LEADING ON NONTECHNICAL TERRAIN • LEADING TECHNICAL CLIMBS • LEADING ON ROCK, STEP BY STEP • PERSONAL RESPONSIBILITY

CHAPTER 14

LEADING ON ROCK

Leading on rock requires the complementary skills of both the leader and the belayer. The lead climber determines the route ahead, places protection for the pitch, and sets up the next belay station. The belayer monitors the leader, feeds out rope, anticipates the leader's need for tension or slack, and comunicates with the leader about remaining rope length, route descriptions, and more. Although the leader incurs additional risk while on the "sharp end of the rope," the belayer and leader both play a critical role in making each pitch safe and successful.

Imagine two climbers high on a rock face. One is on lead, climbing up a crack, belayed by rope through numerous points of protection by a partner anchored to a ledge below. The leader gives a sharp yank to the stopper he just placed in the crack. Grasping the rope tied to his harness, he pulls it up and clips it in to the protection. His belayer yells up to him "Halfway!" to indicate that he has reached the midpoint on the rope. He exhales deeply, switches hands in the crack, and shakes out his arm before raising his eyes to study the route ahead. He sees that the thin splitter crack continues up steeply,

with a few uneven pockets where a hand jam appears solid. From his rack, he readies a cam he feels would be ideal for placement when he reaches the most promising pocket several moves up. He mentally rehearses his moves, then resumes climbing.

Leading on rock requires merging climbing skill and psychological readiness. How do climbers decide whether they are ready? Others, especially more experienced climbers, can help assess someone's skills. However, only the individual climber can assess personal mental preparation, so each must search deeply within. Prepare by practicing and gaining confidence with placing rock protection, building anchors, belaying, learning how to manage the rope, and understanding fall forces (see Chapter 9, Basic Safety System). Work on rock technique, a methodology of gear selection and placement, and routefinding. Use every pitch you follow as an opportunity to observe and learn. Experience helps refine judgment.

LEADING ON NONTECHNICAL TERRAIN

A climbing party may travel unroped or unbelayed over second-class and third-class rock, each person climbing in balance and maintaining three points of contact with the rock. If the risks of the climb escalate beyond the party's comfort level, the leader has several options for using a rope to help minimize danger, short of full belayed climbing.

HAND LINE

A fixed hand line can be set up for members of an unroped party on less technical but exposed terrain to save the time it would take to belay multiple party members. The leader can either be belayed up or can scramble up this section, bringing along the loose end of the rope and placing protection along the way, if warranted. At the top, the leader anchors the rope, taking care not to place the rope under tension over sharp edges. The other climbers then move through this section, either holding on to this hand line or preparing to grab it if needed. Alternatively, if they are wearing harnesses, they can clip in to the line with a carabiner attached to a runner from their harness (fig. 14-1), or they can clip a carabiner directly from their harness in to a sling attached to the line with a prusik hitch. The rope may also be anchored at the start of this section to make it easier to prusik—that is, to move along the rope using the climbers' prusik slings tied to the rope or to safeguard a traverse. The last

climber removes the protection and breaks down the hand line while ascending, possibly on belay or while prusiking up the hand line.

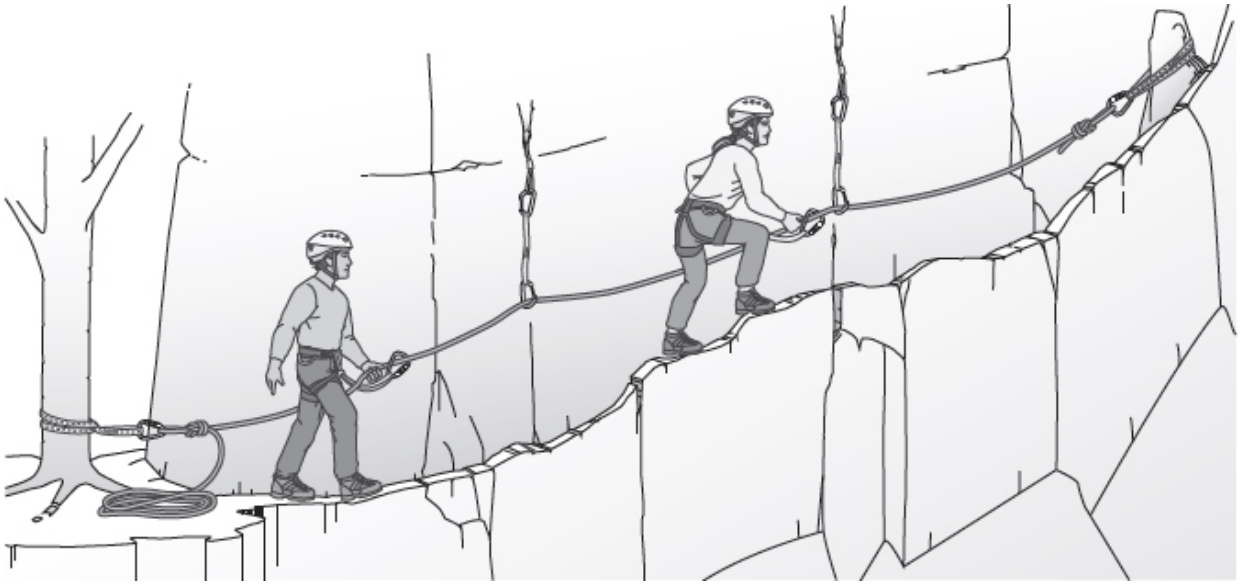

Fig. 14-1. A hand line offers limited protection for an unroped party.

RUNNING BELAY

The running belay, also known as *simul-climbing*, is another useful option when a team is climbing together over relatively easy terrain but is still roped together (fig. 14-2). Roped climbing teams normally consist of only two people. To establish a running belay, the lead climber simply clips the rope in to some rock protection that she places at appropriate intervals. At least two pieces of protection should be in place, clipped in to the rope between the leader and the follower at all times. The follower climbs simultaneously with the leader (hence the term "simul-climbing"), removing any protection that he passes. If one climber takes a fall, the rope will remain linked to the protection—and the weight of the other climber will naturally arrest the fall at some point.

If a party decides to use a running belay, the climbers must decide how much rope to leave between the leader and follower. Having more rope out has the advantage of absorbing more force should a fall occur, but it also increases the potential for the rope to snag on blocky or bushy terrain, introduces rope drag, and can make communication between the leader and follower more difficult. When the situation calls for it, coils (see below) can be used to shorten the rope to the appropriate length.

The running belay is less secure than belayed climbing but considerably safer than no protection at all. Given the advantages and disadvantages of this technique, the decision to simul-climb should be made carefully, weighing the potential risks and benefits for the given party and the specific situation. Important factors to consider include both the skill and comfort level of the climbing party, the degree of time pressure experienced during the climb, the likelihood of falling, and the degree of runout and exposure or the consequences of falling in the given situation. The lead climber needs to be sensitive to the skill level of the follower and should be ready to set up an anchored belay if the follower needs that degree of security. Communication is imperative between the climbing team. An anchored belay would also need to be set up if the lead climber runs out of protection while simul-climbing, so that the follower can either transfer gear back to the leader or can switch leads and continue the running belay.

CLIMBING IN COILS

Sometimes, between sections of more technical terrain where running or fixed belays are used, climbers coil most of the rope between them, leaving themselves tied in and with about 10–16 feet (3–5 meters) of climbing rope separating them. This is called "climbing in coils." (See more about "Shortening the Rope with Coils" in Chapter 18, Glacier Travel and Crevasse Rescue.) Climbers coil the extra rope over their shoulders and tie in short to a locking carabiner attached to their harness. This method can increase efficiency, saving time because climbers can forgo untying from the rope and packing it up in between more technical pitches. Also, by climbing closely together, climbers can minimize rope-induced rockfall.

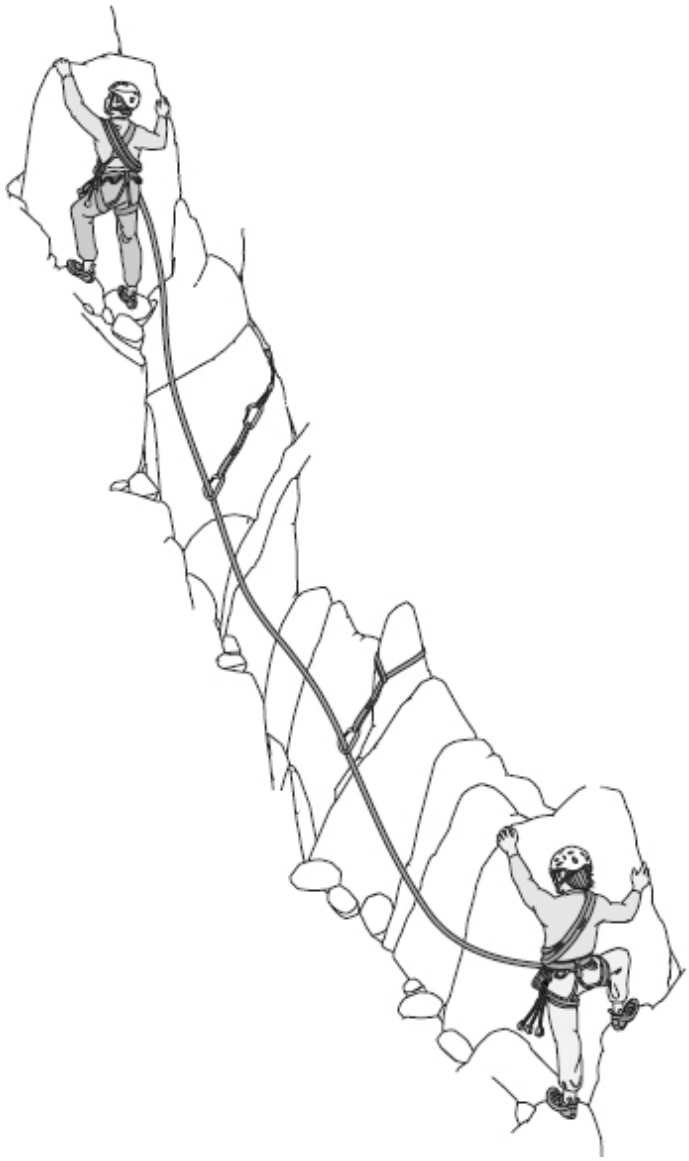

Fig. 14-2. A running belay offers limited protection for a two-member climbing team.

LEADING TECHNICAL CLIMBS

Technical rock climbing begins when anchored belays are needed for the party's safety, and deciding when to choose this option is subjective. In this scenario, each pitch is led and belayed. The leader accepts more risk than the second, who is belayed from above. An aspiring leader should learn the mechanics of leading while climbing well below his or her actual climbing ability. It may sound obvious, but always be sure your climbing ability is consistent with the route you decide to lead. For example, you may be good at

face climbing but have trouble with cracks; in that case, if a route requires crack climbing, make sure that it is within your crack-climbing ability.

Steep, bolt-protected sport-climbing routes can be relatively safe places to attempt leading hard moves. An overhanging 5.11 route can be safer to lead than a 5.7 climb with ledges if the only risk in a fall off the former is hitting air. When transitioning from sport climbing to alpine rock climbing, be conservative in estimating your climbing abilities. The extra time and additional skills required for setting protection can substantially increase the difficulty of a traditional climb compared with a bolted sport climb of the same rating. In addition, trad climbing difficulty is increased by carrying a pack and wearing or carrying mountaineering boots. On a long, remote alpine climb, even if the actual rating of the climb is relatively easy, the consequences of a fall can be great. Evaluate routes in terms of potential risk and your ability to manage the consequences of a fall, and be conservative in choosing an alpine route and gear.

CHOOSING THE RACK

The collection of gear used for protection is called the *rack*. Each climbing team prepares just one rack, which is carried by the leader. While climbing each pitch, the leader places individual pieces of protection from the rack; the follower removes the equipment and carries the pieces up while climbing. At the top of the pitch, the rack is reorganized, and the leader takes the gear needed for protecting the next pitch.

The decision about what to bring is determined by the climb and each climber's comfort level. If the selected climb is in an area covered by a guidebook, check the book for general information such as the type of rock and what a "standard rack" for that area contains. The climbing route sketch map (fig. 14-3) for the selected climb, called a *topo*, may show the width of cracks, the amount of natural protection or fixed protection (labeled as "fp"), the length and direction of each pitch, the difficulty of each section and the overall climb, and perhaps even the precise sizes of the pieces of protection needed. Particularly on commonly climbed routes, more detailed information regarding the specific protection needed can sometimes be found online in climbing trip reports or climbing community blogs or websites.

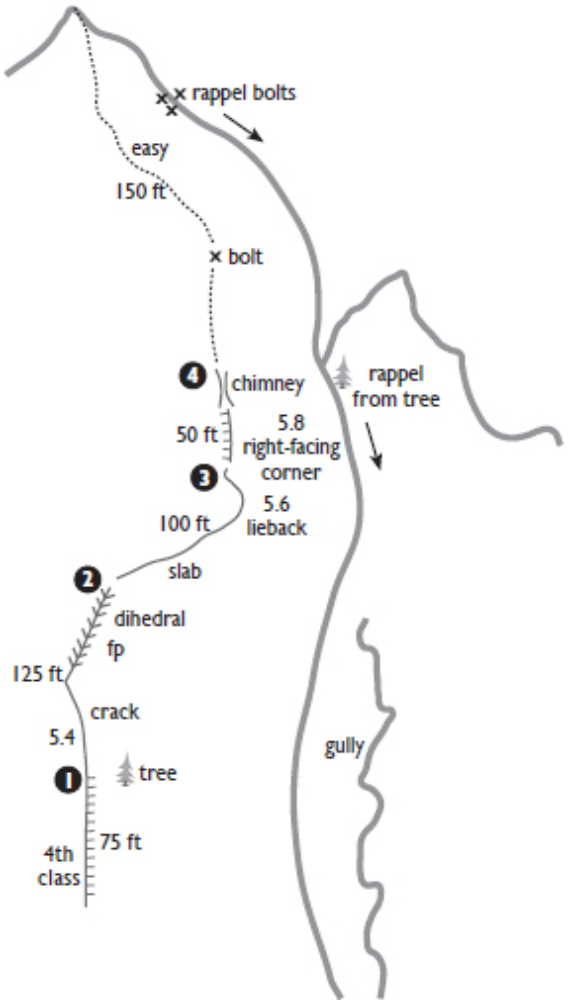

Fig. 14-3. A typical climbing route topo.

If the selected climb is in a remote area, usually less information is available. Take too big a rack, and the extra weight and equipment can impede the climbing. Take too little protection or the wrong pieces, and the team may not have what it needs to safely climb the route. Research the climb by consulting several guidebooks or talking with other climbers who have done the route, as well as by checking any relevant resources on the internet.

A typical rack includes a selection of passive chocks (nuts and hexes, for example), spring-loaded camming devices (SLCDs or cams), carabiners, and runners. The specific selection of protection varies with each route. A long, thin crack might dictate small wired nuts and some small cams. A wide crack may require the largest cams, hexes, or tube chocks. A long, parallel hand crack may require multiple 2-inch (5-centimeter) cams. Many cases are less clear-cut, requiring a full range of sizes. The “standard rack” is difficult to define narrowly, since different climbs call for different types and sizes of

protection; in addition, individual climbers often have their own preferences for gear that they never leave home without. However, as an example, a rack that will accommodate a large number of traditional alpine climbs in Washington State's Cascade Mountains and beyond is generally defined as one that includes gear up to 2 or 3 inches (5 to 7.6 centimeters), consisting of at least a full set of nuts, some additional chocks (such as hexes and Tricams), and a set of cams ranging from small to medium-sized.

Each piece of protection typically connects to the rope with two nonlocking carabiners and a runner or quickdraw. Locking carabiners can be used instead if the gate is in a position where it could be forced open during a fall (by striking the rock). Carry a few extra carabiners as insurance against running short of them. The ideal runner at any protection point will be just long enough to help the rope stay in as straight a line as possible. A runner that is longer than necessary lengthens a fall, and one that is shorter than necessary causes rope drag. Quickdraws may work well for a straight-up climb. A zigzag route line, roofs, or turns on the pitch require longer runners. Additional runners may be needed for belay anchors, unanticipated protection placements, and rappel slings. Especially on alpine climbs and any routes that deviate from a direct vertical line, it is recommended to bring several longer slings (multiple singles and at least a few doubles), as quickdraws will be insufficient. Slings are inexpensive and light, and they can be shortened and used as quickdraws for straight pitches (see Figure 14-7). The importance of bringing and using sufficiently long runners for reducing or preventing rope drag cannot be overemphasized (see Figure 14-10), yet failing to do so is a common mistake made by novice leaders.

The nut tool, a thin metal device designed to help extract pieces of protection (fig. 14-4), is carried by each climber to use when following a pitch; if a team is swinging leads, both climbers will take turns following. Also known as a *cleaning tool* or *chock pick*, the nut tool can help the follower retrieve pieces of protection that do not come out easily. It is also recommended that climbers carry this device when leading, since occasionally the leader may need it to reset or replace a piece of protection in order to take advantage of a more secure placement.

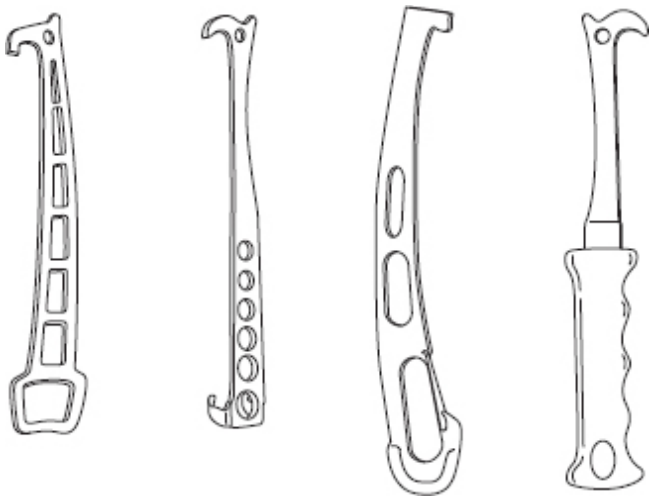

Fig. 14-4. Nut tools.

In addition to carrying gear for protection, carabiners, runners, and a nut tool, a rock climber also carries a few other important pieces of equipment. These include a belay device, material for building belay anchors (in other words, a cordelette, equalette, and/or webbing for equalizing anchor points—see Chapter 10, Belaying), a tie-off loop (a short loop of accessory cord for emergency techniques, tying off a climber after a fall, or backing up a rappel—see Chapters 9, Basic Safety System; 10, Belaying; and 11, Rappelling), at least one rappel ring, a knife for removing old slings (or for emergencies), and perhaps chalk for keeping hands dry. Overall equipment choices, which are influenced by the setting and the type and length of the rock climb, warrant careful consideration and planning.

OTHER IMPORTANT ITEMS

Particularly for multipitch routes that the climbing party is not intimately familiar with, it is also a good idea for the party to bring along a route description, route topo, and/or notes to help with routefinding. Packs (of varying sizes, depending on the route and the speed of the climbing party) are often carried by at least one member of the climbing team for many alpine climbs or for traditional crag climbs in which the party does not plan to return to the base of the climb. Depending on conditions and the comfort level and skill of the individual climbers, various types of footwear may be chosen for the approach and the climb itself. Mountaineering boots (from very lightweight to heavyweight) or lightweight approach shoes are typically used for the approach (and sometimes on the climb itself as well). Rock shoes (see

Figure 12-1 in Chapter 12, Alpine Rock Climbing) are generally the preferred choice for climbers leading technical routes, especially on climbs of higher relative difficulty and on virtually all cragging and sport climbs.

HOW TO RACK

The ideal racking method permits the leader to place protection efficiently and to climb smoothly despite carrying the gear; it also allows easy transfers between climbers for swinging leads. Keeping the hardware away from the rock makes the gear more readily available. For instance, when you are climbing an inside corner with your left side in, it is easier to have the rack hang from your left shoulder and under your right arm, using a sling to carry the equipment (see "Where to Rack Gear," below). No racking method is perfect, but several are commonly used, alone or in combination.

Group passive pieces or small cams together on a single carabiner. When you are organizing gear for the rack, it generally works best to group several pieces of passive protection (nuts, hexes, or Tricams) on a single carabiner (see Figure 14-6a). For example, most climbers group a partial or full set of nuts together on a single carabiner. If a large number of nuts are included on the rack, or if there are doubles in certain sizes, sometimes climbers will divide the set of nuts into smaller and larger sizes, and use a couple of carabiners. Climbers often use the same method for small cams as well.

This strategy reduces the number of carabiners needed for carrying these pieces, and this method can make climbing easier because it results in a less bulky rack with better weight distribution. This technique also facilitates more efficient gear placement for these types of pieces. To choose the best piece for a placement, unclip the carabiner of gear for that size range and hold the whole batch of pieces up to the placement, eyeing each piece for fit. Then unclip the carabiner from the chosen piece, place the chock or cam, and return the carabiner and unused pieces to the gear sling.

With this method, climbers usually have two carabiners pre-attached to several runners or quickdraws because the placed protection lacks a carabiner (remember that one carabiner attaches to the protection and the other carabiner attaches to the rope; see Figure 13-2 in Chapter 13, Rock Protection). Although this method of racking may somewhat increase the risk of dropping gear, since more gear is handled every time a piece is placed,

many climbers feel that the increased ease of climbing this method offers far outweighs this disadvantage.

Place other pieces of protection on separate carabiners. In contrast to passive pieces and small cams, most climbers prefer racking medium-sized to large cams and other active pieces such as tube chocks on separate carabiners (see Figure 14-6). By design, active pieces of protection like cams (at least medium-sized to large units) cover a wider range of sizes than passive pieces such as nuts or hexes. With experience, it is easier to select the single right cam for a given placement than it is to identify a single nut that is the right size in a given situation. Arranging medium-sized to large cams on separate carabiners results in faster placement and less awkward juggling of multiple large pieces of protection on the same carabiner. After placing the appropriate cam in the rock, the leader can simply clip the cam's pre-attached carabiner to a runner, then the runner's carabiner to the rope.

WHERE TO RACK GEAR

After deciding how many pieces to place on the carabiners on the rack, the next question to answer is where a climber will rack the gear. The three most common options are on a gear sling, on the climbing harness, or on a combination of the two. A padded gear sling from a climbing shop may be the most comfortable choice, but a single-length runner can also be used. Commercial gear slings (fig. 14-5a) are also available with partitions (fig. 14-5b).

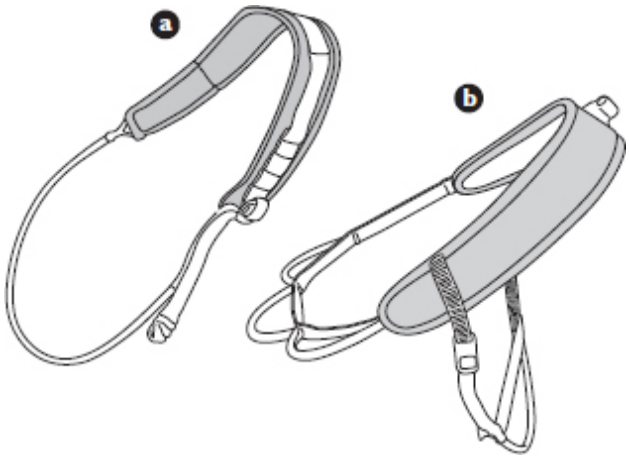

Fig. 14-5. Commercial gear slings: a, basic padded gear sling; b, partitioned gear sling.

Rack gear on a sling. Climbers racking protection on a gear sling (fig. 14-6a) place the sling over one shoulder and under the opposite arm (see Figure 14-6c). This method of racking has the advantage of smooth gear transfers when switching leads, since the entire rack can be passed from the belayer to the leader at once. The primary disadvantage of this method is that having the entire rack over the shoulder can make the climber feel a bit top-heavy, and, at least with nonpartitioned slings, the weight of the rack can shift quite a bit when the leader is climbing.

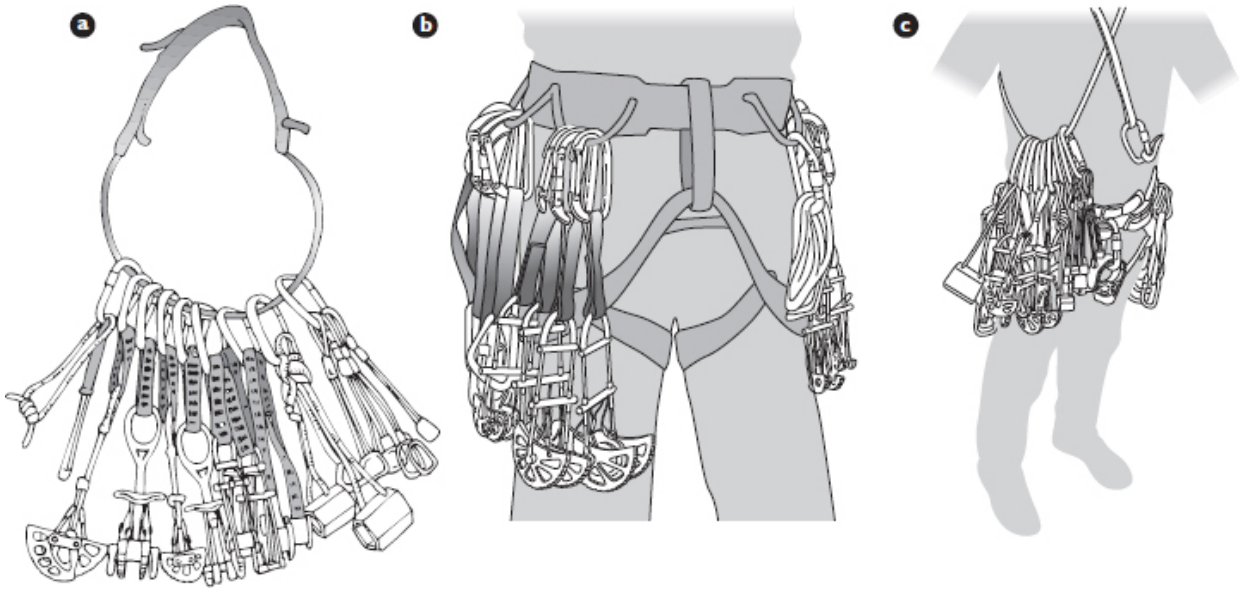

Fig. 14-6. Examples of racking methods: a, pieces of protection racked on a gear sling; b, pieces of protection attached to gear loops on the seat harness; c, hybrid method in which gear is racked on both a gear sling and the harness, and one or more double-length runners are also looped over one shoulder.

Rack gear on the climbing harness gear loops. Using the gear loops on the climbing harness to rack gear (fig. 14-6b) evenly distributes the weight of the rack on the climber's waist, and the different types of protection can be separated (although the latter can also be done with a partitioned gear sling; see Figure 14-5b).

Transfer of gear at belays can take longer with this method of racking, since gear must be transferred from multiple gear loops rather than a single gear sling. However, for experienced climbers, this time difference is likely to be nominal. Besides the time needed for reracking, the primary disadvantage of this system is that some equipment will be inaccessible when you wedge your body into larger cracks. When using this racking method, be sure the gear does

not hang down so far that it interferes with climbing footwork. Also, on many climbs, it is a good idea to rack runners and/or quickdraws and carabiners on both sides of the harness for easy access when clipping the rope in to protection.

Rack gear on both the harness and a gear sling. Perhaps the most common method of racking is a hybrid of these two systems (fig. 14-6c). For example, a climber could place all the pieces of protection on a sling over the shoulder but place runners and carabiners on the harness. Conversely, a climber could place the protection on the harness, with runners and carabiners on a sling. Or a climber could place some gear on a sling and some on the harness.

Whatever method is used, rack the protection in a systematic order so that a particular piece can be found in a hurry. The usual order is to start at the front with the smallest wired chocks and work back with larger pieces. For each carabiner clipped to the rack, use the same orientation so that each one unclips in exactly the same way. For example, all the gates of the carabiners should be facing the same way—either in or out, but not both. This allows you to unclip by feel rather than having to look at the gear.

Particularly for climbers who are relatively inexperienced at swinging leads or transferring gear at belays, it is recommended that climbing partners agree beforehand on using one racking technique; otherwise, much precious time may be lost in reracking at each belay when climbers are swinging leads.

OTHER RACKING CONSIDERATIONS

Runners need to be racked as well. Quickdraws can be racked on the harness or on a sling. Climbers can carry single-length runners over one shoulder, but if a number of them are carried, it can be difficult to retrieve just one from the tangle. Climbers can carry a single-length runner quickdraw-style by attaching two carabiners to it and threading one carabiner through the other (fig. 14-7a), then clipping the resulting loop (fig. 14-7b) and straightening it (fig. 14-7c). This style is also called an *alpine draw*; clip one carabiner to protection (fig. 14-7d). Such runners can be quickly extended by unclipping all but a single strand from one carabiner (fig. 14-7e) and then pulling this carabiner until the runner is fully extended (fig. 14-7f). Climbers can carry double-length runners looped over a shoulder and connected with a carabiner (see Figure 14-6c). Alternatively, climbers can chain the runner (fig. 14-8) before attaching it to the harness; when it is needed, pull or shake it out to remove the loops.

Climbers can also fold a double- or triple-length runner several times and tie it in an overhand or figure-eight knot, then clip it to the harness.

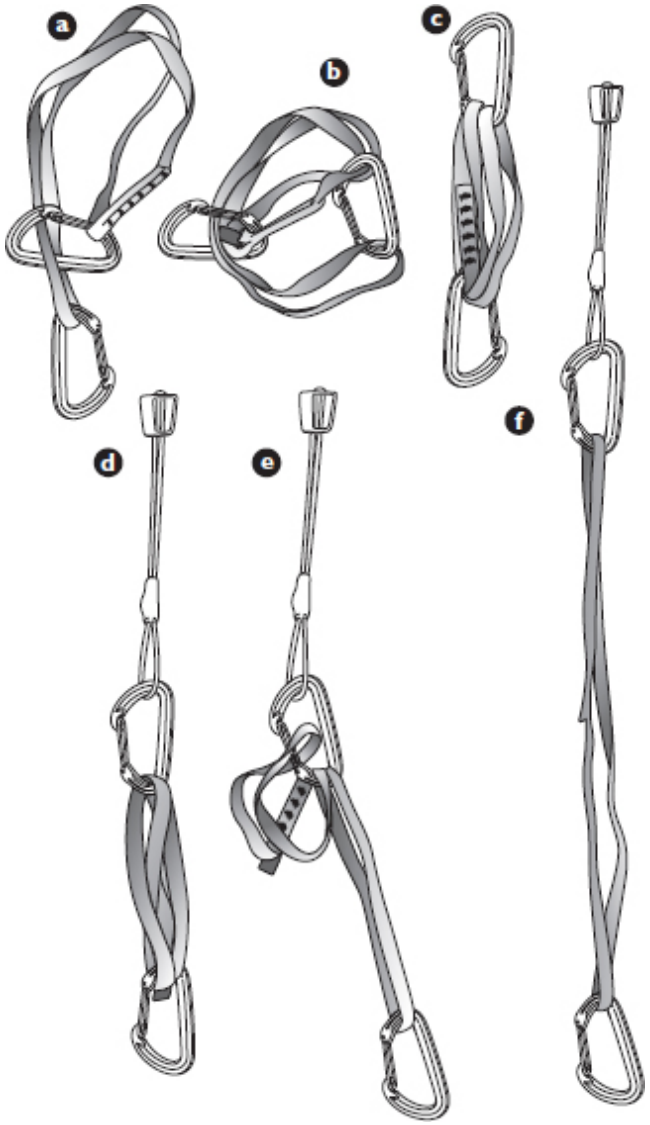

Fig. 14-7. Racking and extending a single-length runner quickdraw-style (also known as an alpine draw): a, clip two carabiners to a single-length runner and pass one carabiner through the other; b, clip the first carabiner back in to the newly formed loop; c, straighten the loops; d, clip the protection to one carabiner; e, unclip the other carabiner from all but one loop of the runner; f, straighten and extend the runner.

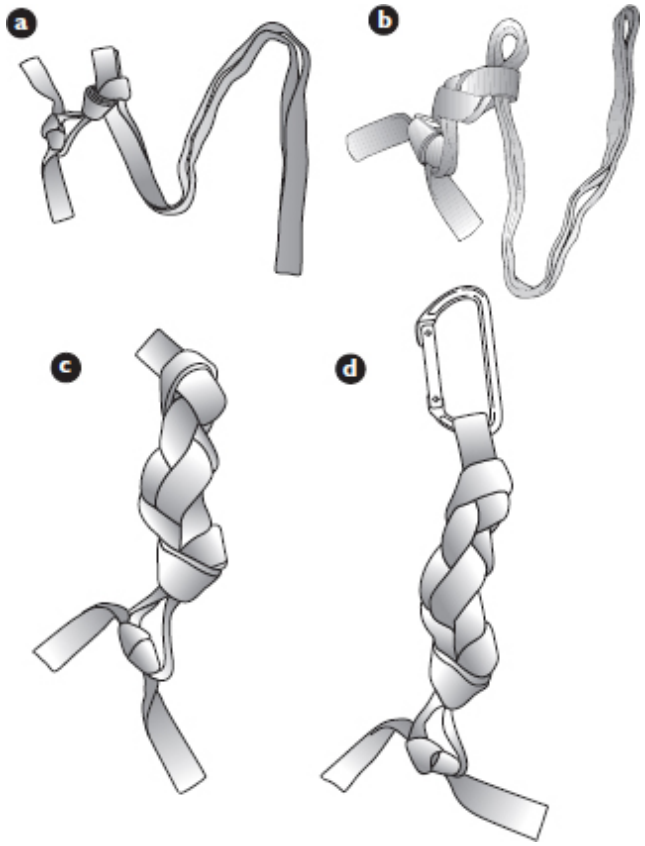

Fig. 14-8. Chaining a long runner: a, form a slipknot; b, pull runner through the loop formed by the slipknot; c, repeat this process until the runner is chained; d, attach the final loop to a carabiner to carry it and to ensure that it does not unravel.

When climbing with a pack, put it on first, then the rack. When carrying double-length and single-length runners over one shoulder (or both shoulders), put the single-length runners on top so that the singles come off without tangles and the doubles can be removed without displacing the singles.

Carry cordelette (or other anchor-equalizing cord or webbing), nut tool, and belay device on the harness gear loops so that they are easily accessible. Other gear such as a knife and tie-off loop can be clipped to the harness or carried around the neck so they are out of the way but accessible.

LEADING ON ROCK, STEP BY STEP

Whether you are leading the next pitch or the next climb, it is imperative to plan the route, evaluate rope and rack requirements, and know the descent. Leading is a complex business. Beginners usually need an apprenticeship,

moving behind seasoned climbers before they can safely "take the sharp end of the rope" (lead). Never take the lead if you do not feel ready, and do not pressure others into leading. Keep the art of leading exciting, challenging, satisfying, and safe—as it ought to be.

PLANNING THE ROUTE

Planning a route begins with background research at home. Look for climb descriptions in printed guidebooks and online climbers' blogs. Talk to others who have climbed the route before. For alpine climbs, obtain needed maps for the approach, and check weather and avalanche conditions for the dates being considered (see Chapters 5, Navigation, and 28, Mountain Weather). The skill required depends on the location and nature of the climb as well as potential difficulties that might be encountered on the approach and descent.

Routefinding can be as easy as following a guidebook picture with a climbing route topo or simply following a line of bolts on a crag, but it can also be as difficult as an off-trail multiday approach and ambiguous technical climb with a vague route description. Routefinding on alpine climbs or some long crag routes can be complex. Longer routes often are less clearly defined. The guidebook description may be sketchy: "Ascend northeast buttress for several hundred feet of moderate climbing." The descent may be complicated and vaguely described.

For any climb, confirm the descent and—if it is not obvious—perhaps check with others who have done the route. Decide whether boots are needed for the descent in addition to rock shoes for the climb. Make sure the rope is long enough for rappels.

ON THE WAY IN

Once the climbing party is on the way, study the route on the approach if possible; often the best view of a climbing route is at a distance from the start of the climb. Look for major features that the line of ascent might follow, such as crack systems, dihedrals, chimneys, or areas of broken rock. Note areas of small trees or bushes that could indicate belay ledges or rappel anchors. Identify landmarks that, when reached, will help determine the party's position on the route. For this kind of planning, the climbers' eyes will tell them what the topographical map cannot.

Watch out for deceptively tempting lines leading to poor-quality rock, broad roofs, blank walls, or false summits. These may not be visible once the

party is on the climb, and if they climb these features in error, they may dead-end after several pitches.

QUESTIONS TO ASK BEFORE LEADING A PITCH

- **How long and hard is the pitch?**
- **Can the leader see the general path of the pitch** and where the next anchor will be?
- **What is the nature and location of the crux** (most difficult move of the pitch)?
- **What sizes, types, and amount of protection** will be needed?
- **How much other gear,** including carabiners and runners, will be needed to protect the lead?
- **What gear will be needed to build the anchor at the end of the pitch?**
- **What climbing techniques will be used?** Liebacking? Chimneying? Jamming? As a result, on what side should the climber rack?
- **Does the leader want the belayer to shout out how much rope is left while climbing,** calling out "halfway," "20 feet," or "3 feet . . . 2 feet . . . 0"?
- **Will the belayer and leader be able to hear each other throughout the climb?** If not, do they have rope signals? Radios?
- **How will a fall affect the belay?** Could the leader drop past the belayer in a fall? Is the belayer well secured for any pull from a potential leader fall?
- **Where and how will the first piece of protection be placed?** Will it minimize the fall factor and the chance of setting off the zipper effect? (See "The Zipper Effect" later in this chapter.)

Develop a plan for the line of ascent, but keep likely alternatives in mind. Continue planning the routefinding as the actual climb begins, looking for more local features and landmarks. Seek out natural lines to follow when leading the route. Form a tentative plan for each pitch, perhaps including a place for the first piece of protection and a spot for the next belay station. Do not hesitate to look around the corner for easier route alternatives that may not be visible from below.

When faced with a choice between pitches of varying difficulty, consider the rest of the climb. Two moderate pitches are better than an easy pitch followed by one beyond the party's ability (see the "Questions to Ask Before Leading a Pitch" sidebar).

On the way up, keep track of retreat possibilities in case the climb is aborted, and study—to the extent possible—the party's planned descent route. Rain, lightning, unexpected wind or cold, injury, or illness may make it prudent to retreat from the route. As the climb progresses, evaluate changing route conditions, the weather, and the climbing party. Know the party's alternative responses to any changes, weighing all resources. Consider whether the party is equipped to deal with an unplanned bivy while on the climb. Know descent or escape routes in case they are needed. See Part V, Emergency Prevention and Response, for more about dealing with uexpected or emergency situations.

PROTECTING THE LEAD

Placing protection every few feet requires a big rack and eats up time. Placing very little protection at all greatly increases the risk of a long leader fall and potential injury. Learning the appropriate balance requires practice and sound judgment. Climbers certainly should protect moves they expect to be hard. Always space the protection to avoid potential falls that are excessively long or dangerous. Protection above a move provides the safety of a top rope. In deciding when to place another piece of protection, keep in mind the quality of the placements already made. Consider how to minimize dangerous rope drag—which is exacerbated by changing rope angles through protection and around rock corners, and which is eased by keeping the rope running straight on route—and how to take the fall factor into account (see Chapter 10, Belaying).

SELECTING AND MAKING A PLACEMENT

The perfect placement is a combination of a crack sized and shaped ideally for placing protection with a comfortable stance from which to place it, located right at the next hard move—but two out of three is not bad either. When on the sharp end of the rope, avoid making difficult moves far away from the last protection. Place protection right before and after a hard move.

Chapter 13, Rock Protection, details types of protection and good placements. Consider the stability of the rock when placing protection. Look,

listen, and feel for the soundness of the rock by hitting suspect rock with the heel of a hand. Beware of expanding flakes and hollow-sounding or crumbling rock. Remember that a protection placement is only as solid as the rock into which it is placed.

To place protection, find a stance that is secure enough that you can release one hand, because you must be able to make the placement and then clip in to it without falling or seriously tiring. When possible, take advantage of natural protection—a tree, bush, rock tunnel, or horn—because it can be easy to use and is often multidirectional, and doing so can save on gear. The leader must be able to quickly place and clip sound protection (see "Connecting the Rope to Protection" in Chapter 13, Rock Protection) with either hand, whether the carabiner gate faces left (fig. 14-9a and b) or right (fig. 14-9c and d), to make the lead safer. Reverse these techniques when using your left hand.

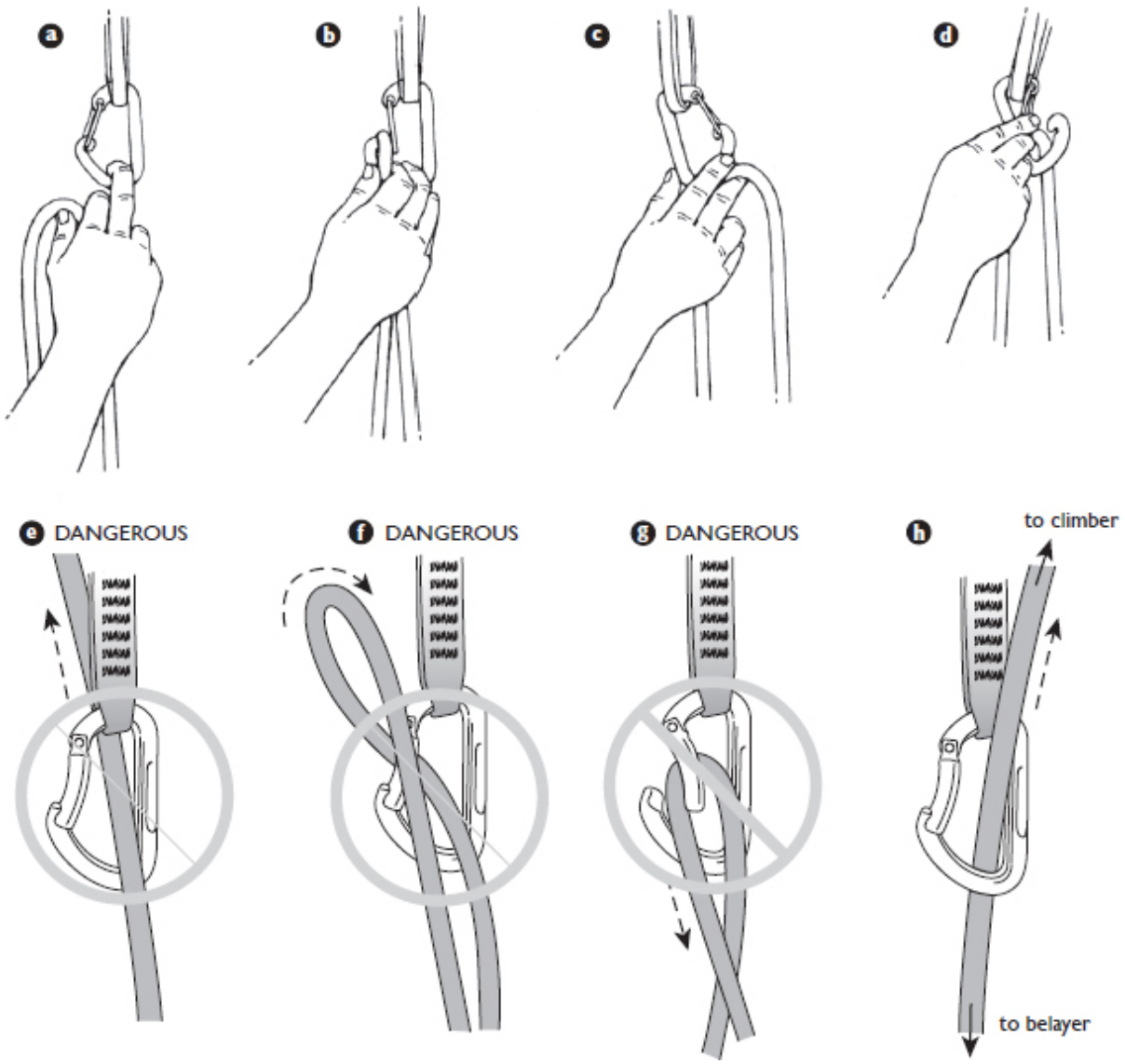

Fig. 14-9. Clipping technique: a and b, gate facing left, right hand; c and d, gate facing right, right hand; e, rope is back-clipped (dangerous); f and g, back-clipped rope causes carabiner gate to open in a fall; h, correctly clipped carabiner.

Clipping inefficiently and incorrectly is a common and potentially dangerous mistake made by new leaders. An especially common mistake among novice leaders is *back-clipping*: that is, the leader's end of the rope is clipped so that it travels *behind*—rather than in front of—the carabiner to which it is clipped (fig. 14-9e) as the leader ascends above this piece of protection. A consequence of back-clipping is the rope accidentally opening the carabiner gate (fig. 14-9f and g) during a leader fall. In a correct clip the leader's end of the rope travels out the front of the carabiner to which it is clipped and up to the lead climber (fig. 14-9h). (See "Clipping Bolts and

Other Protection," later in this chapter.) Study diagrams on correct clipping technique, and then practice clipping with either hand until the process is fluid and fast.

Suppose that as a leader you are faced with a choice between two or more possible placements. Ask these questions:

- Which placement combines the best fit with stability in the direction(s) of pull?
- Which placement will be stronger?
- What size chocks or cams should be conserved for use higher on the pitch or at the anchor?
- Which placement will be easier for the second to remove?
- Will one placement interfere with a needed foothold or handhold?
- Which placement will minimize rope drag?

If the unfortunate choice is between questionable protection and none at all, by all means place something, but also plan to place additional protection as soon as possible. Placing and equalizing two pieces can also help (see Chapter 13, Rock Protection). Do not let such placement give a sense of false security, however. Do not trust obviously bad protection.

Suppose the leader faces a hard move without any apparent protection. Restudy the rock for some less obvious way of protecting the move. Evaluate whether there is a movement sequence or rock feature not seen at the outset. The options are these:

- Protect the move after all, and then resume climbing.
- Go ahead and attempt the move without good protection.
- Down-climb and see if the belayer will lead the pitch.
- Find an easier line to climb.
- Consider retreating from the climb.

After studying the situation and evaluating the consequences of a fall, carefully and calmly weigh the options, and then decide on the course of action that seems best.

DETERMINING THE LENGTH OF THE PITCH

The length of a given pitch is dictated by several factors. On most sport climbs and many single-pitch traditional crag climbs, the end of a pitch is clearly indicated by the presence of bolt anchors and/or chains, and the pitch is often short enough that the leader can be lowered back to the ground by the belayer. On other traditional crag climbs and most alpine rock climbs, the

pitches are more variable in length and may be considerably more ambiguous, since they are often not marked with bolted belay anchors but instead utilize natural anchors or require the leader to construct gear anchors. This latter type of route requires more routefinding and discretion by the leader.

The maximum length of a pitch can never exceed the length of the rope, which typically ranges from 50 to 70 meters (164 to 230 feet), with 60 meters (197 feet) being the most commonly used rope length for most rock climbs. However, in many cases, the ideal pitch length will be less than the full length of the rope, often considerably less. The key point is that the leader should be prepared to do pitches of varying lengths, depending on the circumstances. Avoid the temptation to make every pitch a full rope length, which can result in slower, rather than faster, climbing, especially when it causes rope drag or the need to down-climb to a more secure belay location that a leader passed up.

When determining pitch length, use any available information from route descriptions and topos. Beyond this, seek out and use good belay spots (when in doubt about the best pitch length, do not pass up a great location to set up a belay anchor), try to maintain communication (particularly in windy conditions, long pitches can significantly compromise communication with a climbing partner), and work to prevent or minimize rope drag. If rope drag becomes a problem, seek out a good belay spot sooner rather than later.

JUDGING THE DIRECTION OF FALL FORCES

The leader must anticipate the direction of forces on the protection in order to make placements, but this judgment must take into account the entire climbing system. A protection point may seem solid for a fall when it is placed, but later it could pop out when the system causes pulls in directions not initially anticipated.

A zigzagging climbing rope causes severe directional forces as well as rope drag that, at its worst, can immobilize the leader (fig. 14-10a). Pieces of protection that may have been placed to hold only a downward pull may now be in danger of taking sharp pulls from quite different directions in case of a fall. In catching a fall, the rope loads and straightens from the belayer up to the highest protection point and then back down to the falling climber. When the protection has been placed in a zigzag, pieces can be pulled sideways or upward by the tightening rope. If protection is placed for only a downward pull, it can be pulled out by falls higher up the pitch. Instead, extend the runner

from protection to the rope, so the line of the rope from belayer to leader is more vertical than zigzagging (fig. 14-10b).

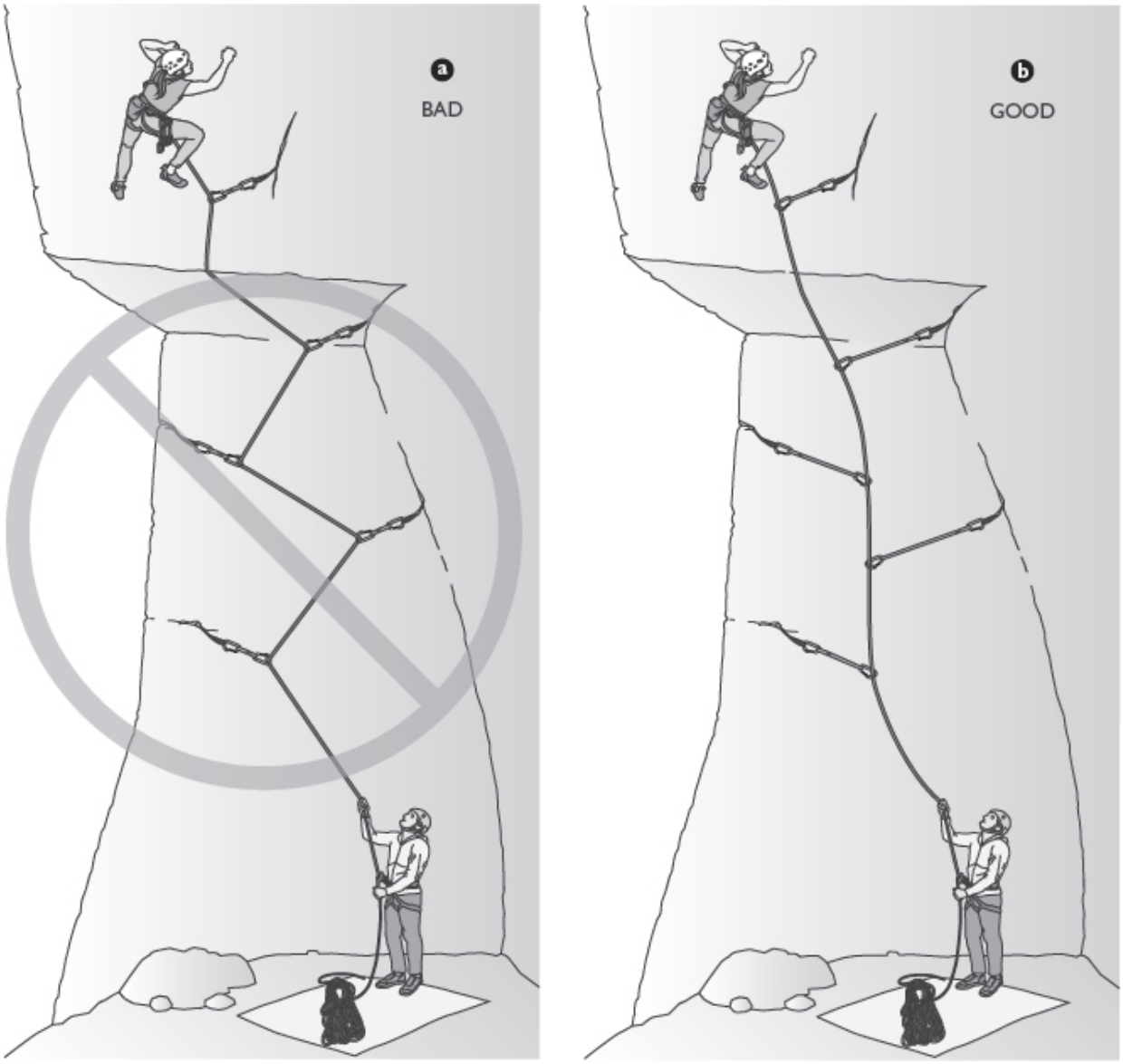

Fig. 14-10. Avoid rope drag: a, zigzagging rope can result in severe rope drag, which can impede the leader's ability to move upward; b, use runners to extend the connection to the pieces of protection and keep the line of the rope more vertical, reducing drag and keeping the pieces from being loaded from the side.

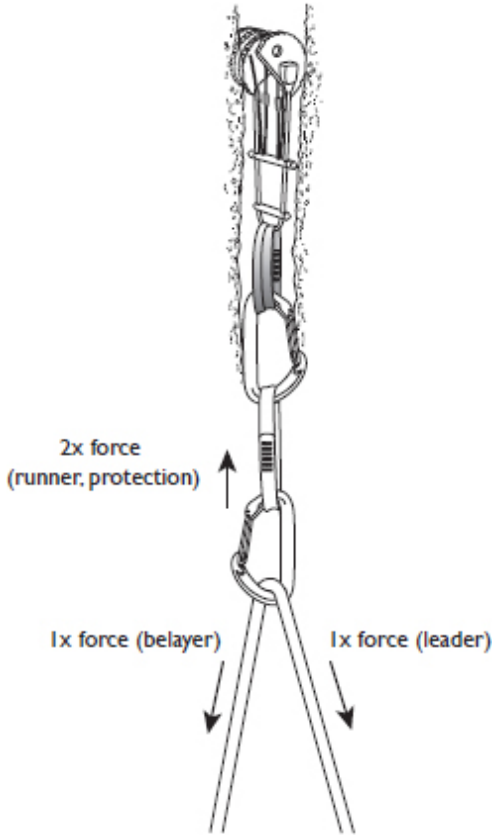

Fig. 14-11. The combined force on the top piece of placed protection during a fall.

During a fall, the top piece of protection is loaded with high forces: the force of the falling climber, plus the force of the belayer holding the fallen climber, potentially increased by other factors such as distance of fall, amount of rope out, diameter of rope, and how the belayer is anchored, minus friction forces in the system between the fallen climber and belayer. Typically a piece of protection would see at least two times the forces exerted below it when arresting a fall (fig. 14-11). All protection placements should be solid, but consider backing up protection before hard moves if the placements afforded are less than ideal. Protection that allows the rope to follow in a straight line helps preserve the integrity of the system and minimizes rope drag; extend protection by using longer runners to connect it to the rope where needed (see Figure 14-10b). Rope drag not only makes climbing harder for the leader, but it also decreases the rope's ability to absorb forces in case of a fall by effectively increasing the fall factor (see Chapter 10, Belaying). Make placements multidirectional when a bend in the climbing line must be made—use natural protection, opposing chocks, or cams that can safely rotate with

minimal walking (see "Using Opposition Placement" in Chapter 13, Rock Protection). Or consider placing the belay on the other side of the bend.

The Zipper Effect

The full-scale zipper effect is a dramatic demonstration of the importance of anticipating force directions. The zipper effect occurs most readily where the belay is established away from the base of the pitch (fig. 14-12a) or where the rope zigzags up the route (see Figure 14-10a). Again, as the rope loads during a leader fall, the bottom chock can have a tremendous outward pull placed on it. If it pulls out, the next piece becomes subject to the outward pull. Each in turn could fail, causing the line of chocks to be yanked out one by one as the "zipper" opens from the bottom up (as in Figure 14-12a). Overhangs and sharp traverses also have the potential to zipper.

Prevent the zipper effect by making the suspect placements multidirectional through the use of multidirectional cams (fig. 14-12b) and by eliminating the potential for outward pull by extending pieces with runners. The belayer could also reduce outward pull by belaying closer to the base of the route (see Figure 14-12b).

PROTECTING SPECIAL SITUATIONS

Leading on overhangs or traverses requires special considerations to keep climbers safe.

Overhangs

Keep the rope running as free of an overhang as possible. Extend the rope with runners in order to reduce rope drag (fig. 14-13a), prevent dangerous fall forces such as the zipper effect, and keep the rope from being cut by the edge of the overhang (fig. 14-13b). On small overhangs, leaning out and placing protection above it may be the most effective strategy.

Traverses

When leading a traverse, be sure to place protection both before and after a hard move (fig. 14-14a). This guards not only the leader but also the follower from the possibility of a long pendulum fall (fig. 14-14b). In addition to the danger of injury, that kind of fall could leave the second in a tough spot, off route and with no easy way back.

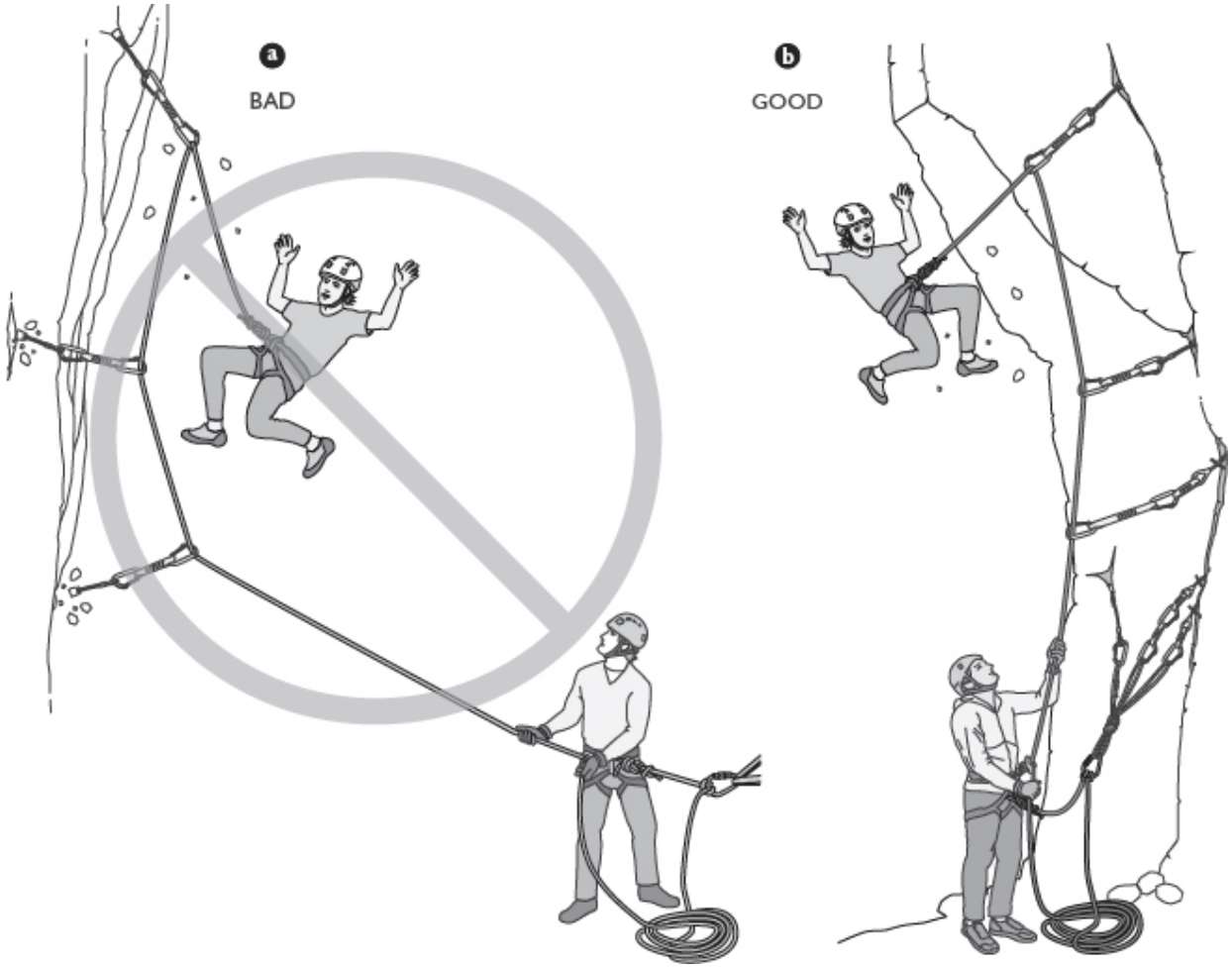

Fig. 14-12. The zipper effect: a, the zipper effect in action; b, a well-placed cam (or opposing chocks) placed at the bottom of a pitch provides multidirectional protection against the zipper effect.

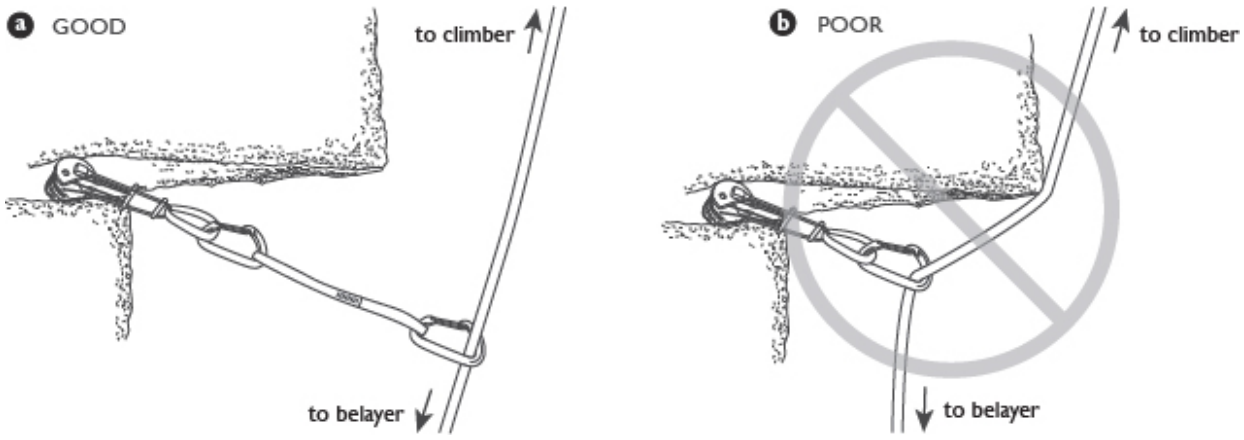

Fig. 14-13. Placements under overhangs: a, rope running free of the overhang (good); b, bends cause rope drag, and rope could be cut by rock edge during a fall (poor).

When leading a diagonal or traversing section, keep in mind the effect each placement could have on the second climber. Put yourself in the second's shoes and ask, "Would I like some protection here?" If so, place it. Asking this question will help climbers avoid a common and potentially dangerous mistake made by beginning leaders: neglecting to adequately protect the follower on a traverse.

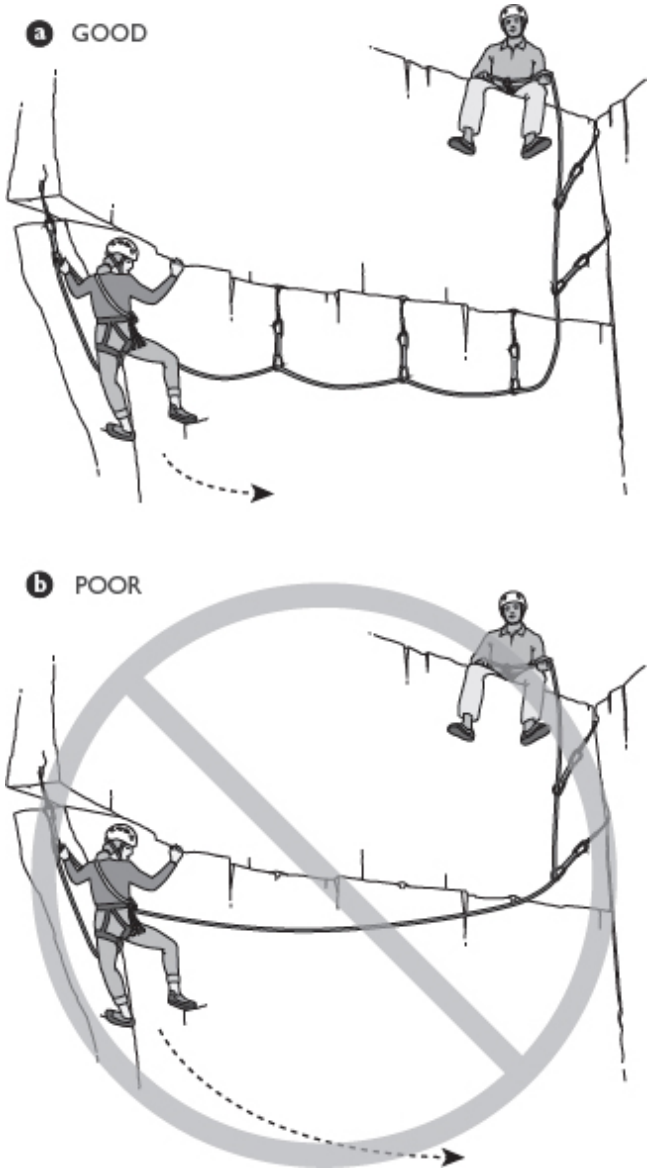

Fig. 14-14. Protecting a traverse: a, placing a piece of protection both before and after a hard move on a traverse reduces potential for a long pendulum fall (good); b, the second climber faces a long pendulum in case of a fall because of inadequate protection (poor).

If the party has the necessary equipment and it seems prudent, consider belaying the second with an extra rope, which may help protect against a long pendulum fall and provide better protection than using the leader's rope. If the party is using the double-rope technique (see "Double- and Twin-Rope Techniques" later in this chapter), do not clip in both ropes during the traverse, so that the follower can receive a belay from above on the free rope.

CLIPPING BOLTS AND OTHER PROTECTION

A carabiner clipped to a bolt hanger should normally have its gate facing away from the leader's subsequent direction of travel (fig. 14-15a and b). Otherwise, the carabiner may rotate or slide in such a way that the gate makes direct contact with the bolt hanger (fig. 14-15c). In the case of a sudden fall, the gate can then open and potentially unclip by striking the bolt hanger. However, not all carabiners and bolt hangers are alike, so the leader should evaluate each circumstance with that in mind, with the goal of trying to safeguard against situations in which the gate of a carabiner could unclip when sudden force is applied.

The same basic principle applies when clipping in to pieces of protection other than bolts. Avoid placing a carabiner in a position wherein the gate could open if it strikes the rock or any other contact point.

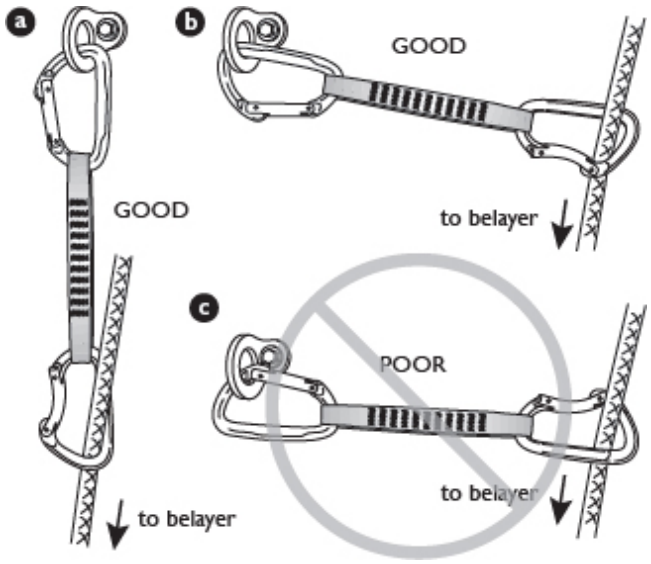

Fig. 14-15. Clipping a carabiner in to a bolt hanger: a and b, gates face opposite direction of climb that goes up and right and are not in danger of unclipping (good); c, gates face wrong direction and are in danger of unclipping (poor).

Similarly, the gate of the carabiner clipped in to the rope should always face the opposite direction that the rope is traveling. If the climb proceeds to the right after a protection point, the gate of the lower carabiner clipped to the rope should face left (as in Figure 14-15a). If the climb proceeds to the left, the gate should face right. If this principle is not followed, there is an increased risk that the rope could travel over the gate if a fall occurs and open up the carabiner, causing the rope to become unclipped. When the climb travels straight up from the last protection point, the gate can be facing either left or right.

ARRIVING AT THE NEXT BELAY

At the top of the pitch, clip in to a solid anchor before signaling "Off belay!" Add additional pieces as needed to form a multidirectional belay anchor (see Chapter 10, Belaying). Make sure the anchor secures the leader against being pulled from the stance by the second.

Think through the belay sequence before settling in so that it is clear which hand to use for the braking hand and where to flake the rope while belaying up the second. Keep the belay system simple. Strive for straight, easily traceable lines from the anchor points to you. Effective rope management techniques are critical to a safe belay, especially when at a hanging or sloping belay stance (fig. 14-16). The most common method is for the belayer to flake or stack the rope neatly on the rope or runner that connects him or her to the belay anchor; alternatively, devices such as rope hooks or rope buckets specifically made for this purpose can be used.

Never lay belay devices, gloves, carabiners, or other items on the ground. If an item is not in use, keep it attached to your harness or a sling or to an anchor. Have only one item, such as the rope, a chock, or a carabiner, in hand at a time. The moment an item is no longer needed for whatever you are doing, reattach it to your harness or a sling or the anchor. Unattached objects are easily knocked or blown off the belay ledge. Take off your pack and rack and attach them to the anchor, but keep them within easy reach. That way, you will be more comfortable while belaying the second.

When the belayer is settled in, haul up the slack rope until it is taut. The second should yell, "That's me." After placing the second on belay, yell, "On belay." See Chapter 10, Belaying, for a full set of climbing commands.

CLEANING A PITCH

The climber who follows the leader should climb as quickly and efficiently as possible after being put on belay (see the "Tips to Save Time and Energy as the Second" sidebar). While ascending, the second climber cleans the pitch: removes the protection from the rock in an orderly way, organizes it, and efficiently transfers it to the belayer at the end of the pitch.

Fig. 14-16. Multidirectional belay anchor at top of a pitch: careful and clean rope management, shown here at a sloping belay stance, is a critical skill for leaders.

The second can minimize the risk of dropping gear by using a careful cleaning procedure, which may depend on the method used to rack the hardware. Consider a typical placement consisting of chock-carabiner-runner-carabiner-rope. The following procedure is an efficient way to clean gear that minimizes the risk of dropping gear:

1. First remove the chock from the rock.
2. Holding the carabiner that is clipped to the chock, clip the carabiner-chock combination directly to the gear sling or harness gear loop.
3. Then unclip the carabiner-chock combination from the runner.

4. Next, loop the runner over your head, unclip the runner-carabiner combination from the rope, and rotate the runner-carabiner combination so that it is under one arm.
5. Continue climbing to the next piece of protection, then repeat.

If the placement uses a quickdraw instead of a runner, follow this procedure:

1. First remove the chock from the rock.
2. Next, clip the carabiner that connects the chock and quickdraw in to the racking sling.
3. Last, unclip the quickdraw's other carabiner from the rope.

In general, cleaning from rock to the rope is best. This keeps the pieces clipped to something at all times, and there is little possibility of dropping any gear. In any racking procedure, minimize the handling of unattached gear to also lessen the risk of dropping it.

TRANSFERRING EQUIPMENT AT THE TOP OF A PITCH

The first thing the second climber needs to do when arriving at a belay station —before being taken off belay—is to clip in to the belay anchor. If the climbers are swinging leads, then the belayer need not remove the rope from the belay device but can back it up with an overhand or figure eight on a bight. If they are not swinging leads, the climbers have to trade places, with the follower taking over the belay to free up the leader to lead the next pitch. In either case, if the second is neat, organized, and efficient in cleaning the pitch, the transfer of gear at the belay station should go quickly, whether the original leader transfers the rest of the rack to the second, who will now lead, or the second transfers the cleaned pieces back to the leader's rack. Follow this sequence, remembering that both climbers always stay anchored to the rock:

1. First, reconstruct the rack. Clip the cleaned pieces to the rack, whether the original leader or the new leader has it. Be careful not to drop any gear.
2. Then hand the removed runners and/or quickdraws over to whoever will lead.
3. If either climber is wearing a pack, it can be removed and clipped in to the anchor.
4. If the original leader plans to lead the next pitch, reflake the rope so that the second's end of the rope is on the bottom and the leader's end is on

top; the second should then settle into the belay position.

TIPS TO SAVE TIME AND ENERGY AS THE SECOND

- **Start preparing to climb as soon as the leader is off belay.** When it is safe to do so, begin breaking down the belay station (but always stay clipped in to at least one anchor until the leader has you on belay).
- **Put the pack on before anything else.** If you are already carrying climbing hardware on a gear sling, put it on next. Plan where to put the gear that you clean, whether on the gear sling, the harness, or another sling.
- **Give the area a last look to make sure nothing is left behind.** Then, once you are on belay, yell, "Climbing!" and start out.
- **Remove each chock by reversing the way it was placed.** A stopper slotted down and behind a constriction should be removed by pushing it back away from the constriction and up.
- **Be persistent but careful.** Use the nut tool to tap on a stubborn wedge or hex-shaped chock to loosen it, taking care to avoid hitting the piece's wires; then lift the chock out gently. Prying and tugging often only tightens or wedges the chock more and can damage its wires. Use a loose rock or other object, if available, to tap on the end of the nut tool.
- **Sometimes nut tools can retract the triggers of cams** that have "walked" back into a crack; if their trigger cannot be retracted with your fingers, try the nut tool. Or use the wires of two stoppers to snare the trigger device so you can retract the cams.
- **Consider asking your belayer for tension** and put your weight on the rope, freeing your hands to work on removing a chock that refuses to budge.
- **As a final option, simply abandon protection if necessary.** Too much time and effort can be wasted on a piece of protection that is not going to come out.

Swinging leads is more efficient but requires both climbers to be competent at leading. The new leader shoulders the reconstructed rack and then racks the runners according to the climbers' chosen system. The new leader rechecks and adjusts the rack to ensure that everything is ready for the next pitch. A

look at the route description may be in order. At the very least, the leader should examine the next pitch and have a sense for the general line to be traveled. The leader is placed on belay and then unclips from the anchor, and the climbing resumes.

CLIMBING WITH A PARTY OF THREE

Most rock climbing is done in pairs, but occasionally a party has three climbers. A three-person team generally is more awkward and less efficient than a two-person team. However, it has an advantage of an extra person available for hauling, rescue, et cetera, and a team of three is faster than two teams of two. Two ropes are required unless the pitches are extremely short. Each of the three climbers must remain securely anchored when not climbing.

Using two ropes sequentially, also known as *caterpillar technique:* In a team of three, the leader climbs with one rope while the second belays and the third remains anchored at the belay station. At the top of the pitch, the leader sets up a belay and brings up the second, who is belayed on the first rope and has the second rope either clipped with a locking carabiner to the harness's back haul loop or tied in at the front of the harness; the second rope will be used by the third climber.

If the pitch follows a straight line up, the second can clean the pitch; remember, a top belay is very safe, and if a fall occurs, the climber falls only a very short distance. If the pitch includes some traversing, some or all of the protection should stay in place for the third climber to help prevent a pendulum fall. In this situation, the second climber unclips each piece of protection from the first rope and clips the protection to the second rope. Once the second climber is at the top of the pitch, the first rope is now completely at the top belay, and the second rope is put on belay to bring up the third climber. When the third climber reaches the top of the pitch, the climbers then may decide to swing leads, with the third climber leading the next pitch using the second rope. For the second to lead, the ropes may need to be retied and perhaps restacked.

Using two ropes simultaneously, also known as *parallel technique:* Another way to climb with three is for the leader to tie in to both ropes while the second and third climbers each tie in to one of the ropes. Double ropes can be used for this method instead of two larger-diameter single ropes (see the next section), if desired. The leader then climbs the pitch, belayed on both ropes. The belay can be provided by one belayer with two ropes in one

device (preferable) or by two belayers with one rope per belayer. At the top of the pitch, the leader sets up a belay station. Then the leader can either belay one follower at a time or bring both up together, one slightly ahead of the other, making sure to leave sufficient space between the climbers so that they will not collide if the higher climber falls.

Several belay devices available on the market work well for belaying two climbers at a time (see "Auto-locking belay devices" in Chapter 10, Belaying). This technique takes more rope management, but this way three climbers can ascend nearly as fast as two. When using this strategy, it is simplest for the original leader to remain on lead throughout the climb, because with the additional rope and climber involved in a three-person team, belay stations can be more confusing and messy.

DOUBLE- AND TWIN-ROPE TECHNIQUES

Most of this book describes climbing situations in which a single rope is usually used. However, climbers can opt for one of the methods that use two smaller-diameter ropes: double-rope technique or twin-rope technique. For both techniques, an advantage is that two ropes are available for rappels.

Double-Rope Technique

The double-rope technique uses two ropes that serve as independent belay lines. Each rope is referred to as a "half rope," is approved by the UIAA and/or CEN for such use, and is marked by a "½" on the end of the rope. Half ropes are usually 8 to 9 millimeters in diameter. The leader clips each rope in to its own protection on the way up, and the belayer manages the ropes separately. Most belay devices with two slots can be used, but some are specially designed for use with double ropes. See the manufacturer's guidelines for more details on the approved use of different devices.

Although the double-rope technique is more complicated than using a single rope, it does offer some advantages. Rope friction can be greatly reduced, falls can be shorter, two ropes are less likely than one to be severed by rockfall or sharp edges, and two ropes are available for rappel. The technique is widely used by European climbers, by ice climbers, and by an increasing number of climbers everywhere to increase protection on highly technical routes. The ropes should be different colors to allow for clear communication about which rope needs slack or tension.

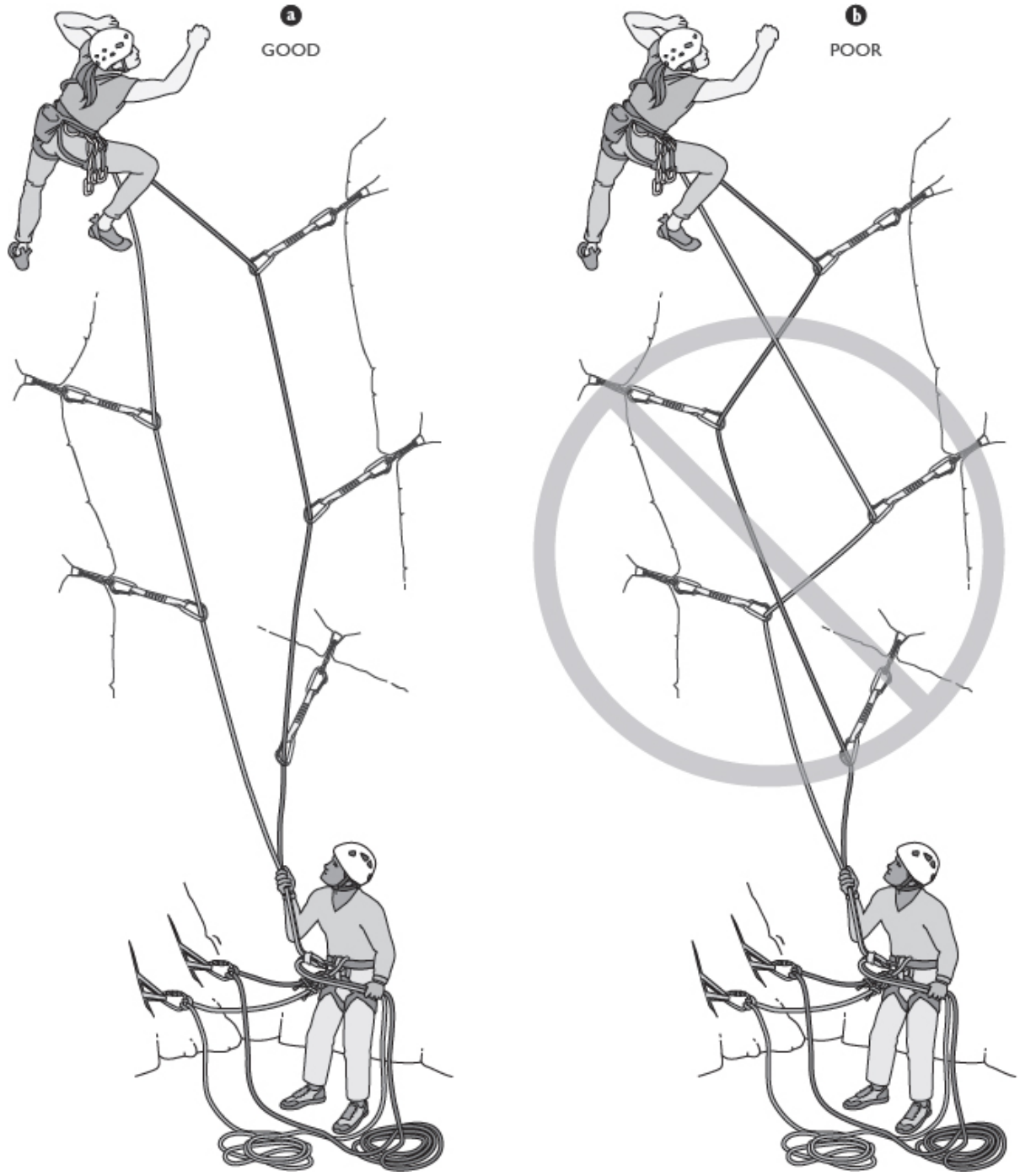

Fig. 14-17. Double-rope technique: a, two ropes do not cross but run reasonably straight to reduce rope drag (good); b, two ropes cross and run in a zigzag, increasing rope drag and sideways stress on the protection (poor).

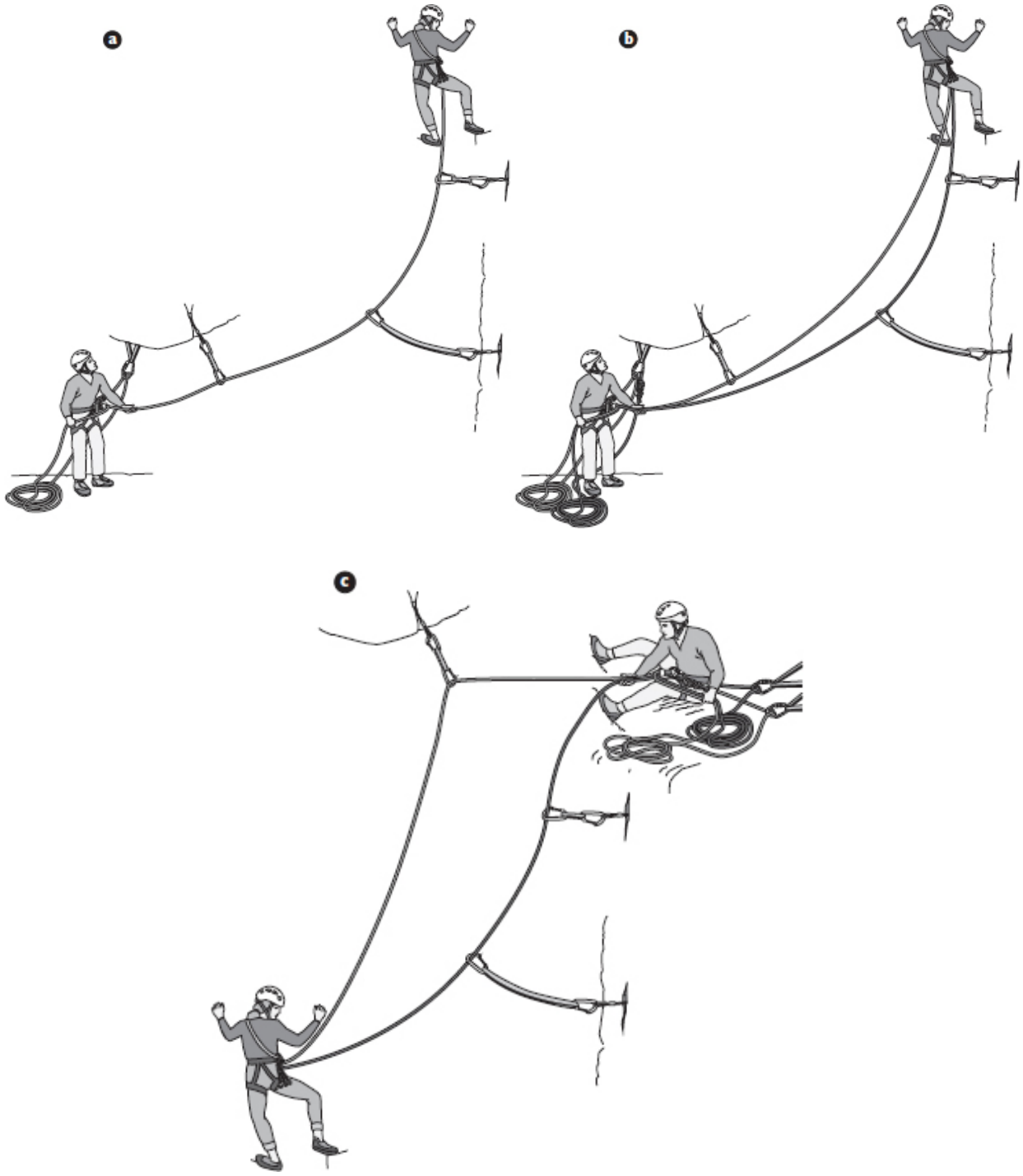

Fig. 14-18. Advantages of double-rope technique: a, using a single rope, the second climber will be exposed to a longer pendulum fall after traversing beyond the first piece of protection; b, one rope through the first piece of protection can safeguard the second climber on the traverse, while the second rope protects the leader on the direct ascent; c, off-line protection (placed off the route line) can be used to minimize or eliminate the pendulum risk.

The double-rope technique offers great advantages when the route meanders. With a series of zigzag placements, one rope can be clipped in to the pieces on the left and one rope in to those on the right, allowing the ropes to remain relatively straight, in roughly parallel lines that do not cross (fig. 14-17a). Be careful to keep each rope on the same side so that rope drag does not become a serious problem (fig. 14-17b). When both ropes are clipped to the same protection placement, each rope is attached using a separate carabiner.

Traverses can be better protected with the double-rope technique, especially when the route traverses at the start of a pitch and then heads straight up. The leader can use one rope for protection on the traverse and leave the other free to belay the second climber from above. If the climbers are using only a single rope, the second climber could risk a long pendulum fall (fig. 14-18a). But with double ropes, the belay on the free rope can minimize or prevent a long pendulum (fig. 14-18b and c).

Another major advantage of the double-rope technique is that it reduces the worries of the leader who is straining to clip in to the next piece of protection. In single-rope climbing, the rope is slack as the leader pulls up a big length to clip in to the next placement, but with a double rope, the slack for clipping is provided on one rope, and the other rope is held snug by the belayer. Thus, when the leader is clipping in to a newly placed piece of protection, a potential fall is shorter.

Fig. 14-19. Twin-rope technique: two small-diameter ropes are used as one, with both attached to each piece of protection.

One disadvantage is that the belayer's job is more complex, handling the movements of two ropes at the same time—often letting out slack on one rope while taking it in on the other. Also, the two ropes weigh and cost more than a single rope or twin ropes. Another drawback is that the technique requires more practice for both leader and belayer than does single-rope technique. However, many climbers find that on long, challenging, and complex rock pitches, the advantages of double ropes greatly outweigh the disadvantages.

Twin-Rope Technique

UIAA- and/or CEN-approved twin ropes are generally 7.5 to 8.5 millimeters in diameter, **and they are not rated for use as single ropes.** The ends of the rope are marked with a symbol of two overlapping circles.

The twin-rope technique shares some characteristics with the single-rope technique and some with the double-rope technique. Two ropes are used, but they are each clipped in to the same pieces of protection, as a single larger-diameter rope would be (fig. 14-19). Twin ropes are commonly used when climbing a route that requires a double-rope rappel. This allows a team of two to climb the route without having to carry an extra rope to rappel at the end.

The twin ropes together absorb more energy and can withstand more falls than a single rope. Though twin ropes are smaller-diameter, the likelihood of severing both at one time is less likely than that of severing one larger-diameter rope.

A disadvantage is that the thinner the rope, the more likely it is to tangle. Also, together, twin ropes weigh and cost more than a single rope. Another disadvantage is that the technique lacks the specific advantages of the double-rope system on meandering routes, traverses, and shorter falls. As with double-rope technique, the belayer has to deal with two ropes, but separate management of each rope is greatly lessened.

PERSONAL RESPONSIBILITY

Leading on rock is a serious commitment. Climbers face decisions in which a poor choice may be fatal. It is impossible to have a rule for every possible situation. Memorized dogma will not ensure safety. Accurately evaluating the risks of climbing requires instead a fundamental understanding of the risks of the environment and the consequences of each climber's own actions. Base your decisions and actions not on superficial rules but, rather, on the knowledge gained through study and experience.