once over itself. It may be argued that a *loop* is a special form of *bight*, but the terms are generally considered to be mutually exclusive (based on the absence or presence of a cross over). *Loops* are usually, but not necessarily, approximately circular. They can be clockwise or counter-clockwise, and they can be underhand (with the *wend* passing under the *stand*), or overhand (with the *wend* passing over the *stand*). As the start of a helix, a *loop* has *chirality*. A clockwise overhand *loop* (or a counter-clockwise underhand *loop*) has left-hand (S) *chirality*. A clockwise underhand *loop* (or a counter-clockwise overhand *loop*) has right-hand (Z) *chirality*. *Knots* with a single *loop* (such as a common sheet bend or a bowline) can be made in right-hand or left-hand *chirality*. There is commonly a mixture of *chiralities* in multi-*loop knots*. Structures that are initially cast as *loops* can be the basis for *coils*, *turns* or *half hitches*. In such forms, they are fundamental to the structure of many *knots*.

In *knotting*, *loops* are generally closed: with the arms in contact with each other at the point of crossing. A *loop* may be open: if a projection of the structure shows the *line* crossing even though the arms are not in contact with each other at the projected cross-over. This open state exists eg while a *turn* or *half hitch* is *capsized* to transfer it between *lines*. It may be a dangerous condition as an early stage in the process of *loop*, *turn* or *half hitch* straightening, which can eg convert the *fixed-eye* bowline knot (*ABOK* #1010) into a *noose*.

The term "loop knot" or simply "loop" historically has been used for *knots* that provide a useful bight of *cordage*, including *nooses* and fixed *eye knots* (*ABOK* #33). This historical usage is superseded in common current use by the term *eye knot*.

The term "loop" historically has been applied to any curve narrower than a semi-circle in *cordage* (*ABOK* #31, #32), or to a curve in which the ends neither touch nor cross (Warner 1992, #5D). These historical usages are superseded in common current use by the term *bight*.

It is important to make the correct "translation" from these differing historical uses of "loop", to avoid confusion between them and the current structural definition. Fortunately, the meaning is usually obvious from the context of usage, especially if illustrated.

Nip is pressure exerted by a *line* on itself or on another solid with which the *line* intersects. There is historical use of the nip as "the spot within a knot where the end is gripped and is

thereby made secure" (Ashley, 1944), which helps to explain some discussion of *knots* with "good nip" vs "poor nip". But in most *knots*, *nip* is exerted over a considerable distance; which varies depending on the characteristics of the *cordage*, the *dressing* of the *knot*, and the force on the *line*. The wider definition best fits this reality.

In this context, a **nipping turn** is a *turn* that exerts pressure on a *line* (or *lines*) that it encloses, thus creating friction that is relevant to the *security* of the *knot*. *Nipping turns* are often *half hitches*. They may be uni-loaded (as typically experienced during use of a sheet bend *ABOK* #1431); or bi-loaded (as typically experienced during use of a bowline *ABOK* #1010, or a reeving-line bend *ABOK* #1459). When a *nipping turn* is bi-loaded, tensions on the arms may be equal (as often experienced in reeving-line bends), or unequal (as often experienced in bowlines). Because they are so important in *knotting*, *nipping turns* have been given various names such as TurNips or cuckold's necks, particularly in relation to bowlines. "Nipping loop" has also been used, but is not recommended because the function always requires a *turn*. The term is sometimes restricted to *turns* that are bi-loaded, but this restriction is not recommended because the type of loading commonly varies depending on the characteristics of the *cordage*, the *dressing* of the *knot*, and variable environmental conditions that cause various directions and magnitudes of force within the *knot*.

The **nub** or **core** of a *knot* is the region in which friction exists that is relevant to the *security* of the *knot*. In many cases, this is the entire *knot*; but in *eye knots* the *nub* may be distinguished from the *eye* which emerges from it.

To **open** or **loose** or draw a *knot* is to untie it. A *knot* that unties completely is said to **spill**. Sometimes this is done by deliberately *capsizing* the *knot*.

An *eye knot* is **PET (post eye tieable)** if it can be made with the *eye* around a post, without accessing either end of the post and without needing to form a preliminary *knot* before passing the *line* around the post. For example, a common bowline (*ABOK* #1010) is PET whereas an angler's loop (*ABOK* #1038) and a figure eight loop (*ABOK* #1047) are not. *Eye knots* that are not *PET* can still be tied around a post (or through a closed ring in a climbing harness) by weaving the *wend* through a preliminary *knot* (eg a thumb knot or figure eight knot made in the *stand*).

Reeving is the passage of a *line* through an aperture in a solid, eg a pulley *block*, a thimble, a grommet in a tarpaulin, or a cringle on a sail. The term is often used to imply multiple passages, such as passage over multiple pulleys in a *block*. It is sometimes used to refer to the passage of a *line* through an aperture between other parts of the same *knot*, during the making of the *knot*.

A **riding hitch** is formed when one *turn* of a *line* lies in the groove or notch created between an underlying *turn* (usually a *half hitch*) and a solid around which it is cast. This creates enhanced friction, and a stabilising inflection if the underlying solid is a similar *line*, as in the form of the rolling hitch illustrated as *ABOK* #1735, #1800, #1993. This may be distinguished from **riding turns** that can be added as a second layer in *whippings* or *seizings* (*ABOK* #3364), and that should never be pulled through the primary *turns* to contact the underlying solid.

Ring loading, or pulling the arms of an *eye knot* apart at the *nub*, is potentially dangerous in many *eye knots* unless they are appropriately *locked*. It can cause a common bowline (*ABOK* #1010) to *spill* through tail slippage; or a figure eight loop (*ABOK* #1047) to flip, potentially repeatedly until the knot *spills* at the end of the *tail*.

A **rope** is a type of *cordage* that is constructed by twisting or plaiting *fibres*, often in several stages, so that they will remain together in use (provided the *ends* are *whipped* or otherwise secured against unravelling). The *fibres* may be either natural or synthetic. Typically *rope* is approximately round in cross section, in contrast to straps of webbing **tape,** or to sheets of woven **fabric**. To be called *rope*, the *cordage* must generally be at least 6 mm in diameter (much larger in some professions). *Cordage* of smaller diameter has been called **small stuff**, cord, string, twine, yarn, or thread.

Security of a *knot* is the resistance of the *knot* to slippage under load, to changing shape (*capsizing*) into a form more prone to slippage, and to loosening (or eventually coming apart) under adverse conditions that may be encountered in the intended use of the *knot*. Adverse conditions include eg cyclic loading, *tail* loading, or ring loading of *eye knots*. *Security* of any *knot* depends on the material in which the *knot* is tied as well as the conditions in which the *knot* is used. The term stability is sometimes used as a synonym for *security*, or for some components of *security* as defined here.

A **seizing** is a binding made of *small stuff* and holding together multiple *lines* or parts of the same *line*. This can be an excellent, though sometimes too slow, method to increase the *security* of a *knot* by holding the *tail* to another part of the *knot* (eg *ABOK* #1011); as an alternative to a *lock* made from the *tail*. *Seizing* may also improve the *lead* of a *line* as it enters a *knot*.

A *knot* is **slipped** when the *tail* is passed back through the *knot* structure in such a way that a pull on the *tail* will cause the *knot* to *spill* (come undone). The simplest example is a slipped overhand knot (*ABOK* #529). Note that if *the standing part* rather than the *tail* is pulled into the *knot* to yield a *bight*, the result will be a *noose* or running *eye knot*. Some *nooses* will *spill* if the *standing part* is pulled (eg *ABOK* #1114), but others will not (eg *ABOK* #1124). In either case, it is important to consider whether an object might be trapped in the sliding *bight*, as in a snare.

A **splice** is a kind of *knot* in which a part of a *rope* (such as a strand from a *laid rope*) is *tucked* into the structure of the same or another *rope*. Very strong and *secure* joins can be made through *splices* that include a sufficient length or number of *tucks*. Common examples in *laid ropes* are eye splices (*ABOK* #2725), short splices (*ABOK* #2635) and long splices (*ABOK* #2692). The proliferation of *braided* constructions in *synthetic-fibre ropes* has been matched by a proliferation of *splices*, each designed to function best in a particular *rope* type.

The **standing end** of a *line* being *knotted* is the *end* which need not be accessed to make the *knot*. It may be fixed to some large structure, or distant from the *knot* tyer.

The **standing part** (**stand** or SPart) is the part of a *line* between the *standing end* and a *knot*. The term is commonly used in reference to the region just before the *line* enters the *knot*, and in this sense there are as many *stands* as there are *knots* in the *line.* A distinction is sometimes made that the *stand* is worked on, while the *wend* is worked with, during the making of a *knot*. However, some *knots* (including most *eye knots*) cannot be made while a load exists on the *stand*. Moreover, the *stand* is sometimes worked with (eg in casting *half hitches* after making a timber hitch *ABOK* #1733). Another distinction is that after the *knot* is made the *stand* is intended to bear a load, whereas the *wend* or *tail* may not be intended to bear a load without *capsizing* or *spilling* the *knot*. In this sense, *knots* that are *tied in the bight* then loaded from both ends may have two *stands* and no *wend*.

To **stop** is to apply a temporary *seizing* or *whipping*, eg a constrictor knot (*ABOK* #3441), or several rounds of adhesive tape (*ABOK* #3402).

A **stopper** or **knob knot** may be tied in the *end* of a *line*, eg to prevent it from unravelling; or it may be tied in any part of a *line*, eg to prevent passage of the *line* through a *block*, *eye* or other opening. *Stopper knots* may be single-stranded *knots* such as the overhand knot (*ABOK* #514) or the figure eight knot (*ABOK* #520). In *laid ropes* they may be multi-stranded *knots* such as the Matthew Walker (*ABOK* #681). Sometimes such *knots* are tied with a largely or purely decorative function, for which they have been elaborated to a great extent.

Strength of cordage is generally taken as the minimum strain under which the *cordage* will rupture or break. Because it is very difficult to be sure of a minimum (given variations of uncertain location that are unavoidable in the manufacture of the *cordage*), the *strength* is sometimes specified statistically, as two or three standard deviations below the average breaking strain from a considerable number of tests conducted on the same batch of *cordage*. *Cordage* should always be used well within a *safe working load* which will only be a fraction of its nominal breaking strain (see below).

Strength of a knot can be expressed as a percentage of the breaking strain of the *cordage* in which it is made. It is generally agreed that all *knots* weaken the *cordage* in which they are made, and well-made *splices* weaken the *cordage* least. Sometimes *knots* are tested in pairs, to see which will break first as tension on the *line* is increased. Difficulties arise because the results depend on the precise conditions of the test. For example, there can be profound differences depending on temperature and humidity, with tensions applied in different ways (notably static or dynamic loading), and with age or diameter of the same type of *cordage*.

Different types of *cordage* respond differently to key breakage risks: eg heat from friction during *knot* slippage, or tight curves in a *line* under load. Also, it is expensive to make enough tests to obtain a reliable measure of the variability of results, under even one specified set of conditions. This is discussed further by Warner (1996). To deal with these problems in practice, *cordage* is generally used well within its **safe working load**, which for new *cordage* is commonly taken to be between 1/5 and 1/10 of the minimum breaking strain. When used this way in the field, it is very rare for *cordage* of quality manufacture to break at a properly-made *knot* that is well suited to the particular application. It is much more common for failure to occur at a *knot* that is poorly made, or used outside of its design parameters; or for *cordage* to fail if it becomes chaffed (eg by rubbing over a sharp edge), or excessively heated (eg by friction in some *synthetic-fibre ropes*), or it has been weakened by prior stress. Because of these considerations, *security* is generally a more important consideration than *strength* in selection of *knots* by climbers using appropriately certified ropes. In contrast, *strength* may be as important as *security* in selection of *knots* by anglers engaged in light-weight fishing.

A **tail** is a *working end* that protrudes on completion of a *knot*. Because many *knots* can slip a little during tightening or under load, *knot* tyers are commonly urged to make the *tails* long enough to obtain reasonable *security*. How long this should be is moot, but one “rule of thumb” is that *tails* should at least be long enough to make a thumb knot. *Tails* are generally shown much shorter than this in illustrations of *knots*, in order to show as much detail as possible in the *nub* of the *knot* while distinguishing the *stand* from the *wend*. *Hitches* typically have only one *stand* and one *tail*, whereas *bends* typically have two *stands* and two *tails* on completion; but there are exception in more complicated members of these functional *knot* classes.

When two parts of a line emerging from a *knot* are not readily distinguished by length, the part which receives, or is designed to receive, the greater load is called the *standing part* and the

other part may be designated as the *tail*. Some *knots* are not designed to receive any substantial load, or particular directions of load, on the *tail*; and may *capsize* if inappropriately **tail loaded**. If a knot is *secure* with a load on either the *stand* or the *wend* (as distinct from an equal load on both), it is said to be **either end loadable** (**EEL**). For example, a ring hitch (*ABOK* #1859) is *secure* when equally loaded on both ends, but it is not *EEL*. A figure eight loop (*ABOK* #1047) is EEL; though the knot *strength* may differ with the end loaded, depending on the *dressing*.

The *tail* is sometimes referred to as the end, the tag end (especially in fishing *line*), or the bitter end. The latter term is sometimes said to be derived from the experience of holding the *end* of a *line* under load without being able to secure it, or having an *end* slip back through a *knot* to release the load prematurely; but according to Ashley (1944) it applies to the inboard *end* of a cable abaft the bitts (*ABOK* #1660). These latter terms are not recommended as synonyms for *tail*, because they are also used in other contexts that may cause ambiguity.

A *knot* is **TIB (tieable in the bight** or on the bight**)** if it can be made without use of the *ends* (it can be tied even if the *line* stretches to infinity). This is sometimes important if a *knot* is to be made in a *line* of great length, or if the *ends* are already secured to a large structure that it is impractical to move the *line* around. It sometimes provides a fast way to cast a *knot* (eg a clove hitch over a bollard). As a general rule, any *knot* which can be *opened* (untied) fully without involving the *ends* is also *TIB*. But discovering the manoeuvres to form the *knot in the bight* can be quite difficult, as in some complex bowline derivatives.

Very few *knots* are simultaneously *PET* and *TIB*. A possible example is the triple bowline (Warner 1992, #435), if the 3rd *eye* is used to form a *lock* and not required to enclose the "post". It is sometimes used this way by mountaineers wishing to secure the middle of a climbing *rope* directly to a harness. It may be argued that this knot is tied *with a bight*, rather than *in the bight*.

A **toggle** is a short length of a rigid solid. The material is commonly a hard wood, although suitable plastics or metals may be used. The *toggle* is generally approximately round in cross section, about the same diameter as the *cordage* with which it is used, and of a length in the order of ten times that diameter. A *toggle* may be secured to the *end* of a *line* so that it can be passed through an *eye* as a quick and reversible way of securing two *lines* or other materials (eg *ABOK* #1929, #1936). Alternatively, a *toggle* may be inserted into a *hitch* or *bend* that includes an *eye* or a *bight*, to provide an attachment that is *secure* under load, but able to be *spilled* quickly by removal of the *toggle* (eg *ABOK* #1521, #1524, #1914, #1919, #1921). In some cases, a *toggle* is used to reduce the risk of *jamming*, rather than as a way to quickly *spill* the *knot* (eg *ABOK* #1522). *Toggles* are sometimes grooved, tapered, and/or attached to lanyards or trip *lines*, according to their applications. A marlingspike (marlinespike), fid or carabiner is sometimes used as an improvised *toggle*.

Topology is in part the study of interconvertible structures. It can be a complex mathematical problem to determine whether structures are topologically equivalent, but it is fairly easy to work *knots* into interconvertible forms. At one extreme, all *TIB knots* are interconvertible without using the *ends*, but most *knot* tyers would not argue that they are all the same *knot*. Ashley (1944) argued that even identical structures that are tied in a different way or used for a different purpose are different *knots*. Most *knot* tyers would not go that far. But if the same passage of *cordage*, with different *dressings* yields structures that have different useful properties (such as different *security* in their intended uses) these structures are generally regarded as different finished *knots*. *ABOK* #488 vs #1434 is an interesting example: the former *dressing* is rarely shown for a double sheet bend, but its structure is more *secure* in some testing.

A **tuck** is a passage of one strand or part of a *rope* under another (as in a *splice*), or one section of a *line* under another in any *knot*. *Tucks* confer *nip*. Extra *tucks* are sometimes added within or outside the *nub* of underlying *knots*, as *locks*. Ill-considered *tucks* can compromise the structure of a knot. The *tail* of a *knot* or a *lashing* is sometimes *tucked* to reduce the risk of it becoming snagged, or loosening through flapping in the wind.

A **turn** is a single *loop* of *cordage* around a solid. The solid may include eg a pole, a spar, a ring, a hook, or a *line*; even the same *line*. The *stand* and the *wend* of a *line* that forms a *turn* around a solid will lie opposite each other (at about 180°). A **round turn** comprises between 1.5 and 2 consecutive *turns*, so that the *stand* and the *wend* of a *line* around a solid are alongside each other (at about 360°). *Turns* are frequently used to create friction between a *line* and a solid, in order to control a load on the *stand* of the *line*. This usage in *knotting* is a sub-set of the meaning of turn outside of *knotting,* which can refer to any change of direction. A *turn* can be open (with no contact between the arms), or closed (with contact between the arms at the point of crossing). A closed *turn* with *nip* between the crossed arms is a *half hitch*.

Passing a *line* in a **U-turn** behind a solid sometimes has been called a turn (*ABOK* #1595; Warner 1992, #9A), but this usage is not recommended (it is a fraction of a *turn* in the recommended use). Thus *ABOK* #1595, #1613, #1614 may be described as a *U-turn* and *half hitch* on a cleat or pin.

The term turn has sometimes been applied to any a structure in which a *line* crosses over itself (*ABOK* #40-#42; Warner 1992, #5E). These historical usages are superseded in common current use by the term *loop*.

A **whipping** is a *seizing* (or for temporary purposes a *stop*) applied at the *end* of a *line* to prevent it from unravelling (*ABOK* #3442-#3462).

The **working end** (**wend**) or running end is the *end* of a *line* used during the making of a *knot*. On completion of the *knot*, the *working end*, unless hidden by *tucking* in the *knot*, becomes the *tail*. Caution: some climbers and cavers use these terms with different meanings; notably working (anchored) and running (free) ends in abseiling.

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The introductory figure is modified from images believed to be in the public domain and originally published in the 1984 monograph: Ropes, chains and slings. Chapter 3 *in* Disaster Rescue - Australian Emergency Manual. Natural Disaster Organization, Canberra. ISBN 0 642 146 56. The basic image has been widely copied, sometimes with errors. The entire document has been reproduced on line. http://www.nzdl.org/gsdlmod?e=d-00000-00---off-0aedl--00-0----0-10-0---0---0direct-10---4-------0-1l--11-en-50---20-about---00-0-1-00-0--4----0-0-11-10-0utfZz-8-00&a=d&cl=CL1.1&d=HASH01df7e8d840f67b4d60dc01b.7

Principles that guided the compilation of this glossary

1. The primary purpose is to allow concise communication about practical knot tying, without creating ambiguity for readers.

2. (a) Traditional meanings are preserved unless there is a compelling benefit in overall clarity, including the removal of ambiguity, from refinement or alteration of a traditional usage.

   (b) Some "traditional meanings" vary depending on the tradition and time period to which one refers. Sometimes the traditional boundaries are unclear (as discussed by Day, 1947). Sometimes they are inconsistent even within the same authoritative work (eg the uses of "bight" in the tying instructions for "loop knots", compared with definitions elsewhere in *ABOK*). In such cases a clear, logical and unambiguous terminology is paramount.

3. The meanings of terms should not conflict with simple interpretation of the words comprising those terms. Any exceptions are long-used traditional terms with widely-accepted meaning to knot-tyers (established jargon of the art).

4. Where usage has changed over time, the glossary indicates important historical meanings, in cases where this is likely to reduce confusion or ambiguity in usage moving forward.

5. While remaining concise, the glossary includes examples or elaborations that seem necessary to provide clarity of intended usage for practical knot tyers.

6. Terminologies used in decorative knotting, Turk's heads, trambles and knot-related areas such as netting, macramé, lace work and weaving are covered only to the extent that they overlap with the terminology of "practical knot tying".

About the Author

Robert has been tying and teaching practical knots for more than 50 years; mostly on land and sometimes on the water. In professional life he served as a scientist: a professor in plant and microbial molecular biology. Recently he has learned with, and taught knots to, men and women who need to tie and use knots under demanding conditions, to preserve life and property. In knotting, as in any field, teaching shows how much one still has to learn; and how important it is to find clear terms that respect, wherever possible, the established uses in the art.