

# Rowing

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**Rowing** is the act of propelling a boat using the motion of oars in the water. The difference between paddling and rowing is that rowing requires oars to have a mechanical connection with the boat, while paddles are hand-held and have no mechanical connection.

This article deals with the more general types of rowing, such as for recreation and transport rather than the sport of competitive rowing which is a specialized case of racing using strictly regulated equipment and a highly refined technique.<sup>[1]</sup>

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## Types of rowing systems

In some localities, rear-facing systems prevail. In other localities, forward-facing systems prevail, especially in crowded areas such as in Venice, Italy and in Asian and Indonesian rivers and harbors. This is not strictly an "either-or", because in different situations it's useful to be able to row a boat facing either way. The current emphasis on the health aspects of rowing has resulted in some new mechanical systems being developed, some (such as the Rantilla rowing method) very different from the traditional rowing systems of the past.

**Rearward-facing systems:** This is probably the oldest system used in Europe and North America. A seated rower pulls on one or two oars, which lever the boat through the water. The pivot point of the oars (attached solidly to the boat) is the fulcrum. The motive force is applied through the rower's feet. In traditional rowing craft, the pivot point of the oars is generally located on the boat's gunwale. The actual fitting that holds the oar may be as simple as one or two pegs (or thole pins) or a metal oarlock (also called rowlock - "rollock"). In performance rowing craft, the rowlock is usually extended outboard on a "rigger" to allow the use of a longer oar for increased power.

*Sculling* involves a seated rower who *pulls* on two oars or *sculls*, attached to the boat, thereby moving the boat in the direction opposite that which the rower faces. In some multiple-seat boats seated rowers each pull on a single "*sweep*" oar, usually with both hands. Boats in which the rowers are coordinated by a coxswain are referred to as a "coxed" pair/four/eight. Sometimes *sliding seats* are used to enable the rower to use the leg muscles, substantially increasing the power available. An alternative to the sliding seat, called a *sliding rigger*, uses a stationary seat and the rower moves the oarlocks with his feet. On a craft used in Italy, the catamaran *moscone*, the rower stands and takes advantage of his body weight to increase leverage while sculling.<sup>[2]</sup>

**Forward-facing systems:** *Articulated* or *bow facing* oars have two-piece oars and use a mechanical transmission to reverse the direction of the oar blade, enabling a seated rower to row facing forward with a pulling motion. *Push rowing*, also called *back-watering* if used in a boat not designed for forward motion, uses regular oars with a pushing motion to achieve forward-facing travel, sometimes seated and sometimes standing. This is a convenient method of manoeuvring in a narrow waterway or through a busy harbour. The "Rantilla" system of frontrowing oars uses *inboard mounted oarlocks* rather than a reversing transmission to achieve forward motion of the boat with a pulling motion on the oars.

Another system (also called *sculling*) involves using a single oar extending from the stern of the boat which is moved back and forth under water somewhat like a fish tail, such as the Chinese *yuloh*, by which quite large boats can be moved.<sup>[3]</sup>

## Ancient Rowing



Typical Finnish rowing boats on the shore of Palokkajärvi, Jyväskylä



Rowing in the Amstel River by a student rowing club.

In ancient times, rowing vessels, especially galleys, were extensively used in naval warfare and trade, in particular in the Mediterranean from classical antiquity onwards. Galleys had advantages over sailing ships; they were easier to maneuver, capable of short bursts of speed, and able to move independently of the wind. Galleys continued in use in the Mediterranean until the advent of steam propulsion. Their use in northern Atlantic waters was less successful, finishing with their poor performance with the Spanish Armada.

The Classical trireme used 170 rowers; later galleys included even larger crews. Trireme oarsmen used leather cushions to slide over the seats, which allowed them to use their leg strength as a modern oarsman does with a sliding seat. Galleys usually had masts and sails, but would lower them at the approach of combat. Greek fleets would also leave their sails and masts on shore (as being unnecessary weight) if possible.<sup>[4]</sup>

## Venetian Rowing

In Venice, gondolas and other similar flat bottomed boats<sup>[5]</sup> are popular forms of transport propelled by oars which are held in place by an open wooden *fórcola*.<sup>[6]</sup> The *Voga alla Veneta*<sup>[7]</sup> technique of rowing is considerably different from the style used in international sport rowing, due to the oarsman facing forward in a standing position. This allows the boat to manoeuvre very quickly and with agility - useful in the narrow and busy canals of Venice. Competitive regattas are also held using the Venetian rowing technique, using both gondolas and other types of vessels.

There are three different styles of Venetian rowing:

1. Single oarsman with one oar, standing near the stern of the boat (the oar also acts as a rudder)
2. One or two oarsman each with two crossed oars (known as *a la valesàna*)
3. Two or more oarsmen, rowing on alternate sides of the boat

## Whitehall rowboats

The origins of this distinctive and practical craft are unclear. In earlier times, however, builders were often sailors or seafaring men. Successful designs for large and small craft alike evolved slowly and as certain desirable qualities were attained and perfected they rarely changed.

Some hold that the Whitehall rowing boat design was introduced from England. However the famed nautical historian Howard I. Chapelle, cites the opinion of the late W. P. Stephens that in New York City there is a Whitehall Street and this was where the Whitehall was first built. Chapelle, Stephens and others agree that the design came into existence some time in the 1820s in New York City, having first been built by navy yard apprentices who had derived their model to some extent from the old naval gig.

In *Wooden Boats to Build and Use* (1996), John Gardner of Mystic Seaport describes a 25-foot (7.6 m) racing Whitehall, named *American Star*, which triumphed in an 1824 race in New York Harbor that according to newspapers of the time drew 50,000 spectators, more than any American sporting event ever until then. The following year the boat was gifted to an aging General Lafayette, hero of the American Revolution, during his tour of the U.S. The *American Star* returned to Lafayette's estate in France where it was displayed in a specially constructed gazebo. During the mid 20th century the boat was rediscovered in storage there, and its lines have been preserved at Mystic Seaport where an exact replica was built in 1974–75, and still rows at Seaport events.

## Design factors of rowing boats

Many considerations go into selecting a good rowboat. A well designed rowboat will perform well in trying conditions. The classic shapes of rowboats reflect an evolution of hundreds of years of trial and error to get a good shape. Some factors to be considered are waterline length, speed, carrying capacity, stability, windage, weight, seaworthiness, cost, waterline beam, the fullness or fineness of the ends and trim .

Design details are a compromise between competing factors. If the waterline beam (width) is too narrow the boat will be tender and the occupant at risk of falling out, if the beam is too wide the boat will be slow and have more resistance to waves. If the freeboard (height of the gunwale above the waterline) is too high then windage will be high and as a result the boat will be caught by the wind and the rower will not be able to control the boat in high winds. If the freeboard is too low, water will enter the boat through waves. If the boat is designed for one person then only a single rowing position is required. If the rower is to carry a passenger at the stern then the boat will be stern heavy and trim will be incorrect. To correct this a weight can be added in the bow, alternatively the boat can supply a second rowing position further forward for this purpose. For a boat to have three separate thwarts and have adequate space for each occupant then the boat has to be of a certain minimum size. A 2.4-meter (8 ft) pram dinghy can carry 4 passengers on 3 thwarts in flat seas. The ideal size of a good row boat intended for distance rowing is 5 m (16 ft).



A French galley and Dutch man-of-war off a port



A Gondola in Venice

Overall beam (width) is important. If the rowlocks are too close together the oars will be difficult to use. If the rowlocks are too far apart then the boat will be overly large and rowing will be inefficient, wasting a rower's effort. Sometimes on narrow, faster rowboats for protected waters outriggers are added to increase rowlock separation. Many traditional rowboats have a beam of about 135 cm (4<sup>7</sup>/<sub>16</sub> ft).

Most modern rowboats between 2.4 m (8 ft) and 4.6 m (15 ft) have a maximum beam of 1.2–1.3 m (4–4<sup>5</sup>/<sub>12</sub> ft). Waterline beam is important for stability. Most general purpose rowboats' water line beams are 0.9–1.2 m (3–3<sup>11</sup>/<sub>12</sub> ft). Stability is much influence by seat height as the rower makes up a big percentage of the total weight. Most general purpose rowboats have a main thwart height of 25 cm (10 in) above the keel. Wider boats can have higher seats. Older rowers with stiff or sore backs benefit from 28 cm (11 in) high seats. The Finnish Savonian type rowboat is very narrow and fast, having very sharp bow and stern, with beam around 110 cm (3.6 ft), but also dangerously tender and prone to capsize easily in unexperienced hands. Most modern style rowboats are considerably lighter than traditional clinker-built style. Many 3.7–4.6-meter (12–15 ft) row boats are about 32–45 kg (70–100 lb). A pure rowing boat built for speed will have a narrow transom 61–84 cm (2–2<sup>3</sup>/<sub>4</sub> ft) and be very narrow at the stern waterline, while a rowboat intended to use a small outboard motor of 2–5 hp (1.5–3.7 kW) needs a wider transom to support the weight of the engine and operator in the stern. Small short shaft outboards need a transom height of 38 cm (15 in). Often the aft thwart is moved forward 30–36 cm (12–14 in) from the stern to give better weight distribution and balance if the boat is being operated solo with an outboard.

Spring in the keel or rocker influences how a rowboat performs. Longer, slender race boats have less rocker of about 7.6 cm (3 in). A short 2.4-meter (8 ft) pram dinghy has a rocker of 15–18 cm (6–7 in). Boats with less rocker are easier to row and faster in flat or nearly flat water. However, in any waves a boat with 13–15 cm (5–6 in) of rocker will be more seaworthy—rising over waves rather than going through them. A boat with more rocker can change direction easily whereas a straight keel boat will track well in a straight line but resist turning. High sided and fine-ended boats, such as dories, are affected by wind. Their trim can be altered by using a plastic container of water attached to a rope that can be moved to the bow or stern as need be. Long-distance rowers can keep up a steady 20 strokes per minute compared to a racing shell which can be rowed at 32–36 strokes per minute by fit athletes. A rower can maintain 40 strokes per minute for only a brief period. Longer, narrower rowboats can reach 7 knots (13 km/h; 8.1 mph) but most rowboats of 4.3 m (14 ft) can be rowed at 3–4 knots (5.6–7.4 km/h; 3.5–4.6 mph).<sup>[8]</sup>

Many old rowboats have very full ends (blunt ends); these may appear at first glance to be bad design as it looks slow, not fast. However a full-ended rowboat will rise to a sea and not dig in as a finer hulled boat might do, thus a compromise needs to be made between the factors of speed and of seaworthiness. This style of rowboat was designed to carry a bigger load and the full sections gave far more displacement. Also older boats were often very heavily constructed compared to their modern counterpart, hence weighed far more. A rowboat designed as a tender carrying occupants to a boat on a mooring might tend to be short, whilst a rowboat for use on rivers and to travel long distances might be long and narrow.

## Oars

The position and length of oars is critical to rowboat performance. Generally, short boats have short oars. A 2.4-meter (8 ft) dinghy uses oars about 2 m (6<sup>1</sup>/<sub>2</sub> ft). A short oar makes quick but short strokes possible. A short oar is easier to use in a narrow creek or a crowded anchorage. This is important in a small tender which may be heavily laden with passengers, limiting the swing of the oars. A short, quick stroke prevents the bow being driven under in choppy waters while heavily laden. Longer oars can be used to produce longer, slower strokes, which are easier to maintain over long distances. Designers may match oar length to the amount of space provided for oar storage in the boat. Wooden oars are generally made of a light, strong wood, such as fir or ash. The blades can either be flat for general use, or spooned for faster propulsion. Utility oars are often unbalanced. Rowers looking for performance and ease of use over long distances often use balanced oars, where the inboard (handle) end uses either heavy shoulders(button/collar) or lead weights inside the handle. Generally the oar is weighted so it is balanced about 28 cm (11 in) outboard of the rowlock in a 2.1 m (7 ft) oar so the oar is slightly blade heavy. Most designers position rowlocks about 30 cm (12 in) aft of the rowing thwart and about 15 cm (6 in) above the thwart. Short rowers—1.73 m (5 ft 8 in) and under—can shorten these distances by 2.5 cm (1 in) and taller rowers—1.88 m (6 ft 2 in) plus—can extend the distance 2.5–5.1 cm (1–2 in). In a short rowing boat the distance is often shortened to 23 (9) and 10 cm (4 in). The height of the rowlock plate is adjusted by the height of the wooden spacer block. Rowboat used as tenders should have U shaped rowlocks so oars can quickly be unshipped when coming alongside.



A *Sunnmørsfering*; a Norwegian four-oared rowing boat, from the region Sunnmøre (Herøy kystmuseum, Herøy, Møre og Romsdal, Norway)

## See also

- Rowing exercise
- Rowing (sport)
- Ocean rowing
- Coastal and ocean rowing
- Sculling

- Racing shell
- Row bar
- College rowing

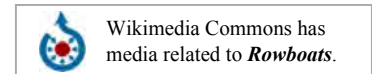
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## External links

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