Tactical Sailing®

A Game Against the Wind

Coach's Toolbox

Against the Wind
and
Boat Against Boat

Version 2.0

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Edition: Tactical Sailing (TS) program version 2.0
Documentation of Coach's Toolbox version 24. January 2024
The required Tactical Sailing program for the functions described here is version 2.240.122 or higher.

Table of Contents

1 "Tactical Sailing" - Version 2.0

The "Coach's Toolbox" has developed over the years into a popular "teaching and learning program" for sailing beginners, regatta sailors and experts in strategy and tactics. We have succeeded in developing more than 100 different learning modules and in the "Coach's Toolbox" to summarize.
The ever-growing scope of the program makes it impossible to add further learning modules for technical reasons.

We have now bundled the most important tactical exercises - the "highlights" - for coach's and regatta sailors in a new program version. The "Coach's Highlights" for PCs (Windows, Linux and macOS) are **a new independent program version with 20 exercises** and are now available as a useful **supplementary program (add-on)** based on the "Coach's Toolbox".

1.1 New program packages – Games and Toolbox

In addition to the "Games and Tips", there is the new version of the "Coach's Toolbox" for PCs (Windows, Linux and macOS) in the program package "All in One" or as a "Stand alone" program - without games. There is also the program version "Highlights" (as of October 2023).

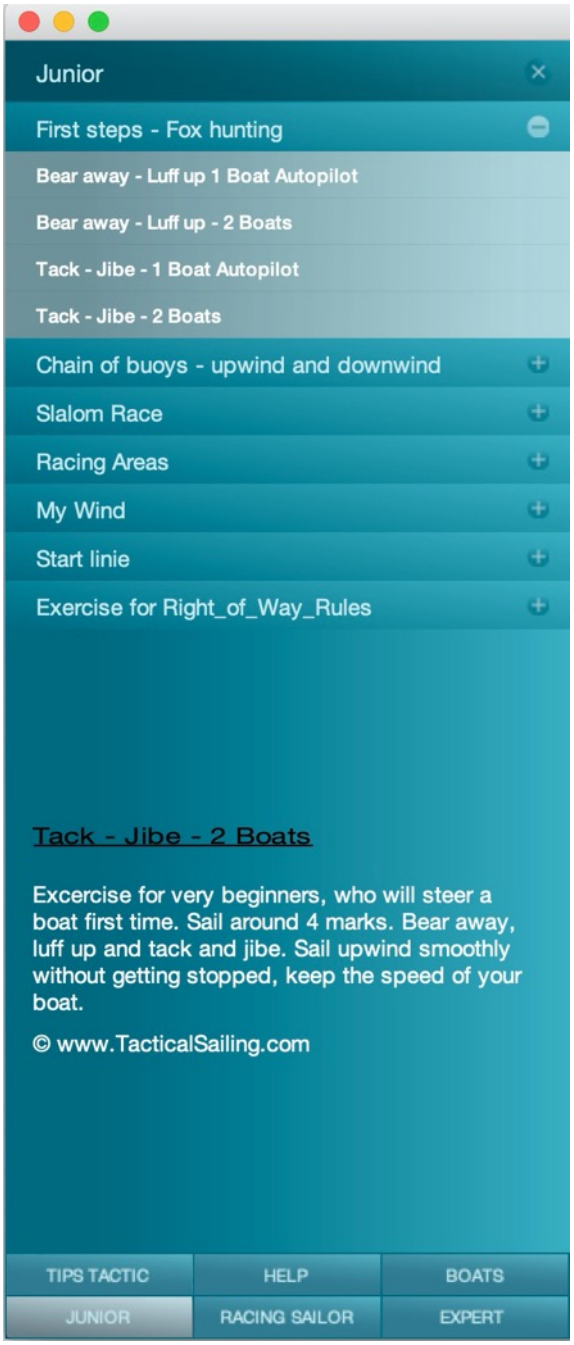
"All in One" or "Stand alone"

Coach's Highlights

1.2 The new Coach's Toolbox

It is possible to access the new " Coach's Toolbox" at the start of the program. The learning modules of the " Coach's Toolbox " are now clearly grouped into following categories in a common "box", namely:

- **JUNIORS, RACING SAILORS, EXPERT, BOATS, HELP AND TIPS TACTICS.**



The exercises are easily manageable in these categories - and easy to use for beginners, professionals, and experts. Classic exercises for regatta sailors from "start to finish", regatta scenes in the "Fleet-, Match- and Team-Race" complete the training offer. In a new section, "Top Tactics", you will find the "top 10" tactical decisions that you should definitely learn and use to sail successfully. Professional sailors have told us their tricks, which is what is especially important in a regatta, in order to always be a "nose length" ahead of the competition. These important "Top-10" can also be accessed as video clips without additional operation on the PC - only with the "1-Click-Operation": Play"!

As before, "sailors" on pc/mac can select the exercises with different levels of difficulty:

- 1 Boat with sparring partner and autopilot to train alone,
- 2 Boats, 4 boats or up to 10 boats to train with several sailors,
- 8 Wind formats from 1x1 to 8x8, constant, shifting, oscillating and gusts,
- 4 regatta formats, Fleet, Match, Champions league and individual training formats.

For this reason, the new six categories, the operating structure is adjusted by explanatory notes and new screenshots.

2 Introduction

With the computer game "Tactical Sailing," we have succeeded in developing an interesting and content-wise comprehensive teaching and learning game, which is being used by many interested sailors across the globe.
Beginning with a simple portrayal of sailing's basic rules, right up to complex regatta situations, our applied simulation methods offer quick and efficient learning success.

2.1 Mathew Belcher and Malcom Page (AUS 11)

The Australian 470er 2012 Olympic Champions, Mathew Belcher and Malcom Page, have the same opinion. As early as 2011 they incorporated "Tactical Sailing" into their training program.

Macom Page, Victor Kovalenko, Mathew Belcher

Coach Victor Kovalenko on duty

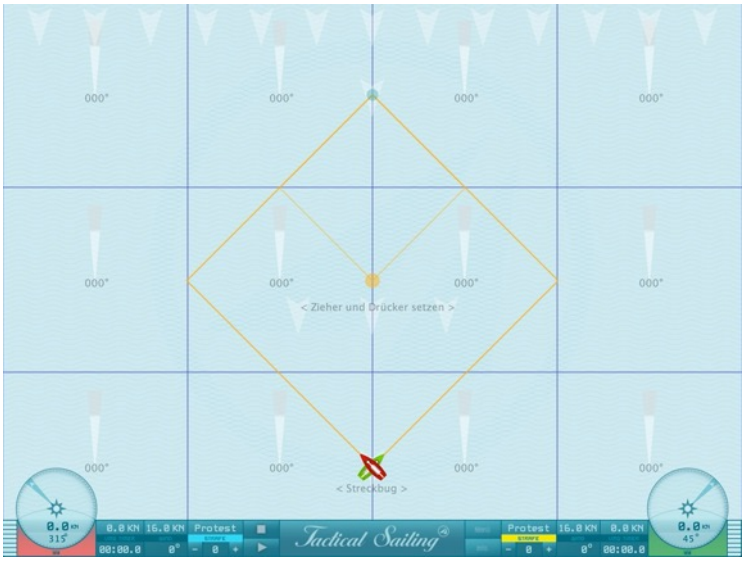
Mathew Belcher says: "It's not an easy game. I've been really intrigued by it. First up, I must be honest I thought this was just another tactical sailing game being produced on the sailing market, but this game has real merit and hones your tactical skills. The complexity of the game is really up to you and what you are looking to get out of it. I will definitely continue to use this game in the lead up to the Olympics."

2.2 European Award for Technology Supported Learning

With the toolbox, which was developed specially for "Tactical Sailing," the program succeeds in demonstrating our main topic, using the wind optimally, even more descriptively than before.
“Tactical Sailing” was awarded the "2012 European Award for Technology Supported Learning" - "EureleA" - in the category "Best Media Didactics."
This toolbox, which was especially developed for this purpose, makes it possible to convey additional and background knowledge of strategy and tactics about utilizing the wind in seminars, workshops or theory lessons, and does so in a game-like form. It also specifically targets increasing motivation, attention and the learning effect through good didactics. Initially, you learn how to optimally use the wind; then, additional opposing boats are deployed, increasing the tactical diversity of the sail. Both situations are addressed in detail through interesting scenarios in their respective “exercises” in the Coach’s Toolbox. The coach can use the default versions as well as individually modify them.
The Toolbox from "Tactical Sailing" is therefore an important and efficient resource for coaches - but not only for coaches.
Any sailor can make use of the Toolbox. It is made for exercising your next regatta to improve your skills in strategy and tactics. The program includes more than sixty scenes - Ready to run with whom you can practice at any time and expand his tactical and strategic skills.

2.3 Against the Wind

The toolbox complements the “Game Against the Wind”, contains **learning variations**, which increase in difficulty: “Uno”, “Quattro”, "Nine", “Chess”, “Gust”, and “Field”. Two boats, both of which can be steered either manually or with autopilot, are available (1 training boat, 1 sparring partner’s boat). The training boat sails the optimal course as opposed to the sparring partner’s boat. Here, the coaches have the ability to decide for themselves about the design of tactical sequences on a case to case basis, e.g. the illustration of tactical rules: Rule 10:17, Long leg before short leg, avoiding lay lines, or setting speed and pointing as required. If the coach changes the direction of the wind, then the consequences are serious, as the long leg, short leg and lay lines, among other things, are changed as well. The position of the starting and finish lines and buoys, as well as their zones can also be modified and discussed. This screenshot shows a special scene "Wind 4x3", one sees two "compass roses” left and right of the picture.



2.4 Boat against Boat

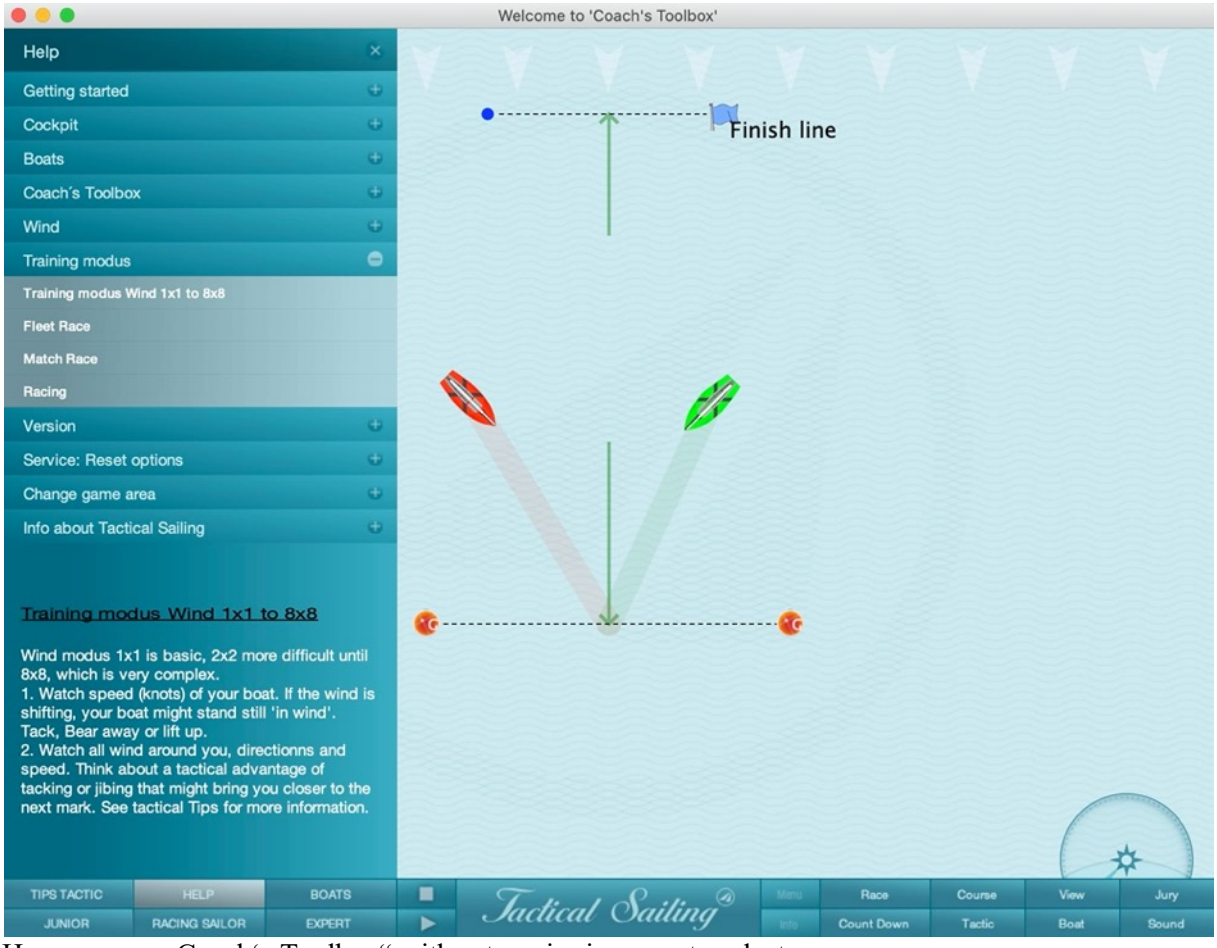
The toolbox complements the “Game Boat Against Boat”, has **up to ten** training and sparring partner’s boats available. This screenshot shows a typical scene "Boat against Boat", you can see two "compass roses" left and right of the picture. Up to four boats are steered manually in the game and toolbox; the other boats follow a tactical path – predetermined by the coach – to the goal. With the game variation “Boat against Boat,” the “right of way” inevitably becomes a tactical topic in the game.

Each sailor has the ability to exercise the right of way and use it to her or his advantage. The program “automatically” recognizes possible rule infractions, e.g. contact with the opposing boat. Other infractions are also immediately registered: contact with buoys, transgression of the starting line (OCS) and other timing mistakes in the starting preparations. Acoustic and visual signals automatically signalize these infractions, which can be interpreted by a (fictional) race leader, umpire, or by the players themselves. With these new functions it is easier for the coach to design and discuss many tactical scenarios that are difficult to explain. Furthermore, not just the so-called “basic rules,” but a number of other more important rules and their decisive sequences can be perfectly “simulated.” You can then immediately try out what is learned in typical regatta scenarios in fleet, match, team races or Champions League format.

2.5 Coach's Toolbox

The learning modules of the "Coach's Toolbox" are clearly grouped into six categories in a common "box". It can be trained with 1, 2, 4 or even 10 boats. The scenes in the Coach's Toolbox always show the picture with two "compass roses" to the left and right of the picture, additional tactical instruments may be added.

Up to 10 boats at starting line



Home screen „Coach's Toolbox" with categories in menu to select

2.6 Strategy and Tactics

There is one thing we know for sure: the wind is constantly changing. With this Coach's Toolbox, we make the invisible monster "wind" visible through its direction and its strength. This way, it is easier to learn how to use its power to our advantage. The strategic and tactical possibilities for using the wind are made very clear through the Coach's Toolbox.

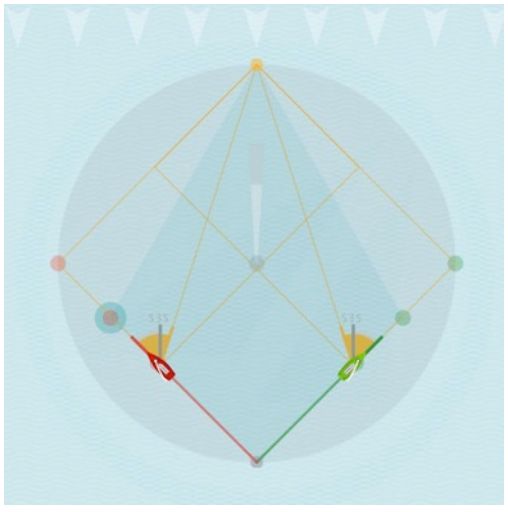
For us, strategy means that before the game starts, inform your self in detail about the expected wind and opponents. Each player makes a plan for him or herself on how they want to act in order to reach the finish line first. An over-all view must be obtained of the wind conditions in the field, ascertain wind information, and be observant to any possible indication of change which could mean an alternative plan must be found. Who is the opponent - a sparring partner, beginner or professional? What strengths and weaknesses do they have? Do they already have experience in "reading the wind," and how well do they know the field? Can they concentrate in order to achieve perfect timing at the starting line? Which techniques do they use on the boat; which will I employ - wind gauge and compass?

Tactics means that in the actual game or regatta situation you must constantly test if the goal is still attainable or not, and react immediately and spontaneously to expected situations or unpredictable changes. The wind and the opponent offer the most different of possibilities. Strategy and tactics are closely connected and influence each other. It could happen that, due to serious changes in the wind or my opponent's behaviour, I have to adjust and update my strategy while sailing.

Therefore, sailing is a strategic and tactical game - against the wind and one or more opponents.
We know from professional sailors that the sailor "who can read the wind the best" and use it to his advantage is the one who will reach the finish line first.
But what applies to two sailors in the lead of the regatta is just as important for sailors fighting for a better position in the middle of the field. Special importance here is the use of "Risk Management".

2.7 Risk Management

Strategic and tactical decisions in Regatta sailing are made with similar consideration to that of conventional Risk Management. A sailor must already be decided at the starting line whether to take the right or the left side of the Regatta Field. Jochen Schümann, Germany's most successful and prominent sailor tells us: "The Physics of sailing permanently compels precise decisions". The objective of a race is obvious: at the beginning, sailing upwind to reach the buoy first. The basic decision here is, in which direction to beat. This is an entirely strategical decision, as the sailor is permanently manoeuvring under changing conditions such as wind direction - wind force and currents. It is essential, in an instant, to make a new decision: "should I stay on this course or tack and veer off in another direction?" (Magazin Capital, 26.11.2004). Regarding this question, "Tactical Sailing" has devised a specific simulation: "Risk and Reward", available in the "Coach's Toolbox" from March-Version 2016 (1.160.316 or higher).



A useful aid for estimating the "Risk" is the "safety diamond". This shows the tactical decision boundary line and should not be crossed. This ensures that the "Risk" has set limits and should not be unnecessarily overstepped.

Another aid for assessing your win or loss through oscillating wind is the "rotating wind ladder". This shows any changes in the distance between you and your opponent, namely: are you now sailing ahead

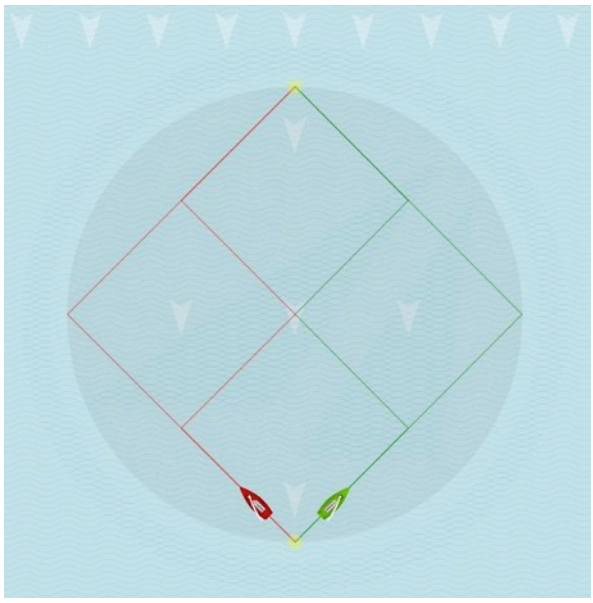
or behind your opponent? In particular, on the way to the finish line are many tactically deciding factors for you to reassess or correct to gain or win.
We hope that through the "Tactical Sailing" especially developed "Simulators", a substantial contribution has been made in preparing young "Profi" - professional sailors for all the complexities of regatta sailing.

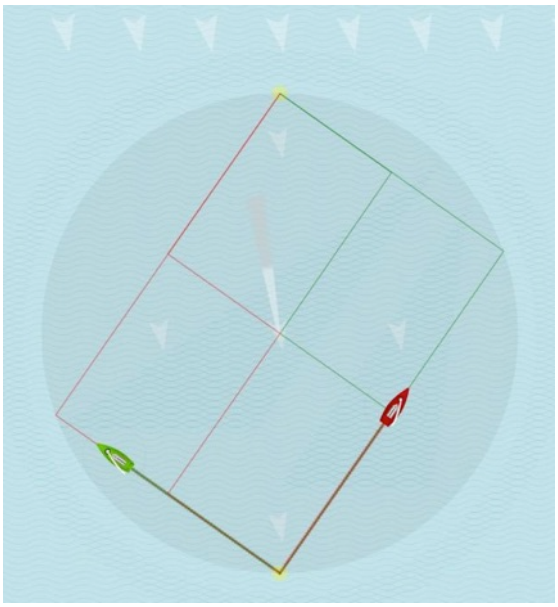
2.8 Technique of the Simulations

The simulations we have developed can be compared to those of a Flight Simulator for training Pilots. It is not only the Start and Landing that have to be exercised, but also how to react in any emergency situation which could arise. When a pilot is later in a real cockpit, he must be able to make decisions immediately and correctly.
Our "Wind Simulator" and "Boat Simulator" work on similar principles to those of a Flight Simulator. It is possible to illustrate various situations that could occur on the water, thus helping the sailor to learn how to react immediately and make the right decision.
The "Wind Simulator" can also do a lot more! For example: on a day that "oscillating winds" are planned on the training schedule, and no wind is on the water, a sailor can still complete this exercise with our simulations. On the PC it is possible to repeatedly practise various manoeuvres- even without wind - until they are memorised. This enables a sailor to react immediately and correctly on the water, in case of an emergency.

2.9 The Wind Simulator

One objective of the toolbox is to make the invisible monster “wind” and the consequences of its shifts visible to us. In the toolbox, the “wind machine” is completely under your control, the wind simulator generates pattern in desired direction and force. With the toolbox you have a tool available for learning about multiple variations and their increasing difficulties. We call this “wind region” - according to difficulty - “Uno”, “Quattro”, “Chess”, "Gust", and "Field”.
For the conveying of basic knowledge, the wind is evenly distributed in direction and strength in “Uno.” But with just a small wind shift of 10°, many interesting and challenging situations for the tactical sailing arise on the playing field.

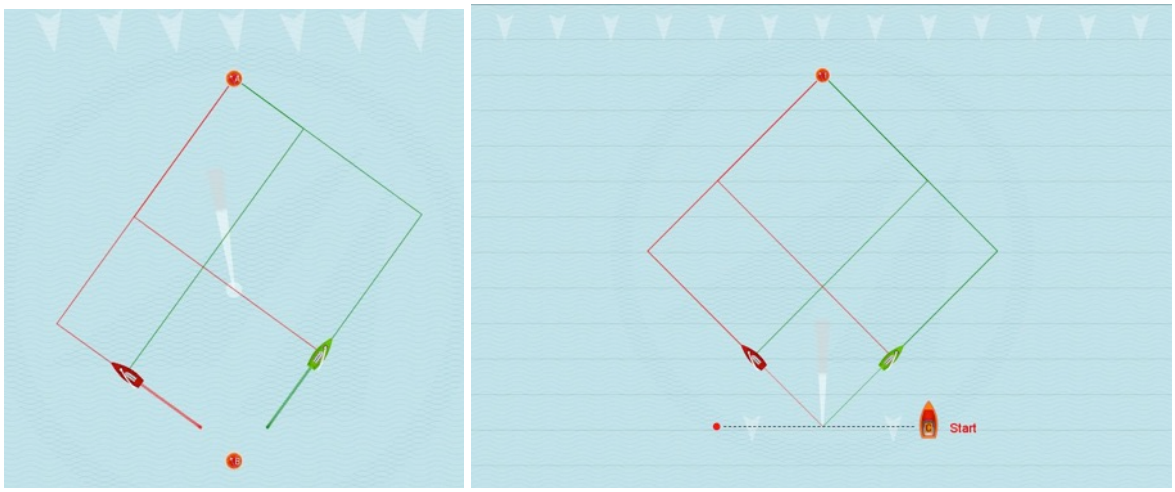




The “playing field” for tactical sailing is displayed here with a circle area. Each point can be seen as an imaginary “tactical goal point” when playing against the wind.

2.9.1 The “Uno” Wind

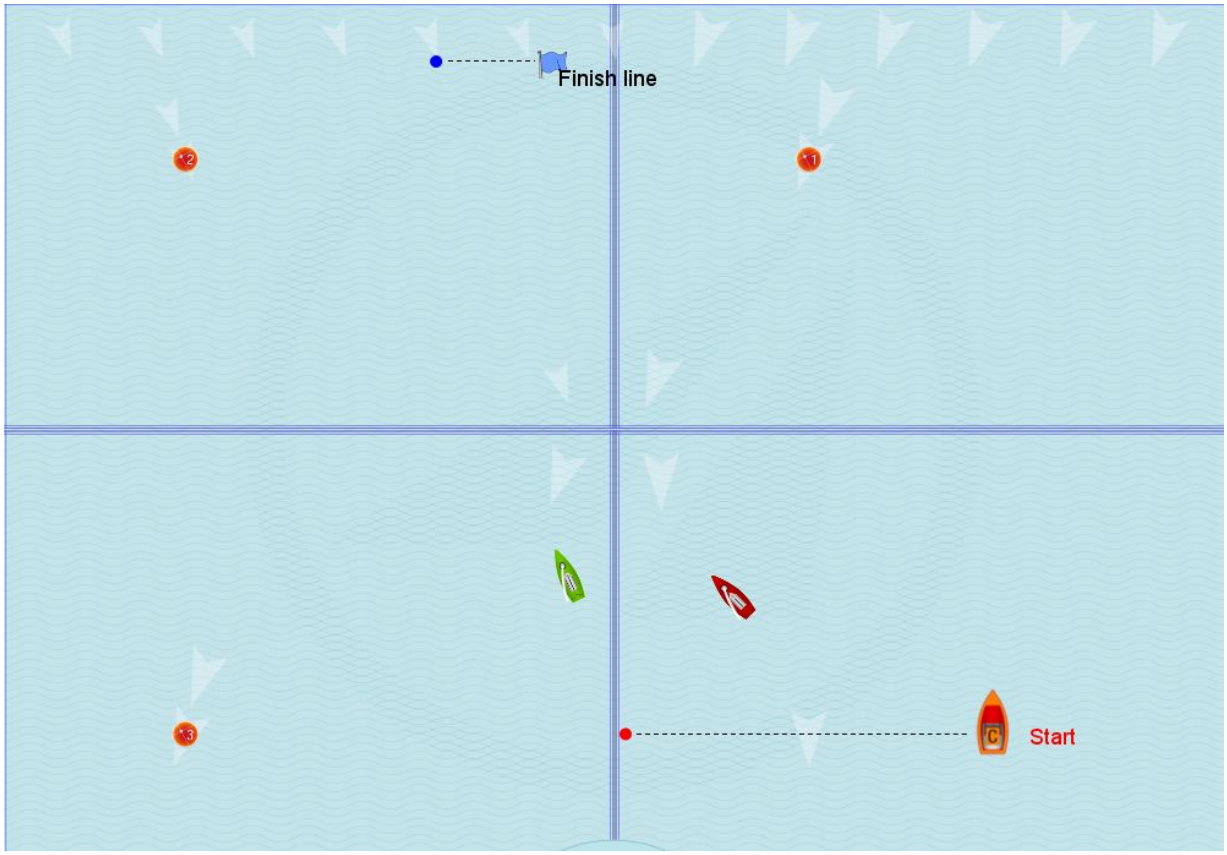
We can indirectly make the wind visible. The drawn lines are indications for the tactical decisions: which way you want to sail to the finish and where you could turn.
Example: Through the forementioned current wind direction (350°), the drawn lines arise. You can optimally use these as your sailing path in order to achieve the goal upwind (360°).



In multiple single scenarios and during a complete regatta, basic knowledge about tactically sailing against the wind can be conveyed. For this, an evenly distributed wind with the name “Uno” is employed. We call this simplest wind pattern: Wind 1x1 or “The 1x1 of the wind”
You can modify the wind at any time, and with that, you have unlimited possibilities to simulate the most diverse wind situations. You can distinctly show turning and oscillating wind, the header and lift, long leg and short leg, as well as lay lines. All wind-dependent lines are automatically adapted when the wind shifts. You can start and draw up the boat, change the wind at anytime and make known, which rules are to be heeded during wind shifts.

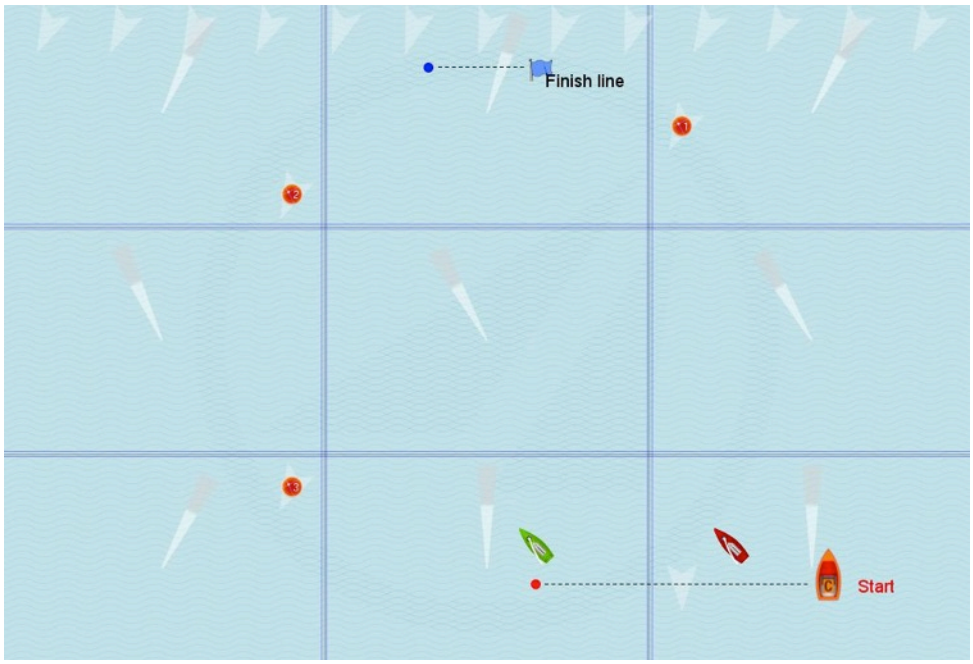
2.9.2 The “Quattro” Wind

Beyond basic knowledge, the wind can be self-designed in a regatta field for intermediate sailors. The wind is divided into multiple wind regions; here, the “Quattro” wind is a wind pattern with 4 regions.
Characteristic of the wind regions: There are different “winds” in each region with its own wind direction and strength. The "borders" of the regions are formed by the number of "columns and rows" that results in the number of regions in the multiplication. Example 2x2 with 4 regions (Quattro).
You can adjust wind strength and direction, as well as simulate the sequence of a regatta. Like in reality, the wind behaves on the regatta field differently in every region. At the start the wind is different as on the first buoy; it turns or oscillates. For training, we can make the borders, on which the wind changes, visible as lines. You can plan your strategy for which side you should head for the windward buoys in order to take the wind from the preferred side.

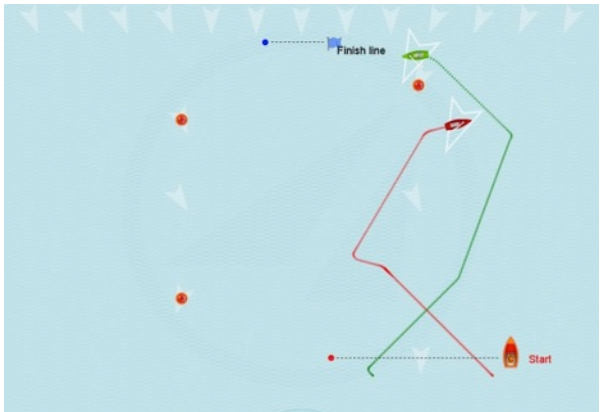


2.9.3 The “Nine” Wind

With the wind pattern 3x3, 3 columns and 3 rows – 9 wind regions – can be used. The wind’s direction and strength can be modified in each region. With this, it is possible to simulate different wind relationships: At the start line, in the middle of the field, above at the windward marks, at the leeward marks, and on the right or left sides of the buoys.



We can indirectly make the wind visible. The drawn lines are indications for your tactical decisions, which path you could sail and where you could turn. In each region – in each rectangle – the wind blows differently; its direction and strength can be set and modified.
Example: Through different wind directions in each region – between 340° and 20°– you can determine you own strategy for practicing purposes. This strategy can include in which region you want to sail in order to take the wind on from the preferred side. With the drawn lines, you can recognize where the wind changes. Use this information where required in order to turn on the long leg. The wind and its boundary lines are also made “invisible” for training. Then, you only use the burgee on the boat as a wind indicator. This Option is very close to the real situation, and in both following examples you see why each boat can reach the windward buoy first, if after the start the field is approached from the correct - right side!



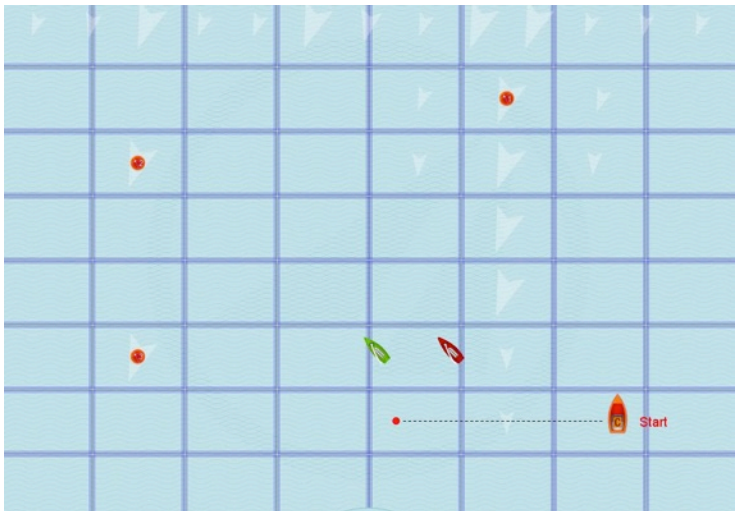
2.9.4 The “Chess” Wind - Master Class

The training goes even further with more wind patterns, Wind 4x4, 5x5, 6x6, 7x7 and the final version, 8x8, with 64 wind regions - the master class for sailors. Those who learned how to win with the “Quattro” wind can also reach the finish line first with “Chess.”

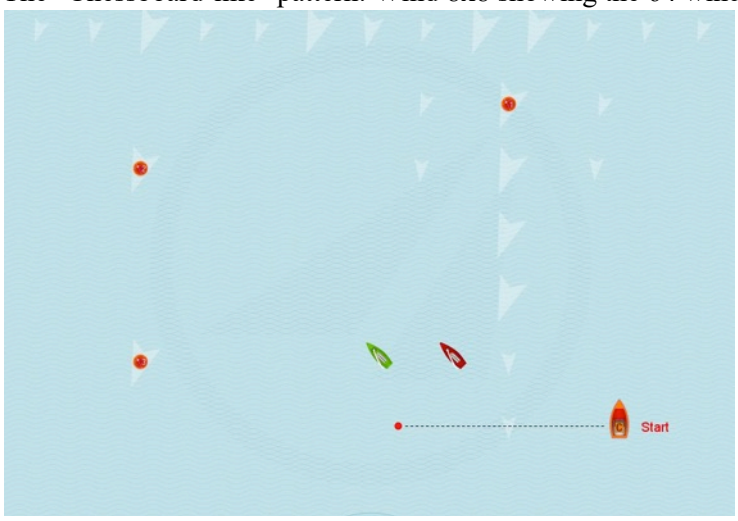
This 8x8 wind pattern is reminiscent of a chessboard and the most prominent German sailor, Jochen Schuemann says, “Sailing is like a three-dimensional chess game.” To practice, you can make the wind regions in the game visible; that way, you can recognize the wind’s limits. However, those who want to win a gold medal in the Olympics like Jörg and Eckart Diesch (FD) have to learn how to read the wind in all its details. Jörg and Eckart Diesch trained intensively to learn this ability and mastered it perfectly. Mathew Belcher (470er) says: "It's not an easy game. I've been really intrigued by it. First up, I must be honest I thought this was just another tactical sailing game being produced on the sailing market, but this game has real merit and hones your tactical skills. The complexity of the game is really up to you and what you are looking to get out of it. I will definitely continue to use this game in the lead up to the Olympics next year (2012)." Mat Belcher and Malcom Page won Gold in London 2012!

See: www.belcherpage2012.com .

Sailing in the master class with the “Chess” wind requires especially strategic and tactical thinking and the highest amount of concentration.



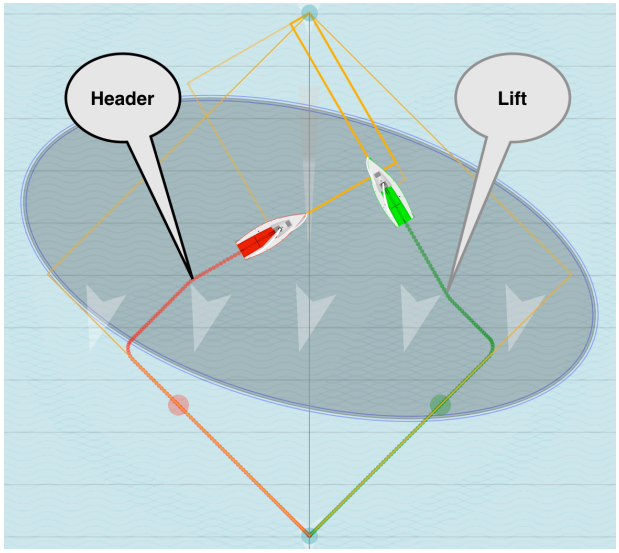
The "Chessboard-like" pattern: Wind 8x8 showing the 64 wind regions and borders for training



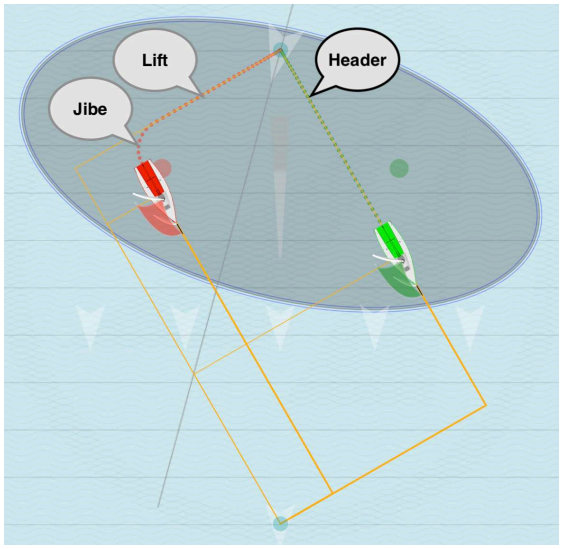
The same "Chessboard" pattern: but NOT showing the regions and borders for a regatta

2.9.5 The Wind “Gust” - Regatta sailors

The wind pattern "gust" offers challenging scenes for regatta sailors for training and play. The surface of a gust is reminiscent of a "cloud in the sky", it provides a "shadow" on the water. The gust is depicted as a dark "ellipse". The gust contains a different wind strength and direction than surrounding wind regions, it can be stationary or move across the surface in x-y direction.
The Trainer Toolbox contains exercises with "pulls and pushes". The "Experts" menu contains scenes with a passing gust with upwind and downwind as well as scenes with wind 4x4, i.e. 16 "wind regions". In each region, the wind direction can be changed manually, so that you can simulate pulls and pushers in each case.

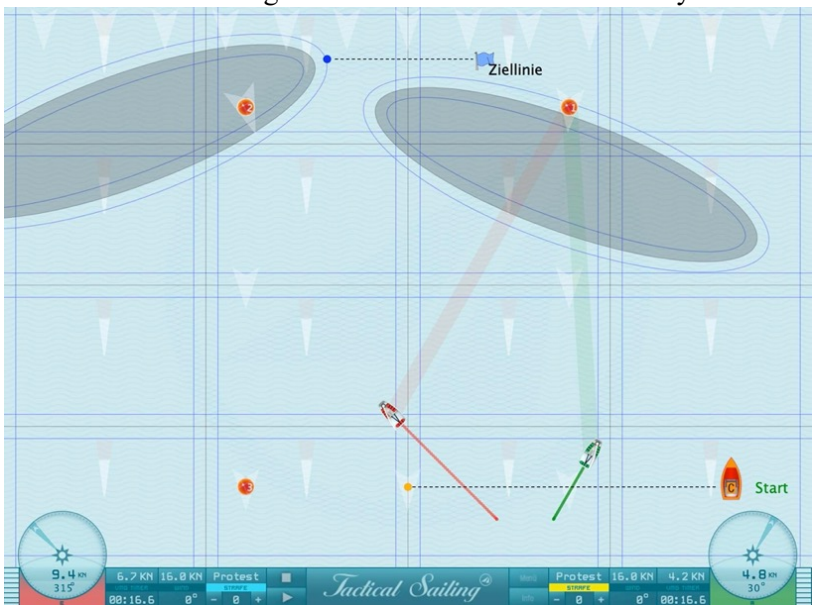


Header + Lift in a gust + 15° Upwind



Header + Lift + Jibe in a gust +15° Downwind

There are the following exercises in the menu: Junior / My Wind: Wind 4x4 with gusts.



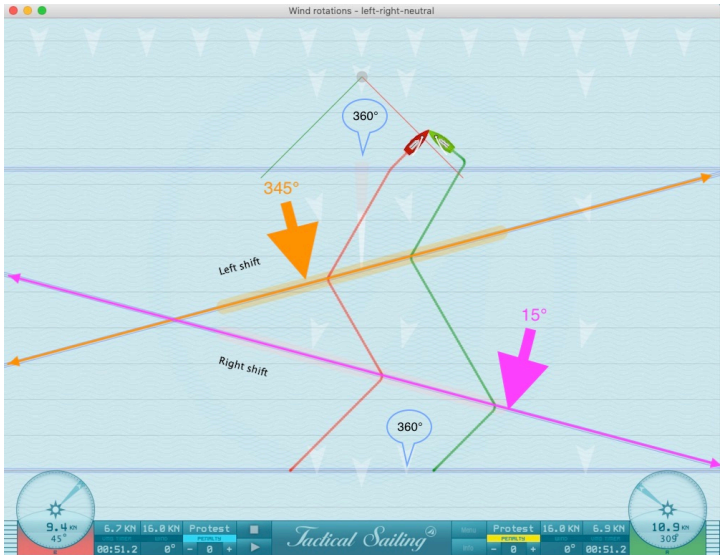
Regatta field with wind 4x4 regions and 2 gusts wander out of NNO and NWW across the field

2.9.6 The Wind "Field“ - Experts

"Do left-hand and right-hand shifts actually neutralize each other? One of the questions that is discussed again and again among regatta sailors is whether two wind shifts by the same amount to the left or right about the mean wind direction neutralize each other in the course of a cross. A geometric observation is best suited to answer this question", see Tilo Schnekenburger at: http://www.schnekenburger.click (German).

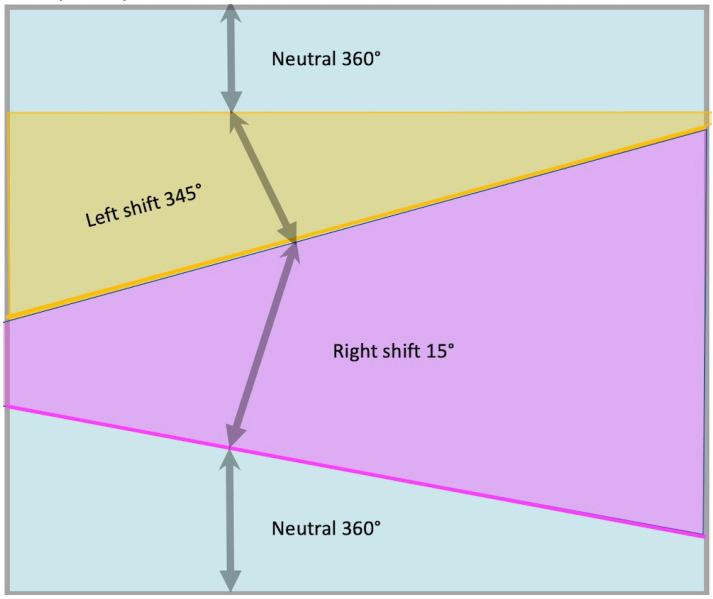
Left-hand and right-hand shift

For experts, we simulate Left and right shifts in Coach's Toolbox:
"Experts / Wind fields / wind fields – left-right-neutral".



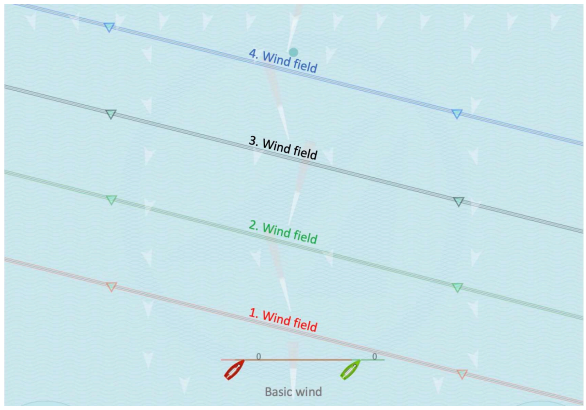
Regatta field with right-hand shift from 15° and left-hand shift from 345°

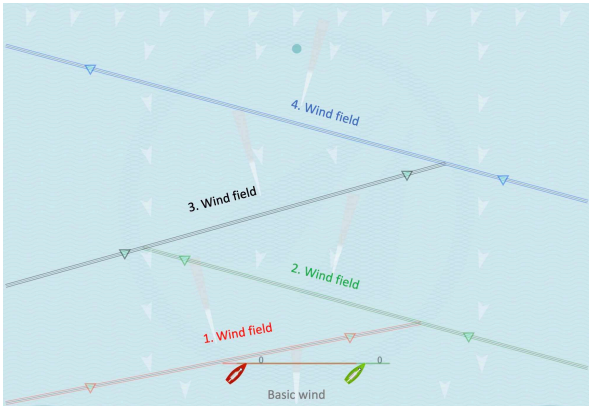
Several wind fields can overlap with different wind rotations, e.g. neutral (360°), right (15°), left (345°) and neutral 360°.



Four Wind fields and directions: neutral 360°, right +15°, left 345°, and neutral 360°

Change wind fields flexibly
Menu: "Experts / Wind fields - flexible - left and right shifts".
Wind fields are bounded by wind edges, they can be moved as desired.
Each wind field is limited by a colored line, the 'edge'.
The 'position' and 'inclination' of the wind edges can be moved as desired.
Use the triangular symbols to ‘drag&drop’ the wind edges to the desired position.
At each wind edge a new wind field begins, it extends 'upwards' in the direction of the wind arrow. Each wind field ends at the next wind edge and a new wind field is created. The borders of the wind fields overlap in the order from bottom to top: red, green, black, blue.



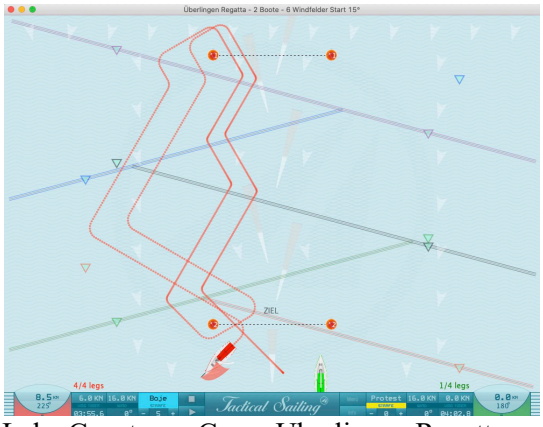


Clockwise shifts with 4 wind fields each with 15° inclination

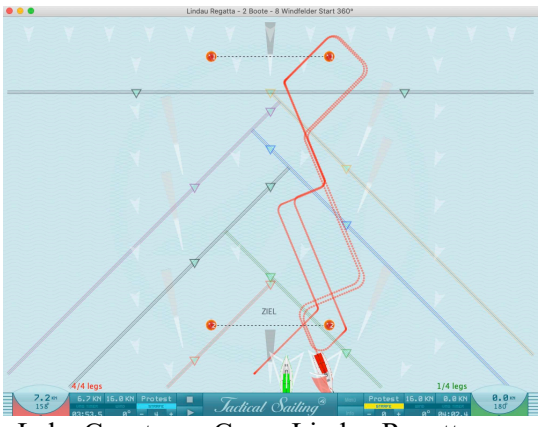
Counterclockwise and clockwise shifts with 15° and 345° inclinations

Wind direction and strength can be changed with 'drag&drop', they are indicated with a white arrow in a wind field - near the wind edge. In addition, so-called wind vanes - small white triangles - can be moved as desired within the wind fields with 'drag&drop'.

See examples in **chapter 9.1.7. Wind fields - left-hand and right-hand shifts**.
For training purposes, some regatta scenes in a so-called "**Lake Constance Cup**" are shown in **chapter 6.2.5 Sailing areas - Championships and Cups**.



Lake Constance Cup – Uberlingen Regatta



Lake Constance Cup – Lindau Regatta

2.10 Coaches and Tacticians

Experienced coaches and tacticians have helped in the development of the "Tactical Sailing Toolbox". By using simulation, the "Toolbox" offers a highly efficient training method for preparing sailors theoretically and mentally to react in various situations. You will be optimally prepared for the practice and when an exercised situation arises, you can now optimise your decision. It doesn't matter if you are a beginner to learn to luv up or tack and use the advantage of sailing the long leg first. Or an experienced sailor needing a more complex tactic, such as considering the decision his or her opponent could be making during a race.

David Dellenbaugh - Tactician at America's Cup

David Dellenbaugh is the publisher, editor and author of Speed & Smarts. He was the tactician and starting helmsman on America3 during the successful defense of the America's Cup in 1992 and sailed in three other America's Cup campaigns. Tactical Sailing presents some of his "How to Play the Wind" tips, all of which are audio-visual animated and simulated. These are very valuable tips for beginners as well as advanced sailors. The jubilee edition Newsletter # 100 contains its "Top 100 Tips", which are used in our Tactical Sailing program as "Tips".

Mark Rushall – „Tactics" is the racing sailors „bible"

Mark: "I'm excited about the possibilities with Tactical Sailing software.".
"The big advantage for me over other race situation software is that you can move the wind direction in real time to reproduce realistic situations, and position the boats to demonstrate (or test!) specific scenarios. Well done! I think the game situations will be a fun way to get basic and subtle sailing concepts across to developing sailors: Great when the water is a long way away or the weather is unkind. Very many sailors and coaches use Macintosh computers so its great that the software runs nicely on a Mac with no need for Parallels etc." Visit Rushall Sailing on Facebook and play this video clip about Persistent Shift on www.facebook.com/rushallsailing/videos (29.10.2011). An actual comment about his book: "RYA Tactics by Mark Rushall is the racing "sailors bible" to winning sailing races". The "Concept of leverage" is realized in Tactical Sailing as a simulation.

Tilo Schnekenburger – „The Tactic Fox"

In his book "Die Geometrie des Regattasegelns" ("The Geometry of Regatta Sailing" – available only in the German language), published in July 2017, Tilo Schnekenburger acknowledged the quality of the "Tactical Sailing" software and described it as being "a decidedly useful teaching and learning aid, ... with its help, as well as the virtual "Regatta Sailing", the "Coach's Toolbox" module shows the visualisation and calculation of a "wide variety of tactical situations becoming outstandingly possible".

The aim and method that Tilo Schnekenburger conveys by using geometry as an academic approach to sailing, is made more comprehensible on knowing why he developed his "geometrical tools". Not only is he a successful regatta sailor but also a lecturer of mathematics! Every professional sailor can use his "geometrical tools" as a basis for his or her personal strategy and tactics.
See: www.schnekenburger.click/
His "Long Leg" tool geometrically illustrates a clear definition of the "long leg" being a calculable shortcut. New mathematical findings regarding the "Switch point" explain that the long leg could become the short leg and, in addition, there can also be a "long leg trap".
With the "Risk Management" tool, Tilo has approached another complicated subject, essential in the "Tactical Sailing Toolbox". Here, specific simulations have been included for the tacking angle and the downwind course in "Reward and Risk" as well as "Gain and Loss".

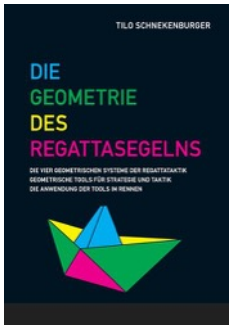
2.11 Literature - Recommendations

We recommend the following reading to extend the theme "Reward and Risks":
David Dellenbaugh (USA): Speed & Smart newsletter, # 117 The value of good decisions, see:
http://www.speedandsmarts.com
Mark Rushall (GBR): i-coach; The Beat (July 2003) The concept of leverage, see:
https://www.rushallsailing.com/
Tilo Schnekenburger (GER): Die Geometrie des Regattasegelns, (in German language, August 2017), see: http://www.schnekenburger.click

Our grateful thanks for discussions and suggestions after trying out and using “Tactical Sailing”. goes also to:
Georg Blaschkiewitz (GER): "The kids had grasped quickly ...".
Lutz Kirchner (GER) "Digital media for Optimist training".
Cyrill Auer (SUI) "I myself working repeatedly with the Tactical Sailing to prepare theory", see
https://www.tacticalsailing.com/en/coachs-toolbox/regatta-sailors
Heiner Müller and Hans Schroecker (GER): Optimist Youngster clinics at Yacht-Club Seeshaupt, Lake Starnberg (near Munich); „Sailing for beginners, how to teach tacking? “ see:
https://www.tacticalsailing.com/en/trainer-toolbox/beginner

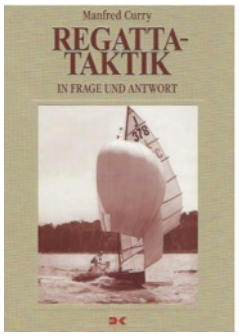
Some special terms in literature and in Tactical Sailing program:

"**Switch Point**" – "Tactical Point"



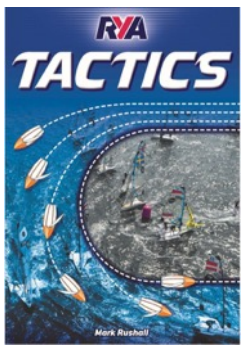
See detailed explanations and tactical advice on "Tactical Tools" at:
Tilo Schnekenburger: Die Geometrie des Regattasegelns. (2. Edition 2019, German language)

"**Curry Wende**" - "Curry Tack"?



Manfred Curry invented a "tactical maneuver" and published it in his book:
Regatta Tactics (1932 German and Spanish language)

"**Leverage**" - "**Cash in**".



"This gain from the wind shift is a "gain on paper" ... it's like making a profit when your stock market shares go up in value ... and we know what that profit can become. It's a real gain when the shares are sold, and the money is in your bank account.
Mark Rushall in a famous book: Tactics (3. Edition 2019, English language)

3 To Operate

It is possible to access the " Coach's Toolbox" at the start of the program. The learning modules of the " Coach's Toolbox " are clearly grouped into six categories in a common "box", namely:

- Juniors, Racers, Experts, Boats, Help and Best Tactics.

The exercises are easily manageable in these categories - and easy to use for beginners, professionals and experts. Classic exercises for regatta sailors from "start to finish", regatta scenes in the "Fleet-, Match- and Team-Race" complete the training offer. In a new section, "Top Tactics", you will find the "top 10" tactical decisions that you should definitely learn and use to sail successfully. Professional sailors have told us their tricks, which is what is especially important in a regatta, in order to always be a "nose length" ahead of the competition. These important "Top-10" can also be accessed as video clips without additional operation on the PC - only with the "1-Click-Operation": Play"!

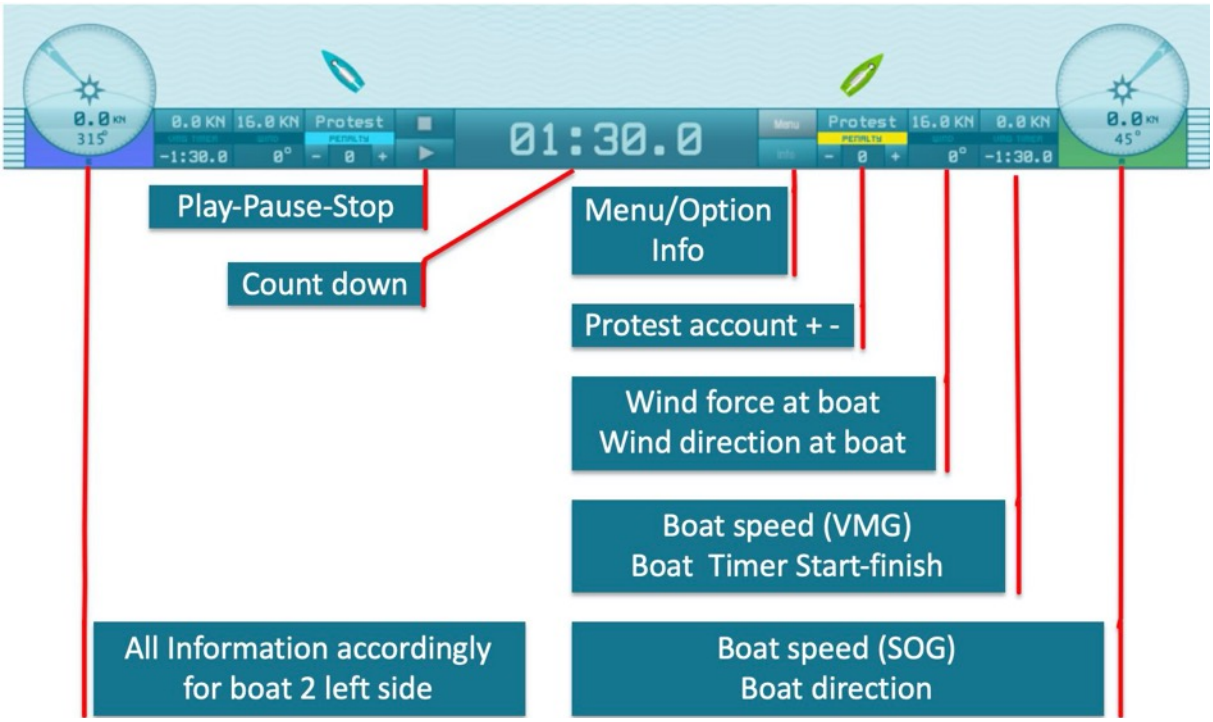
"Sailors" on pc/mac can select the exercises with different levels of difficulty:

- 1 Training boat with sparring partner boats and autopilot to train alone,
- 2 or 4 Racing boats, or up to 10 boats to train with several sailors
- 8 Wind formats from 1x1 to 8x8, constant, shifting, oscillating and gusts,
- 4 regatta formats, Fleet, Match, Champions league and individual training formats.

For this reason the new six categories, the operating structure is adjusted by explanatory notes and new screenshots. In Version 2.0 of the Software, all scenes have been transferred from scenes in modus "Against the Wind" to scenes "Boat Against Boat".

Although you might see screenshots in this documentation of the mode: "Against the Wind" all functions and options are programmed in mode: "Boat against Boat".

3.1 The Cockpit - information at a glance



Observe the information in the “cockpit” from the boat and regatta field.

By clicking on "Menu" all controls open and the boats stop.
On the left: Main menu with 6 categories
On the right: Options with 8 display options on the boat or on the water,
Click "Menu" again to close the controls, then the boats will sail again.

Cockpit view for operating the scene: Play-Pause-Stop

3.2 Main Menu

Choose the exercises in the six categories, there are:

- **Juniors, Racing sailor, Expert, Boats, Help and Tips Tactics.**

Each category contains exercise groups and the corresponding exercises or scenes.

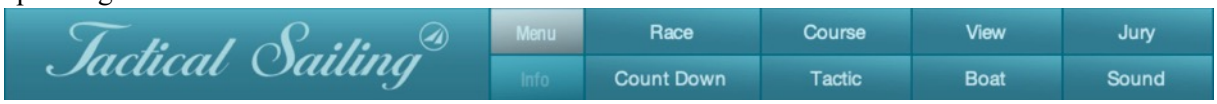
A short description is displayed in the “Info” window. Start any scene: Play!

In most cases it is recommended to “pause” the chain of events in an animation and change Conditions and Options. Click on pause/play, the “P” key, or the spacebar; to continue to sail, click a second time. Using the “ESC” key you can start the scene again from the beginning. The previous settings will remain.

To restart the setting of the scene can be accessed to by starting the scene again and selecting an exercise at main menu “Categories”.

3.3 Options

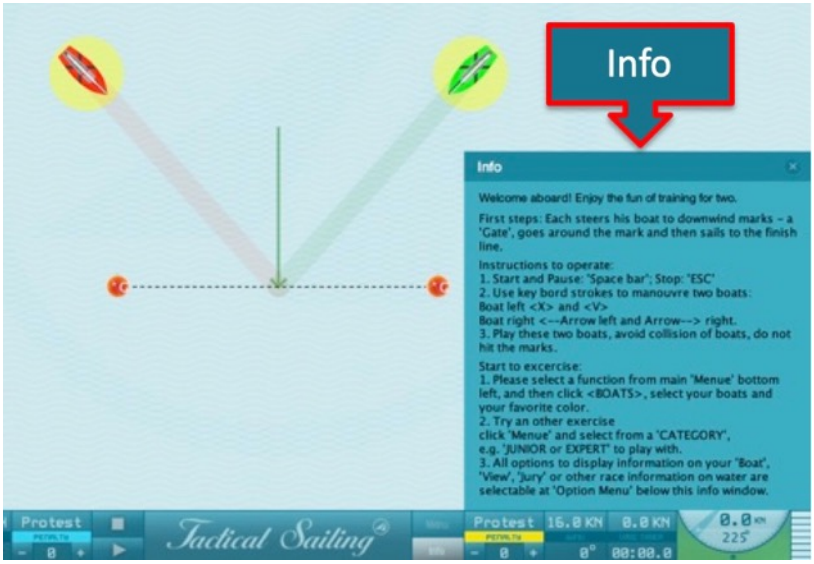
Select the display options on the boat or the water, as required.
Click “Menu”
See right “Race, Countdown, Course, Tactic, View, Boat, Jury or Sound”. In “Info.” you can find further operating instructions for each scene.



In the control windows, further options can be selected, e.g. contrast of the displayed guides, their length or duration of the display.
In Stop or Pause mode, you can change the options of this scene, your settings will be saved and reused the next time you start. The options you set in the menu are saved. In the menu: Help / Settings/Program Settings, the options can be reset to the default settings.

3.3.1 Info Window

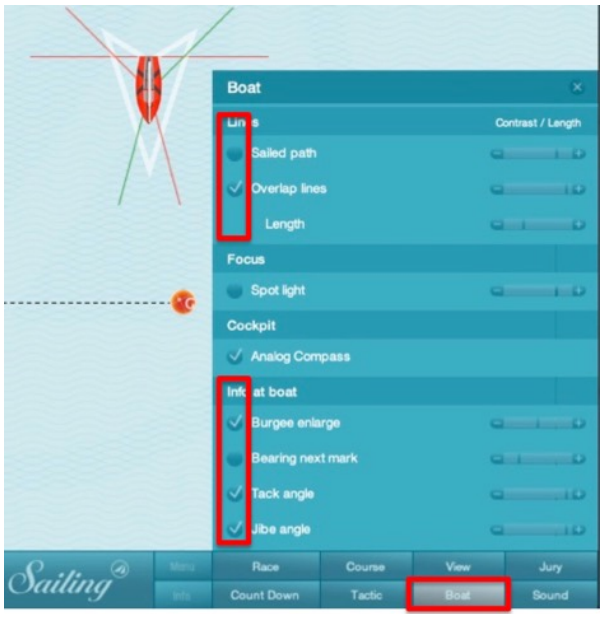
Information on how to operate the exercise is shown in the "Info Window", e.g. which course you should sail. We recommend that you turn the standard options on or off as additional information as needed.



3.3.2 Information at the boat

The "Boat" options show the guides and information directly on the boat, e.g.

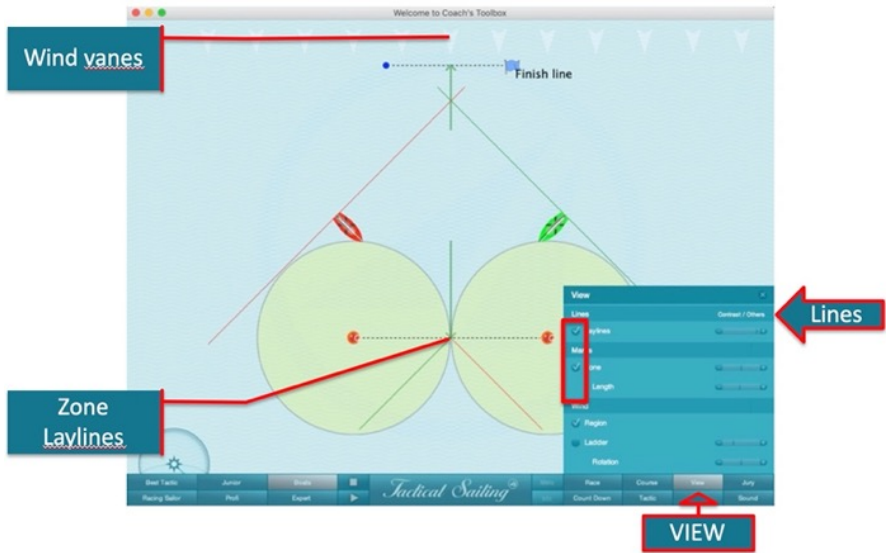
- Sailed path,
- Overlap lines at the rear,
- Burgee (Windex)
- Tacking and Jibing angles.



3.3.3 View at regatta field

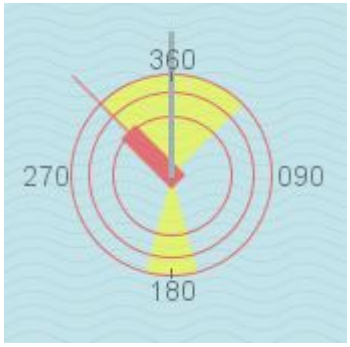
The information on the regatta field - view on the "water" - applies to all boats together. They are "useful lines" with which sailors can make their tactical decisions better. These include:

- Lay lines to the buoys
- Zones on the buoys
- Wind with its regions

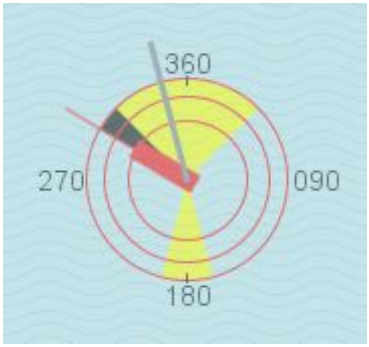


3.3.4 Tactical Instruments

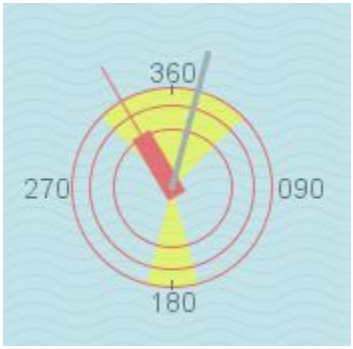
Several "options" may be selected, e.g. in the "**Option**" menus.
In the category **Boat**: Wind conditions and wind indicators, analogue and digital compass, sailed course, "bearing" to the next mark, speed indicator, tacking and jibing angles, overlapping lines, as well as evaluation of performance e.g. Average speed or other requirements.
In the category "**View**": buoys, laylines, zone, wind-regions, wind ladder or other requirements.
In the Options menu: "**Tactics**"
"Tactical Sailing's" Tactical Disc has been especially devised for tactical manoeuvres through shifting winds. "Tactical Sailing`s" **Tactic Disc** shows the bearing in the direction of the course marks, e.g. windward 360°. The yellow segments show the adjusted tacking (90°) or jibing (30°) angles, depending on type of boat's polar diagram. The red circles show the speed area of 60, 80, and 100%. The grey lines show the direction of the wind (360, 350, and 10°). The red line shows the direction of travel; the red bar shows the actual speed in this direction. The black segments show a header. If the red gauge of the sailing direction is in the yellow segment, then you are in a lift.
Note: In the Options menu: "Tactics" the tactic disk can be switched on / off. The position of the tactical disc can be placed anywhere on the regatta field with drag & drop. © Tactic Disc by "Tactical Sailing".



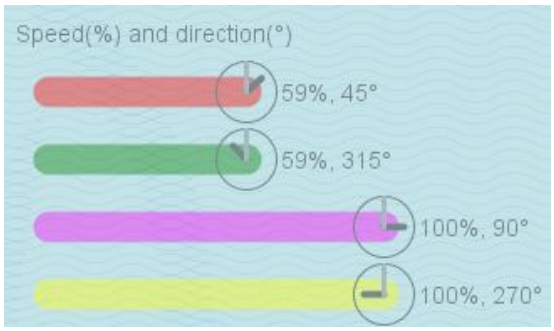
Bearing to mark: 360°
Wind direction: 360°
Compass-Course: 315°



Bearing to mark: 360°
Wind 350° (-10°)
Header down to 305°(-10°)



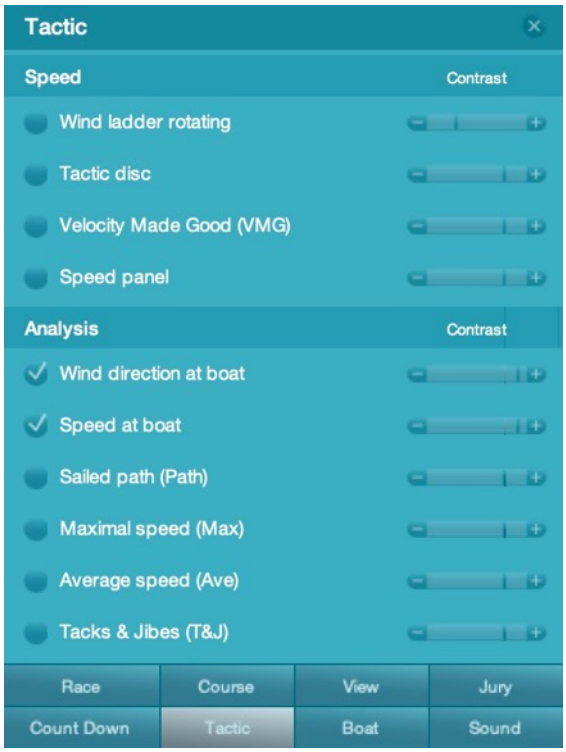
Bearing to mark: 360°
Wind 10° (+10°)
Lift up to 325° (+10°).



1) Speed indicators (%) in the colour of the boat, and the "clock" at the end of the bars symbolize the direction of the wind (minute hand, grey) and the direction of the boat (hour hand, black).
2) A digital display of the log (KN) in the compass.

3.3.5 Tactic analysis

Tactical analyses can be started in the menu: Option / Tactic in the scenes e.g. Expert / Campions league format. The data can provide information on the performance of the sailors. In the scenes in Champions league format with 2/4 boots, options can be selected.

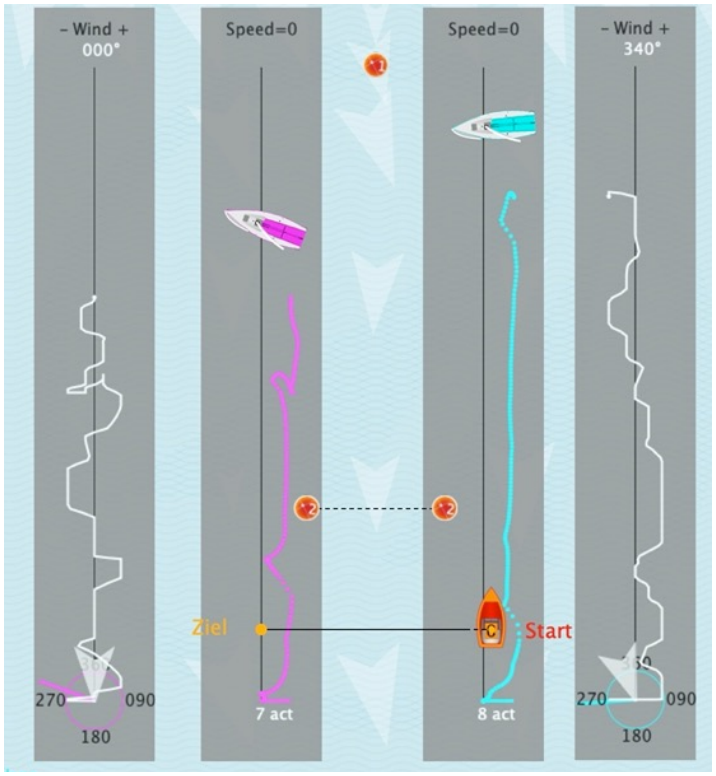


- Wind direction on the boat
- Sailed distance
- Speed on the boat / maximum / medium
- Tacks and Jibes.

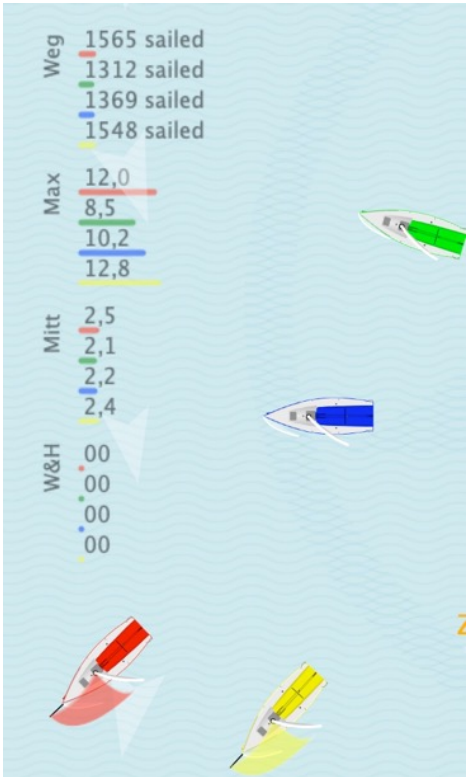
A graphical analysis can be performed for regattas with 2 boats, namely for the entire regatta distance from start to finish will be recorded at each position:

- the wind on the boat
- the speed on the boat.

Menu: Option / Tactic in the scenes in Expert / Champions league format



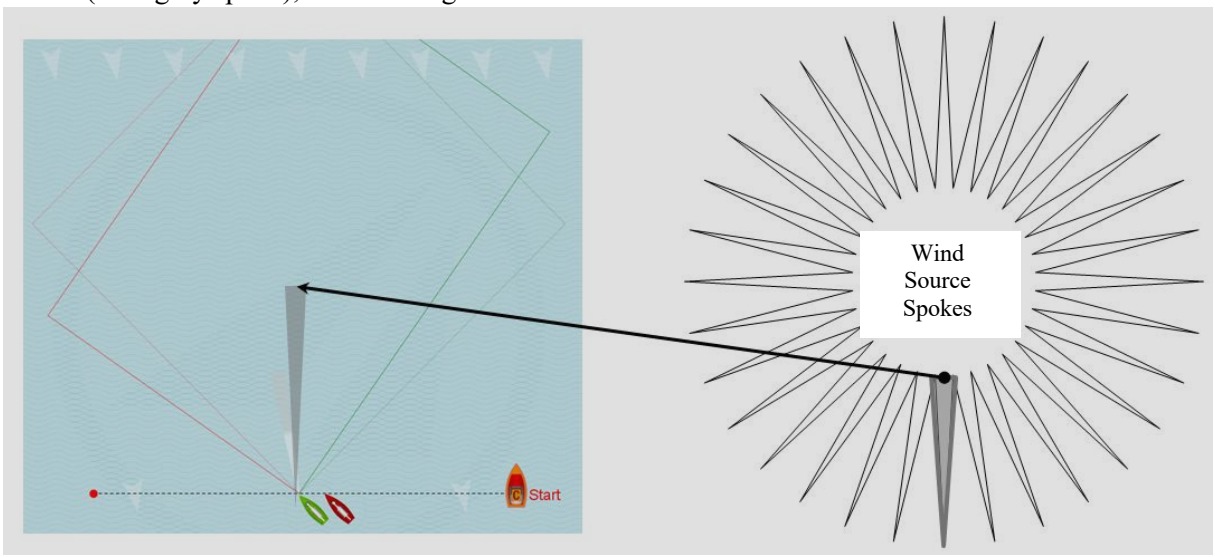
Graphic analysis for 2 boats: wind and speed
You can use "drag&drop" to move the position of the data.



Digital analysis for 4 boats

3.4 Wind Simulator – Wind Machine

The basic function of the Coach's Toolbox is to make the wind and the effects of its changes visible. The wind's source in the Coach's Toolbox is completely under your control, the wind simulator generates pattern in desired direction and force. The entire regatta field is at your disposal. You can change the wind at any time and have unlimited possibilities to simulate different wind conditions! In the Coach-Toolbox scenes, a large grey arrow will be visible that symbolizes a "spoke" of the "Wind Source".
Example: In the Starting Line scene, this arrow is in the middle of the starting line. The boat and the help lines will react automatically to any change in wind direction and strength.
Functions: The strength or direction of the wind can be changed at anytime. To make the gust of wind visible (dark grey spoke), the wind-region must be turned on in the "View" menu.



Starting Line scene | Wind Source

Change the Wind Direction (grey arrow) drag&drop with the mouse or with the keys: **N** or **M**. **Change the Wind Strength** (light grey arrow) by drag&drop with the mouse or with the keys: + or -.

Wind flags: Click on one of the fixed wind flags at the top of the regatta field or on a buoy, create a copy with "drag&drop," and place this in the required position inside the regatta field, e.g. on the starting line. You can delete this wind flag by right click on it. In this example, wind flags are symbolized by grey arrows; the direction of the arrows correlate to the wind's direction. You can create and position as many wind flags as required; the variable size of the arrows indicate a heavy gust or a windless area.

3.4.1 Direction and force

To view the wind arrow in the region, select option: “View” / “Wind” / “Region” = “on”.
Standard wind system-1:
Wind direction and – force, use the following keys:
Wind direction + 5 ° **<M>**
Wind direction - 5 ° **<N>**
Wind force + 2 Bft **<+>**
Wind force - 2 Bft **<->**

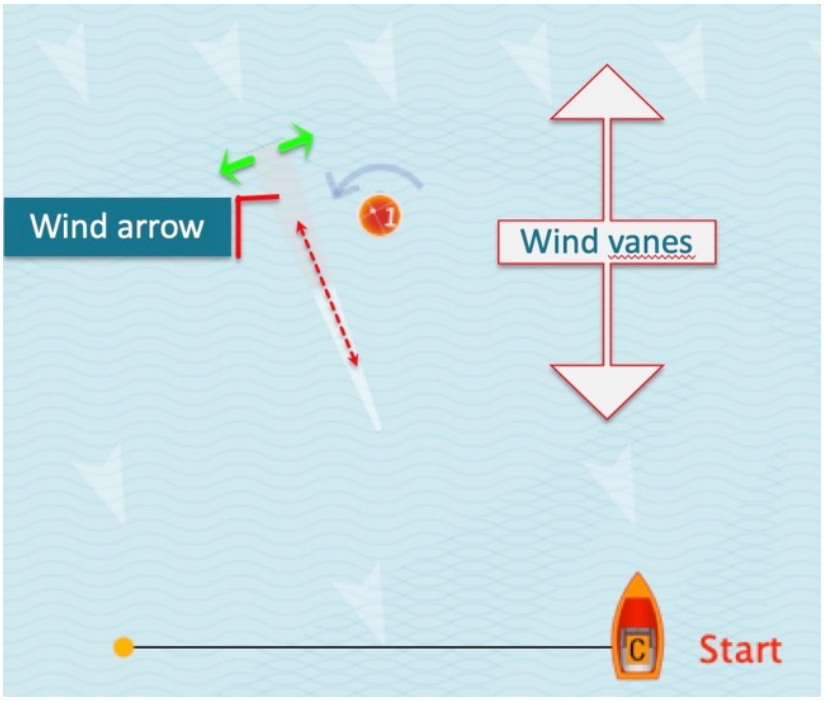
Virtual wind system-2 see an example below.
In exercises with “Virtual wind system-2” use the following keys:
Wind direction and – force, use the following keys:
Wind direction + 5 ° **<H>**
Wind direction - 5 ° **<J>**
Wind force same as in Wind system-1
Wind force same as in Wind system-1

Wind vanes *:
Wind vanes are fixed at the top.
Use the mouse <drag & drop> to draw a flag from above and place it anywhere, e. g. at the start line.
You can delete this wind vane by right click on it.

Wind Arrow *:
Use the mouse to change the wind direction and force with the mouse <drag & drop>
Left mouse button: Turn wind direction horizontally in the grey area: Turn direction 1 ° - 360 °.
Right mouse button: Move wind force vertically in the white / grey area.
Note: * Operation also applies to wind regions 2x2 to 8x8.

3.4.2 Wind region 1x1

Characteristic of Wind region 1x1: Even wind conditions throughout the field.



3.4.3 Wind regions 2x2 to 8x8

Characteristic of the wind regions: There are different “winds” in each region with its own wind direction and strength. The "borders" of the regions are formed by the number of "columns and rows" that results in the number of regions in the multiplication. Example 4x4 with 16 regions:

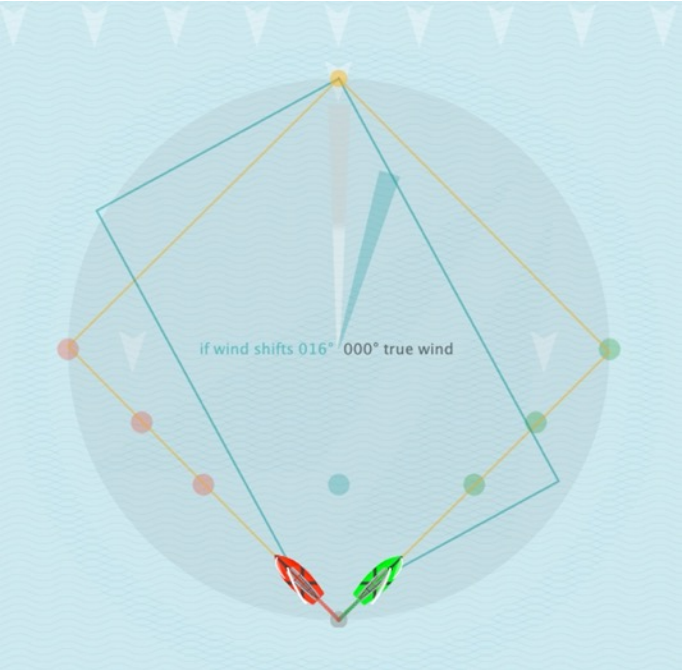
Wind 4x4 – Borders visible

Wind 4x4 – Borders *invisible*

For training, select the option “View” / “Wind” / “Region”. Set this option either “on” or “off”. Wind vanes at the top are fixed. <drag & drop> with the mouse a flag from above and place it at any place, e.g. at the starting line or in every region of the regatta field. You can delete this wind vane by right click on it. You can delete this wind vane by right click on it.

3.4.4 Virtual wind system-2

Characteristic of the “wind system-2” region is: the wind system-2 offers a different wind direction as in wind system-1 with its own wind direction and force. This wind-2 applies at the position of the boats when travelling along to upwind mark. The lay lines of these 2 winds are displayed (orange and turquoise). It is useful for exercises to evaluate “What is, if wind direction would change now?”



In exercises with “Virtual wind system-2” use the following keys:

Wind direction + 5 °	**<H>**
Wind direction - 5 °	**<J>**
Wind force same as in Windsystem-1	
Wind force same as in Windsystem-1	

Example: See Wind arrows and laylines
wind system-1: 360° (grey) and
winds ystem-2: +15° (turquoise)

3.5 Boats

The boats are controlled in principle in the following way:

- ❖ Autopilot
- ❖ Automatic Tacking and Jibing
- ❖ Manual Tacking and Jibing (R-G)
- ❖ Fine control by Luffing up and Bearing away (X-V; ← arrow →)

In the “Info window”, the controls to be used (click on the keyboard, mouse-click or no operation) are indicated. An overview of the keyboard shortcuts is attached in this documentation.

The scenes created as "Tips" do not require boat control. The program automatically controls the boats in tips. Use the buttons: Start, Pause, Stop to press, similar to video clips operations.

Boat control: tack, jibe, luff up, bear away, or change position

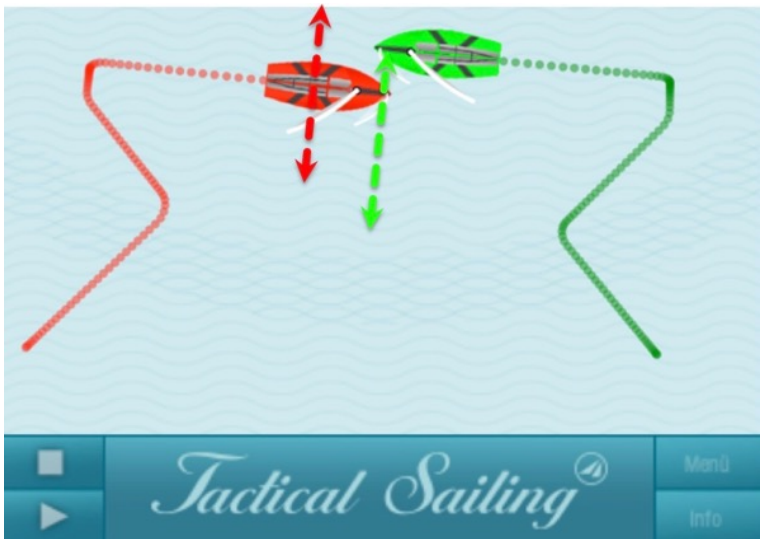
Fine control: Use the following <> keys:

Boot_1 = right:	Arrows ← →.
Boot_2 = left:	keys <**X and V**>.
Tacking training boat 90 ° *:	
Tacking:	<W>
Jibing:	<S>
Special buttons for turning 90 ° **:	
Boat red	<R>
Boat green	<G>
Boat blue	<B>

Change training boat position (see below):
Move your mouse over the boat:
Click and change position with <drag & drop>.
Left mouse button on the **center** of the boat:
Move position on the field.
Right mouse click on the **bow**:
Turn direction 1 ° -360 °.

* In the „Game Against the Wind”.
** In the “Coach‘s Toolbox”.

See further instructions in the 'Info window' and in the list of keyboard shortcuts.

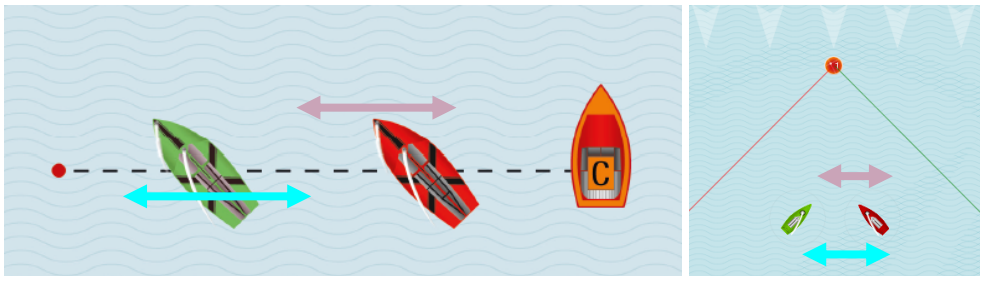


3.5.1 Autopilot

Autopilot is activated when you steer the boat by “tacking” or “jibing.” The autopilot sails to the lay line and then tacks and rounds the buoy automatically. Autopilot is deactivated when you take over the fine steering by “luffing up” or “bearing away”, e.g. by using key strokes ←Arrow left or right → or mouse clicks at the control panel.
Autopilot ON: Tacking or Jibing/Autopilot OFF: Luffing Up or Bearing Away.

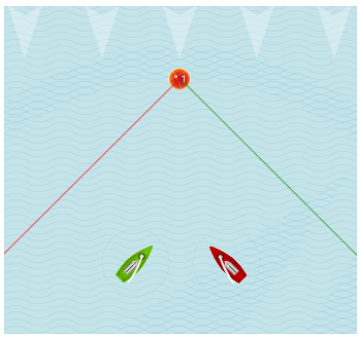
3.5.2 Training boats

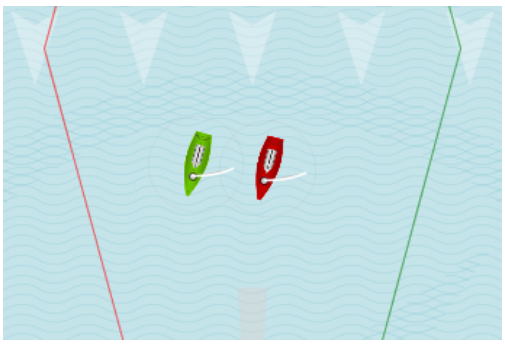
We offer training and sparring partner boats. Our standard boats are Lasers in red and green. You can choose your training boat and even select the colour of it. The sparring boats will automatically be constructed accordingly.
Standard*: The following special characteristics of the different boat classes are simulated: Optimist, Laser, Finn, 420er, 470er, Korsar, Zugvogel, 29er, 49er, J / 70, H-Boot, Fareast 31R, or TP 52. The program shows the potential speed in a 360° circle – a polar diagram (velocity prediction program (VPP) and uses tacking and jibing angles to sail across the race area. You can control* up to three boats in every boat class (a training boat and two sparring boats).
Note: the functions tacking, jibing, luff up, and bear away in the menu are deactivated during training mode. The boats are positioned and controlled in the following manner.
Boat Positioning:
Click pause (in some cases: stop). Place the mouse pointer on a boat and right or left click.
Change the boat position: Left click + drag&drop the boat itself
Changing the starting direction: Right click + drag&drop at the bow



Tack or jibe
Click on the red or green boat* to tack or jibe. These manoeuvres function against and with the wind only inside (!) the area that is bordered by the lay lines. Use drag&drop on the boat to set goal buoys outside the area that is bordered by the lay lines. Autopilot is activated. The boat sails to the next lay line and rounds the buoy automatically.

*** Special functions**: You can tack or jibe the boats **only** in <Game Against the Wind> by click on them. The boat`s course follows the floating marks and manually placed intermediate goals.



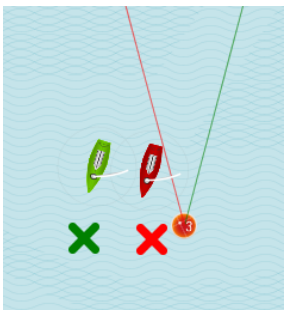


Tip: The autopilot always steers to the lay lines but never passes them. A click to tack or jibe will have no effect if the boat can already reach the buoy.

Luff up or bear away
Make use of a floating mark to steer the boat, a so-called intermediate mark!
1) Place the mouse pointer on a boat: use drag&drop to pull a floating mark for each boat. With these floating marks (**X, X**) you have manual control over the direction that the boats will sail.

2) Move this floating mark by using mouse drag&drop to any position required, the boat will follow through by luffing up or bearing away. You can also predetermine a course that abides by the World Sailing Right Of Way Rules. In order to steer the boat outside the area marked by the lay lines, use the floating mark (**X, X**). You have manual control over the way the boat will sail to avoid collision with another boat or give way around buoys for inside position.
The autopilot is turned off until all the floating marks are reached. The standard rounding of the red buoy is the final goal of the exercise after all the goal points have been reached.

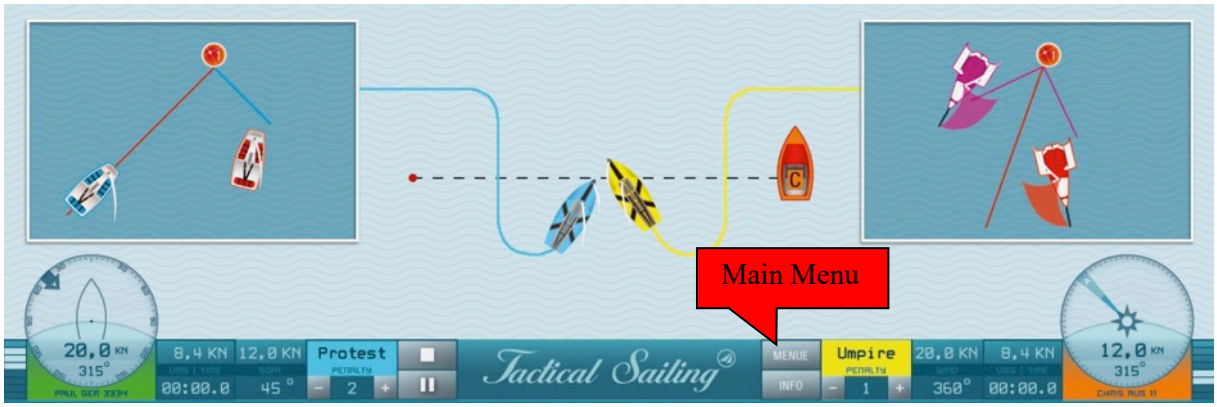
Bear Away



Give mark room

3.5.3 Racing boats

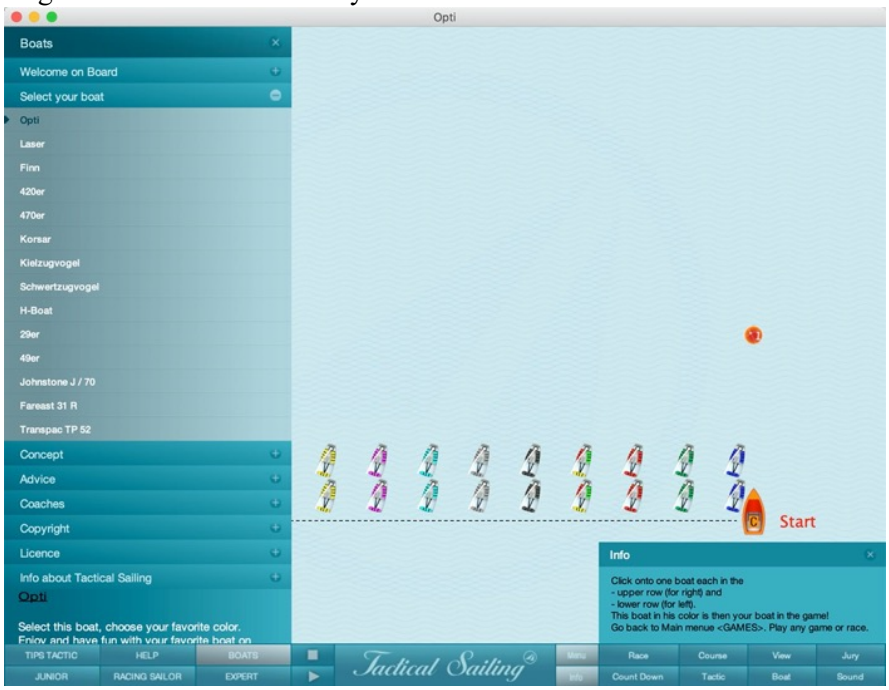
Select the mode "**Coach's Toolbox**". Compasses are displayed on the left and right side of control panel. The categories and functions of the Coach's Toolbox are available for those who have acquired a coaching certification, seen in the Main Menu on the left side ordered in "Categories".



There are multiple scenes prepared, e.g. Fleet Race, start and upwind marks. Start a scene! In many cases, the "Pause" Option is a good opportunity to stop and change the scene. Click on key "P" ("Pause/Play") or "Spacebar,"- to resume sailing click a second time. The initial situation is reproduced with the "ESC" key. In Stop Mode you can alter the initial situation of a scene; your settings will be saved and applied at the next start. You can assess the original settings of the scene by restarting it in the Main Menu under "Categories".

Selected regatta boats colours

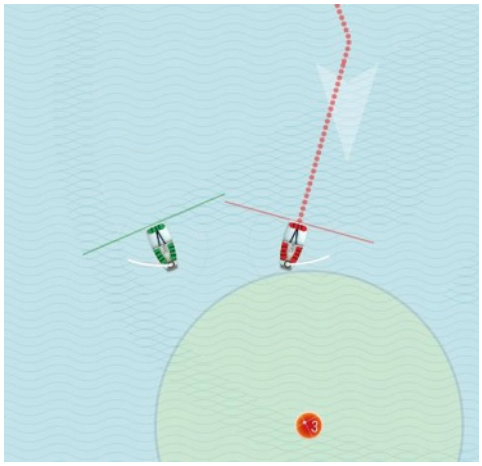
For the exercises you can choose from Optimist, Laser, Finn, 420er, 470er, Korsar, Zugvogel, 29er, 49er, J / 70, H-Boot, Fareast 31R, or TP 52. If you do not select a boat, it is standard that an Optimist or Laser is shown. The two selected regatta boats colours can be chosen. The other two sparring partner boats are assigned a colour automatically.

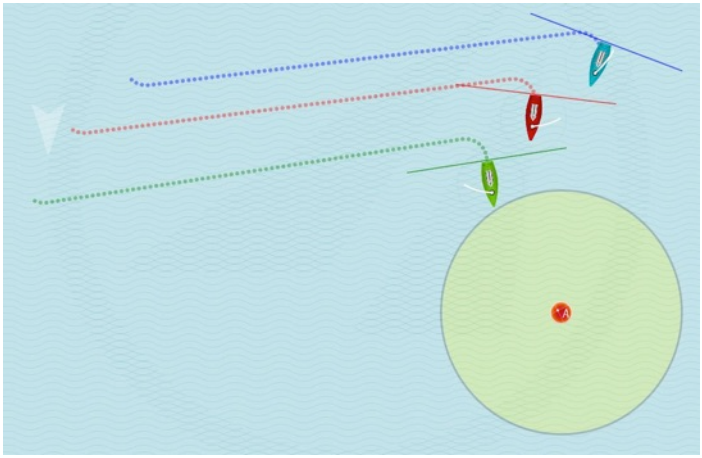


Main Menu "BOATS" Sub menu "Boats types and colours"

3.5.4 Sparring partner boats – 10 boats

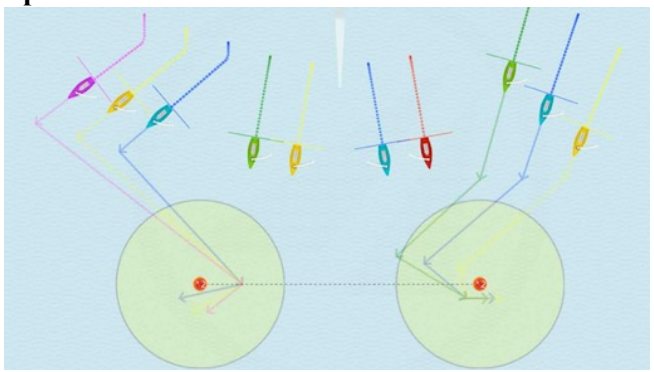
The sparring partner boats are controlled by the "autopilot" or follow the "waypoints" to the intermediate destinations. Set or postpone a "turning point" or a stopover for the sparring partner boats.



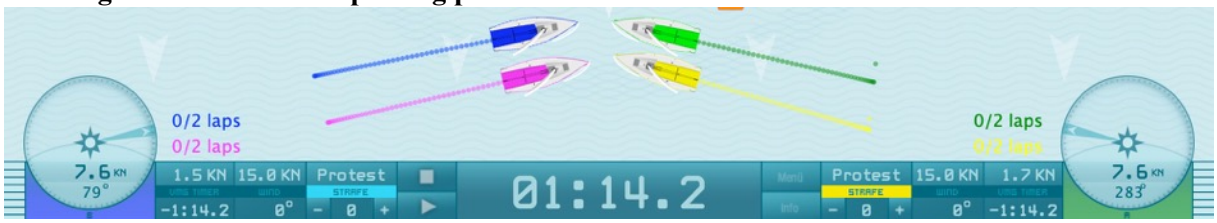


Many coaches have expressed the wish to simulate certain situations with more than two boats. Because of this, we have incorporated special new functions in the Coach's Toolbox. Up to 10 boats can now be placed by the coach. Of particular interest is that the sparring partner boats can be sent on a specific course with simple commands (drag&drop), and with an opportunity (press key "P" Pause) of changing the course at any time during the simulation.
In "Against the Wind", the boats confront each other. They can touch or even overlap. This is not an error, but helps to objectively compare the boats. This shows if you are in front of, behind, or even with the other boat. Up to three boats can be operated in the training mode so that right of way situations can be discussed, e.g. zone and inside position. In most situations, "Pause" is the best way to stop the chain of events. Click on Pause/Play, the "P" key, or the spacebar; to continue to sail, click a second time. Set the intermediate goals according to the rules of right of way by a click as mentioned above or click "Play" to continue sailing. The sparring partner boat can be turned on or off as required.

Up to 10 boats

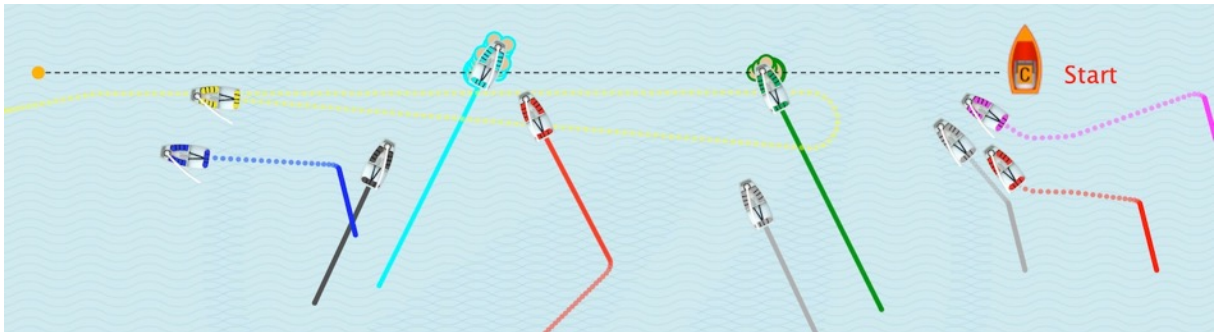


Four regatta boats and six sparring partner boats



Four regatta boats are steered manually as in the game:
left boat-1: keys (X-V),
left boat-2: keys 1 - 2 also
right boat-3: keys (K-L) *,
right boat-4: keys 8 - 9.
* Note: The keys (←Arrow→) are activated in all games with 2 boats, but they are replaced in all games with 4 boats by keys: K-L (from version 1.160.316 as of March 2016). Use keys "K and L" instead!
See chapter „Shortcuts“ (below) for a complete list of keys to use.

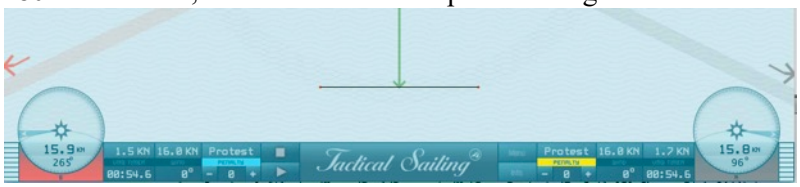
For the exercises you can choose from Optimist, Laser, Finn, 420er, 470er, Korsar, Zugvogel, 29er, 49er, J / 70, H-Boot, Fareast 31R, or TP 52. If you do not select a boat, it is standard that an Optimist or Laser is shown.
The **two selected regatta boats colours** can be chosen. The other two sparring partner boats are assigned a colour automatically.



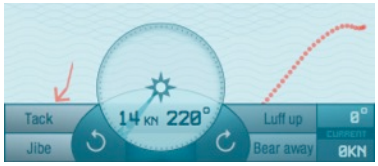
3.5.5 Boats outside the racing field

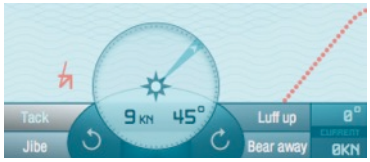
Attention: The wind plays a deciding role for all boats. Too pinched, the boat becomes slower; by changing course downwind, the sails change automatically.

Boats that sail outside the game area are shown as an arrow on the side-lines. Change the direction by 180° of the boat, and observe the compass to bring it back into the field!



If the boat was driven off the field, then appears on the screen a small arrow in the colour of boat (example here in red). The position of the arrow indicates the location of where the boat is just that the arrow is pointing in the direction it sails. Change the direction of 180 ° extent that it sails back towards the playing field. Watch here the direction of the arrow or the speed of the compass so that the boat is not "pointing upwind". The speed (KN) should not be low or equal to zero, that is, avoid the region of the direction of 310 ° to 40 °.



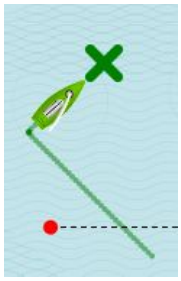


Example: Boat is leaving the racing field in the direction of 220 °, the current position is at the small red arrow to the left. Click "Tack" to return the boat in the racing field, see compass: (9 KN, 45).

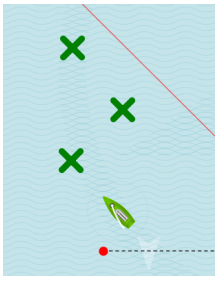
3.5.6 Tactical Goals

The following, describes exercise possibilities regarding the tactical goals, long leg and lay line.
To Operate: Individual floating marks (called sub target or target goals) that act as intermediate marking points (a little coloured cross **X**, **X**, **X**) can also be used. They will also be steered according to the possible lay lines, cannot be turned around, and sail directly into the middle of the cross. Each boat can receive floating marks in the same colour as the boat. Floating marks can be switched On/Off; see Tactic /Floating Mark in the “Options” menu.

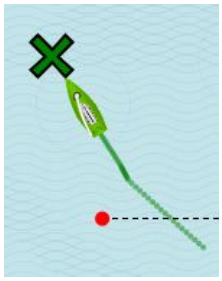
During play mode (the boats are moving), you can set and shift the goals. In some scenes you can click and pause the exercise. During that pause, you can set or move floating marks by using drag&drop. With the combination of the keys “control” and “shift” you can access the following setting possibilities:



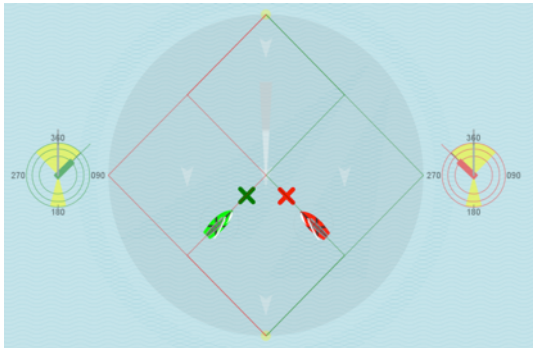
A sub target



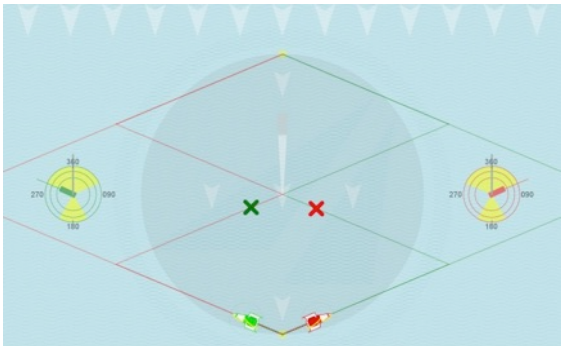
A route of sub target



A forced goal (black cross)



Sub targets for Dinghies and Yachts



Sub targets for 29er and 49er Skiffs

Setting Tack or Jibe marks
By click onto a boat, drag&drop the mouse pointer anywhere, a coloured cross appears and with the help of drag&drop you can move it as much as you want. A tacking point goal, upwind (e.g. 45 °) can only be reached through a tack at the corresponding point.
Enforcing the Goal Point
Set your boat to enforce the goal point by using: **ctrl**+drag&drop, a black cross will be shown. That is the forced goal point that you can sail towards upwind. Note: Enforced goal points have a special effect; they are achievable upwind with low velocity!
Setting the Routes
Set the boat's first cross, afterwards use **shift**+drag&drop for a second and third cross, etc. This way you can set your course. Several tacking crosses achieve the goal of moving upwind using tacking.
Laying Floating Marks and Moving - a Coloured Cross
Using the mouse, put the cursor on the cross and with left click, drag&drop it to the required position.
Deleting a Floating Mark - a Coloured Cross
Use the right click on the mouse and click on the cross.
These settings are for modus: "Against the Wind" only. See modus: "Boat Against Boat" for instructions to set tactical goals.

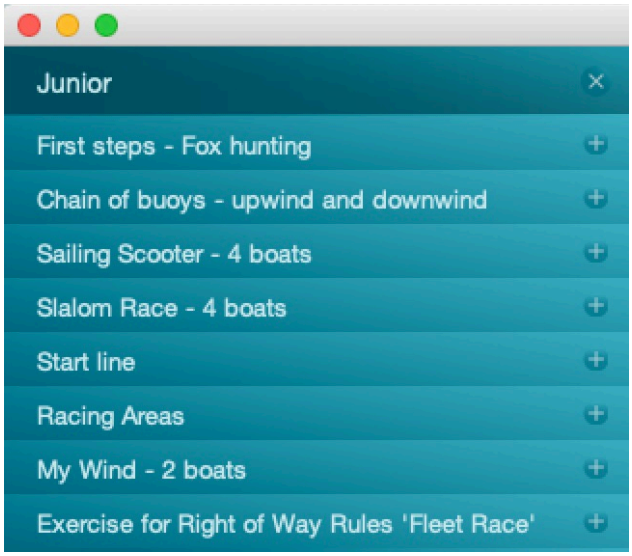
3.6 Shortcuts

There are shortcuts available that improve usability, see functions and the "key" in the list below. Note: The keyboard shortcuts are also explained in the program window "Info" in the respective scene.
Four training boats - also like in the game - manually controlled:
Left boats: keys (X-V); Buttons 1 and 2 as well as right-boats: keys (K-L)*; Buttons. 8 and 9
* Note: The keys (←arrow→) are activated in all games with 2 boats, but they are replaced in all games with 4 boats by keys: K-L (from version 1.160.316 as of March 2016). Use keys "K and L" instead!
The current list of short cuts can be downloaded as PDF file from our website, see "Tactical Sailors Lounge": https://www.tacticalsailing.com/en/downloads/documentation/short-cuts

Tactical Sailing
A Game Against the Wind

	Tactical Sailing	**Shortcuts**		Version 1.70.717 or higher 17. Juli 2017
	Function	**Key**	**Alternative keys**	**Note**
1.	**General**			See also notes in program window "Info"
	Stop	ESC		Sets scene in reset mode
	Start	Space	P	Starts scene
	Pause	Space	P	"Pause" the game, or continues game
	Wind direction + 5°	M		Only in scene Wind 1x1, others use mouse
	Wind direction - 5°	N		Only in scene Wind 1x1, others use mouse
	Wind force + 2 bft	+	Arrow up	Main keyboard only, not on number pad
	Wind force - 2 bft	-	Arrow down	Main keyboard only, not on number pad
2.	**Play Against Wind**			all game scenes Wind 1x1 to 8x8
	Tack +/- 90°	W		other tacking angle of 90 °depends on type of boats
	Jibe +/- 30°	S		other jibe angle of 30 °depends on type of boats
	Fine steering Luff up + 5°	A	Arrow right	a click corresponds to 5°
	Fine steering Bear away - 5 °	F	Arrow left	a click corresponds to 5°
3.	**Play Against Wind - Coach Toolbox**			
	Tack +/- 90°; Jibe +/- 30°	R	W	Boat "Red" or other color in "Coach Toolbox"
	Tack +/- 90°; Jibe +/- 30°	G		Boat "Green" or other color in "Coach Toolbox"
	Tack +/- 90°	B		Boat "Blue" or other color in "Coach Toolbox"
	Wind direction + 5°	J		Only in scene Reward&Risk, or use mouse pointer
	Wind direction - 5°	H		Only in scene Reward&Risk, or use mouse pointer
4.	**Boat Against Boat incl. Coach Toolbox**			all game scenes Wind 1x1 to 8x8
	Boat 1 right			
	Fine steering Luff up + 5°	Arrow right: activated		All games for 2 boats
	Fine steering Bear away - 5 °	Arrow left: activated		All games for 2 boats
	Fine steering Luff up + 5°	K	Arrow right: NOT activated	All games for 4 boats
	Fine steering Bear away - 5 °	L	Arrow left: NOT activated	All games for 4 boats
	Boat 2 left			
	Fine steering Luff up + 5°	X		
	Fine steering Bear away - 5 °	V		
	Boat 3 right			
	Fine steering Luff up + 5°	8	"F11" or "Page up"	in number pad 9, Num Lock off!
	Fine steering Bear away - 5 °	9	"F12" or "Page down"	in number pad 3, Num Lock off!
	Boat 4 left			
	Fine steering Luff up + 5°	1	"F1" or Q	
	Fine steering Bear away - 5 °	2	"F2" or A	
5.	**Detailed describtion see Toolbox documentation: www.tacticalsailing.com/tactical-sailors-lounge/toolbox.html** See also notes in program window "Info" for specific keys			

4 Junior – First Steps



As requested by Coaches, we have now compiled a program in our Coach's Toolbox directly focussed on instructing Juniors (ages 7-8) in the category Junior (July version 2017; 1170.715 or higher). The aim here is to convey
- the enjoyment of steering a sailing boat.
- fun of sailing.

It is not about:
- regatta sailing,
- with perfection on the start and finishing line,
- oscillating winds, or
- strategy and tactics.

The **fun of sailing** is encouraged for beginners by the following playing areas:

- Fox hunting, chain of buoys, scooter, and slalom.

With the computer, coaches can illustrate on land what will later be exercised on the water. Georg Blaschkiewitz, a professional coach and voluntary coaches, such as Heiner Müller and Hans Schroecker (YCSS) have reported that at the start of their training of young sailors, tacking must be frequently practised to get the boat through the eye of the wind and not get trapped in irons. It is exactly for this reason that, for the "Coach's Toolbox", we have especially developed junior exercises in luffing, bearing away, jibing and tacking.
https://www.tacticalsailing.com/en/trainer-toolbox/beginner
Georg Blaschkiewitz said that after using our simulations; "the children had understood that, on the water today, everything had worked quite differently as to the way it usually does. The children had learnt quickly through simulation, why and how far they must luff up or bear away!"
See: https://www.tacticalsailing.com/en/coachs-toolbox/regatta-sailors

Attention: Start the exercise - Precision Control
When the simulation begins the red boat is steered by the "Autopilot". As soon as the Precision Control is activated the green boat now responds to the Arrow Button. From then on, the course of the green boat will be controlled by the sailor alone. For further details see section "Autopilot".
When playing with 4 boats, note the information in the “Info Window” about the boat control buttons:
Boat 1: 'K-L' (Not the arrow keys!).

4.1 Fun of Sailing

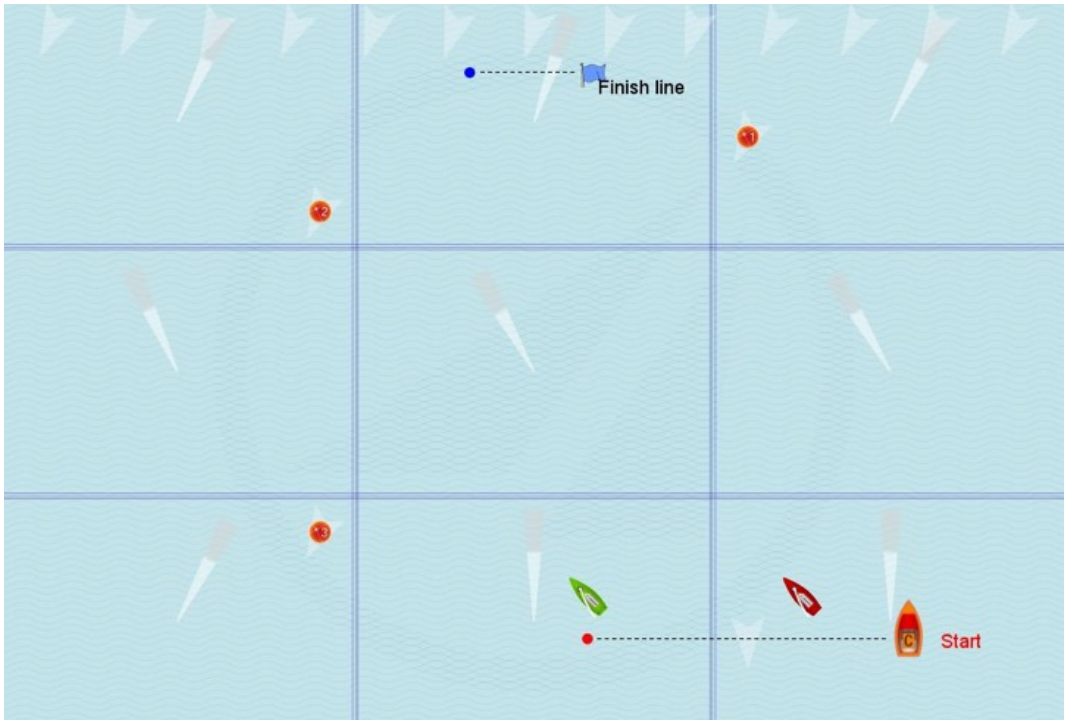
In the “Trainer Highlights” version, the fun of sailing for beginners is awakened through 4 playing fields:

- Fox hunting, chain of buoy, scooter and slalom.

Learn to sail while playing - these 4 games are specially designed for young sailors. With the fox hunt, the buoy chain, the slalom and scooter race, a lot of fun is guaranteed for two or four people! A **detailed explanation** of each game can be found in the program's "**Info**" window.

4.2 Setting your wind conditions

You can simulate a regatta field sequence, by setting position of buoys, start- and finish line (drag&drop) and changing the wind conditions yourself. There are subsequent exercises in the
Menu: Junior: / My Wind with 1x1, 3x3 and 4x4 regions.



Regatta field with Wind 3x3 regions, 9 regions with different wind directions

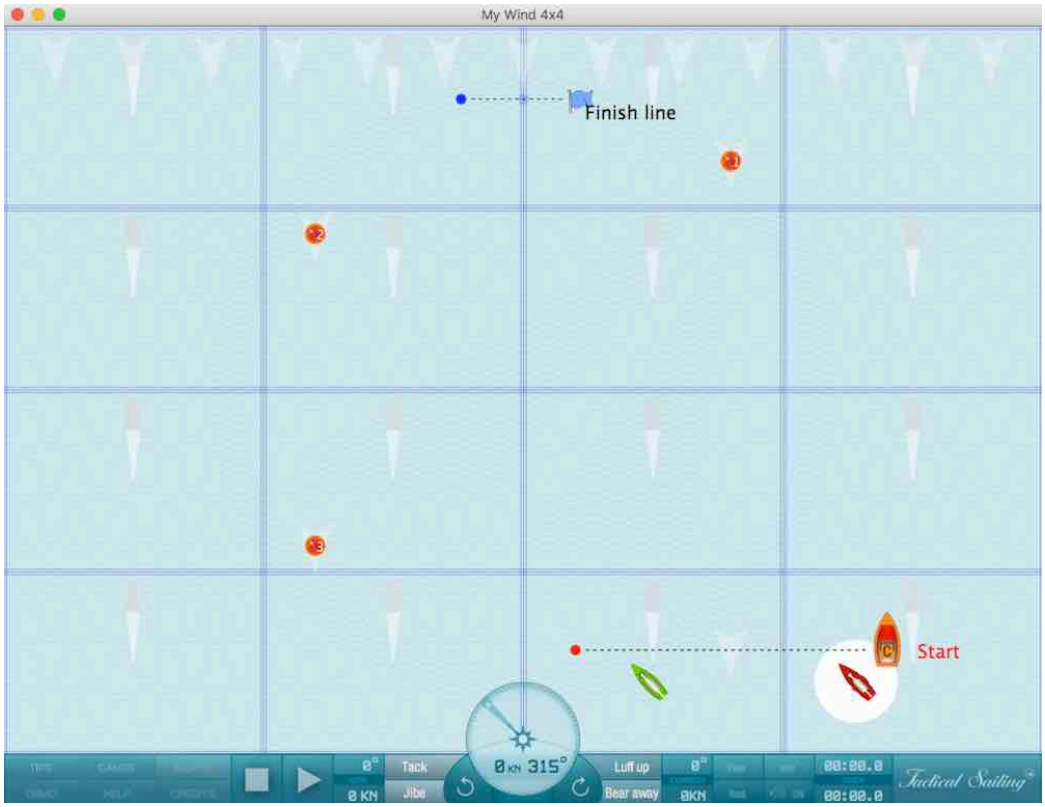
4.3 Exercises with „My Wind”

A single, nine or sixteen wind regions can be used with “My Wind” 1x1, 3x3 or 4x4. The wind’s direction and strength can be varied in each area. This makes it possible to simulate a number of different wind situations: at the starting line, in the middle of the field, at the windward or leeward marks, and on the right and left sides of the buoys.

Operation note:
1) Place the buoys on the regatta field as required for a course. Adjust the tilt of the starting and finish lines.
2) Set the wind conditions.
3) Secure the settings:

- Start the scenario for ca. 2 seconds and then
- click “Pause,” followed by
- “Stop.”
- “Play.

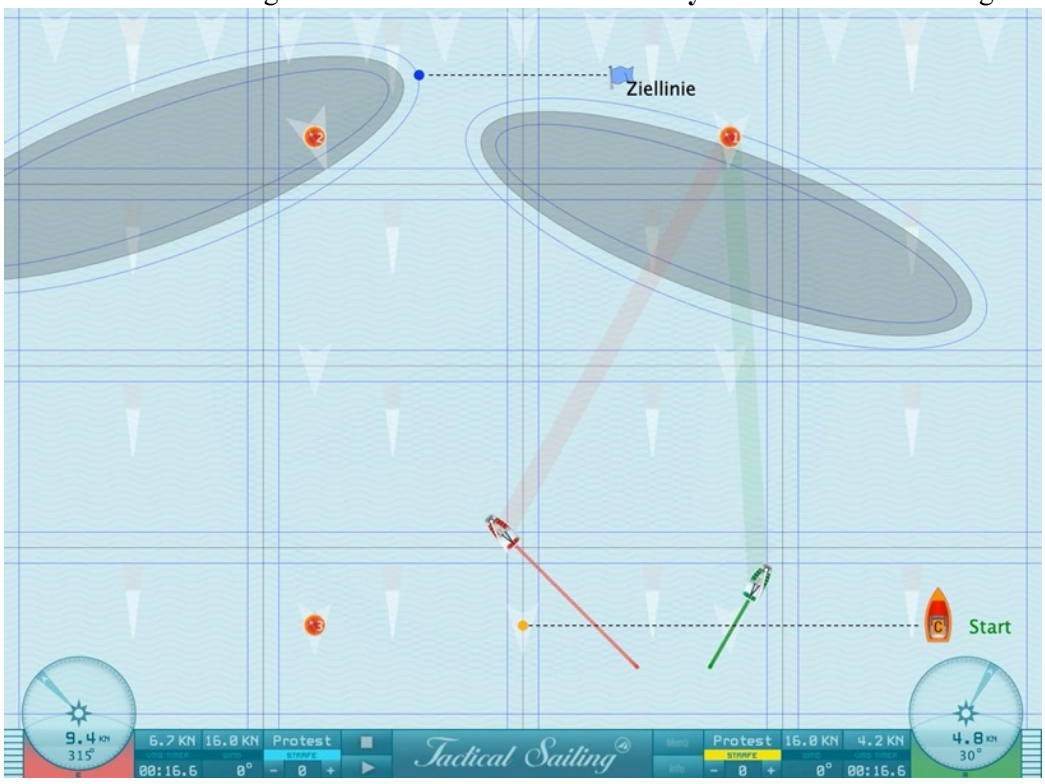
This saves the setting for a re-play.
You can turn the boundaries of the wind areas in the Menu “View”: On/Off. You can pause the regatta with the “Pause” key and then change the direction and strength of the wind on the wind arrows with the mouse.
The boats can be switched in “Stop Mode”. The course - the order of the buoys - is invariably fixed: Buoy 1,2,3/ 2,3/ and then the finish. The buoys are always rounded on portside.



Regatta field with Wind 4x4 regions, 16 regions with different wind directions

4.4 Exercises with gusts

There are the following exercises in the menu: **Junior / My Wind**: Wind 4x4 with gusts.



Regatta field with wind 4x4 regions and 2 gusts wander out of NNO and NWW across the field

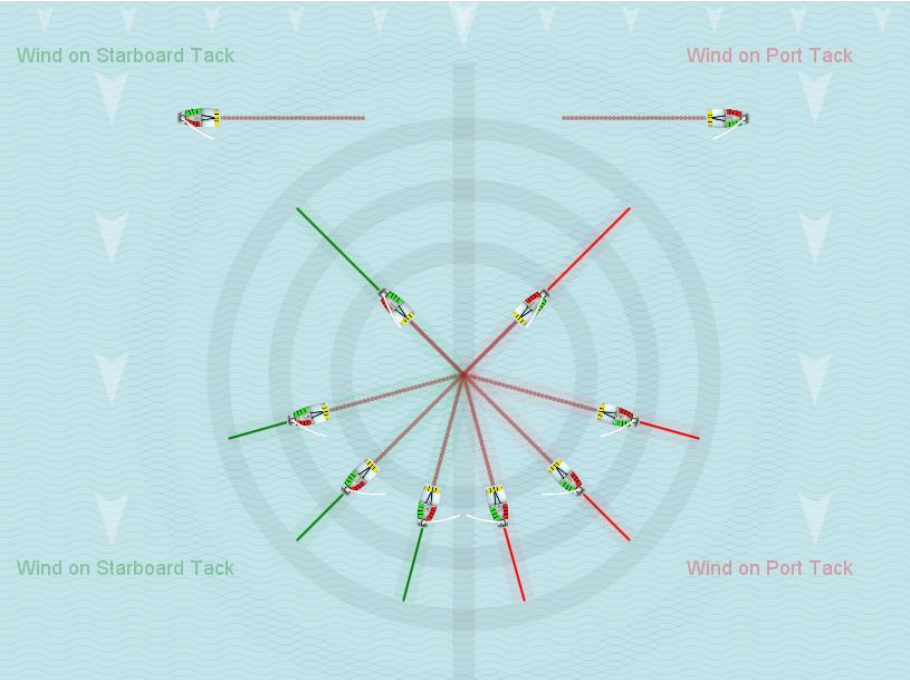
4.5 Basic Racing Rules

The basic rules of right of way are defined by the wind! In “Racing Rules of Sailing” the definition of right of way states: “A boat has right of way over another boat when the other boat is required to keep clear of her.” E.g. Rules 10, 11,12 and 13:

- Boat on opposite tack - Wind from Starboard or Port (10)
- Boat on same tack with overlap - Leeward before Windward (11)
- Boat on same tack - without overlap (12)
- While Tacking - Keep clear (13)
- Avoiding contact - do not cause damage or injury (14)

Note: All the simulations shown in the tips correspond to the ‘Racing Rules of Sailing 2021-2024'.

The following scene shows multiple boats with “wind from starboard and port” with the direction of the wind from above 360°



Basic Racing Rules

These basic rules are available in the **Main Menu**, "**Tips Tactic**" Like the video clips they are easy to use. Coaches can show them without prior preparation. "Game scenarios" are shown when sailing upwind - and with the following applicable rules of the "World Sailing". Rules 10-14 and 18 are simulated for players to inform themselves thoroughly about the right of way.

Uli Finckh released a comprehensive "rule set" question and answer quiz on his website: finckh.org. (English)

Examples of these tips for Rules 10-14 and 18 are shown as a simulation as video clips.

5 Racing Sailor – Against the Wind

The exercises with 2 boats are primarily oriented "Against the wind".

5.1 My Race - 2 boats - Wind 1x1 to 4x4

My Race with 2 boats wind 1x1 to 4x4

5.2 My Race – Lay out your own course

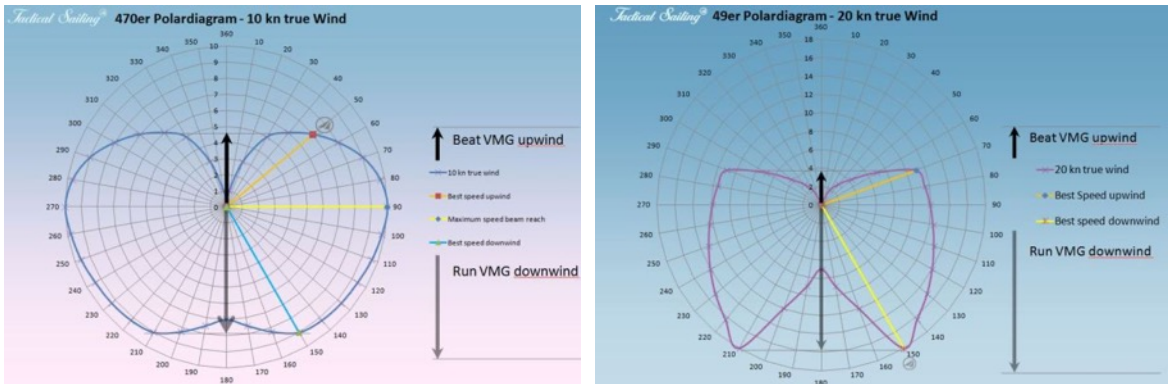
There are 6 buoys available for laying out on the course. Use drag&drop to move to required location. There are 4 boats to sail in Menu "**Racing Sailor / My Race**",

Train triangular, trapezoidal or up-down courses

The course - Fleet or Match Race - and the side on which the buoys should be rounded (port or starboard), need to be disclosed, e.g. Triangular, trapezoidal or Up-Down. The start- and finish lines are movable with drag&drop. Use the right mouse click. The position can be pulled "up/down" at the start boat or on the buoy. It is a wind pattern 4x4 set in 16 wind regions. The wind direction and force can be changed individually in each region.

5.3 Speed and Pointing

The special characteristics of the different boat class (dinghy, skiff, yacht) can be illustrated, for example the optimal speed at a beat, beam reaches and up and down winds. The speed of each boat is determinate by velocity prediction program (VPP) for each class of boat, that is simulated, e.g. dinghies (Optimist, Laser, Finn, etc.), Skiffs (29er, 49er) and yachts (H-Boat, TP 52).

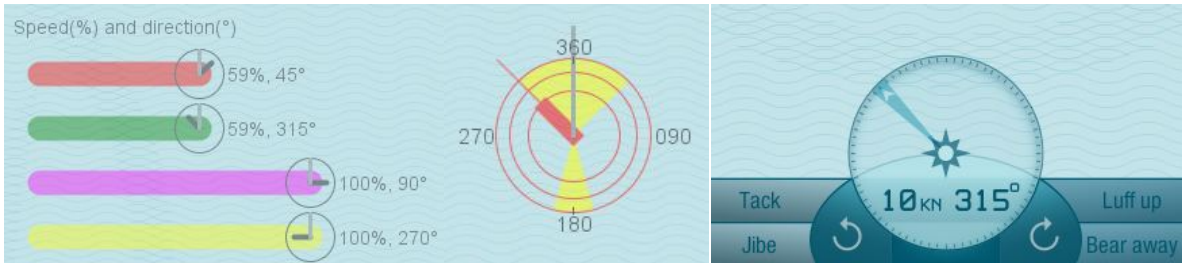


Examples: Polar diagram of 470er and 49er - velocity prediction program (VPP)

Functions: The speed of the boat is displayed on the compass (KN) or the speed bar. Compare the different speeds attained on the different courses.

Speed diagram and bars

There are three possibilities to show the sailing direction and the speed. The displayed values are the relative percentage (%) to the maximum possible speed (100%) according to velocity prediction program (VPP) or absolute knots (KN).

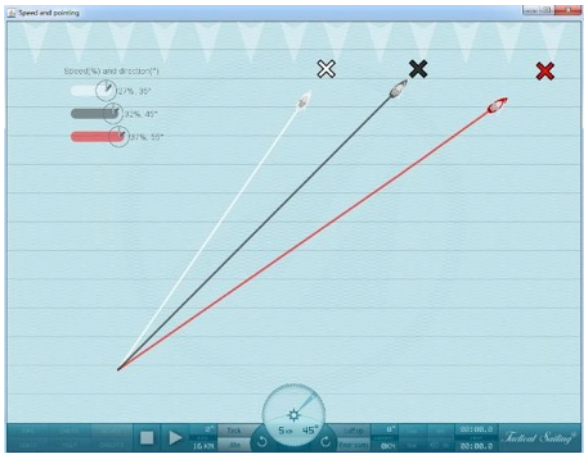


1) Speed indicators (%) in the colour of the boat, and the “clock” at the end of the bars symbolize the direction of the wind (minute hand, grey) and the direction of the boat (hour hand, black).
2) Tactic Disc in the colour of the boat (see: Compass and Tactic Disc)
3) A digital display of the log (KN) in the compass.

The compass and speedometer on the control panel in the cockpit show the data of the training boat that you have chosen.
Note: See menu: Tactic, the Tactic Disc and Speed bars can be switched on/off. They can be placed on the race area at will by drag&drop.

Exercise Speed and Pointing

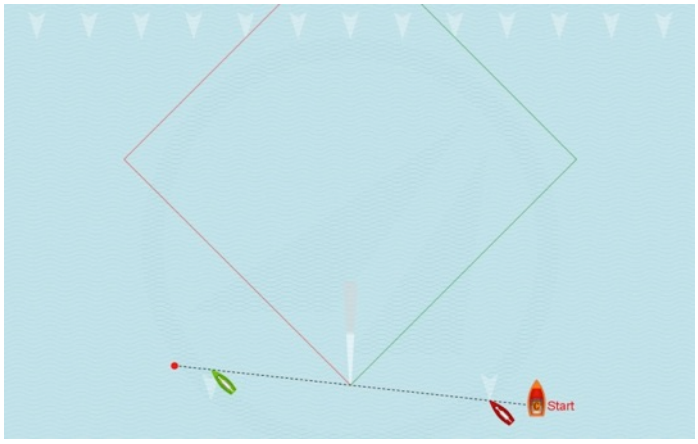
In the exercise “Speed and Pointing” you can move the floating marks (cross). By moving the cross to the right or left (drag&drop) changes the course and the speed of the boats. It always follows the floating mark and the Speed bars show the relative speed (%) of the sailed course (°) of the trainer boat and the sparring partner boats.



New from January 2019 / Version 190.116:
It calculates "per iteration" from the polar diagram the optimal "clause hole course" speed and the corresponding "heading angle" for our standard boat types.
The calculation is based on the polar diagrams available to us. In the new program version, the speed bar of the selected boat "in the middle" shows the optimum " clause hole course " at 16 KN, e.g.
- Finn: 30%, 40 °, Korsar: 58%, 47 °, J / 70: 37%, 37 °, etc. The differences are small due to the small area / short distance at the destination point, but clearly at the wind ladder level visible.

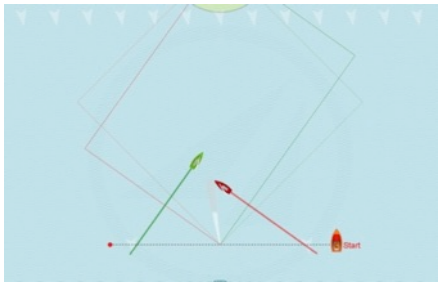
5.4 Start and Finish Lines – Against the wind

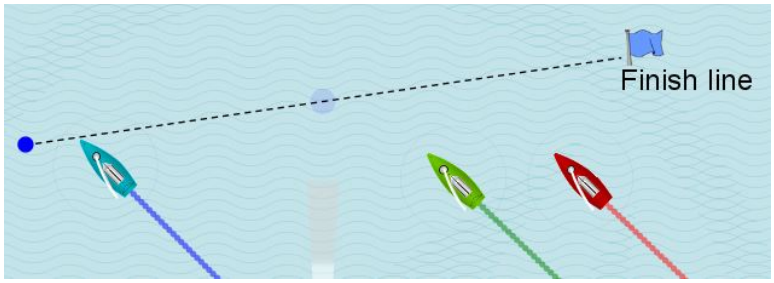
Determine the better side, and calculate the long and short legs. Use tactical positions to the wind and opponent, e.g. sparring partner (See: Rule 10:17).



Functions:
1) The starting line can be modified in position and length. You can change the position and length of the starting line, or
2) change the wind's direction to a preferred side of the horizontal starting line.

To Operate:
1) Using the mouse (drag&drop), move the starting boat(C) into the required position - the length and tilt of the starting line change automatically. You can also change the position of the finish line by moving the blue flag to the desired position.
2) Using the mouse (drag&drop), move the wind arrow so that the wind falls laterally on the starting line. Long and short leg lines as well as lay lines are automatically adjusted.
3) The boats can be positioned as required on the starting line and moved in every starting direction (see Switching Boats).

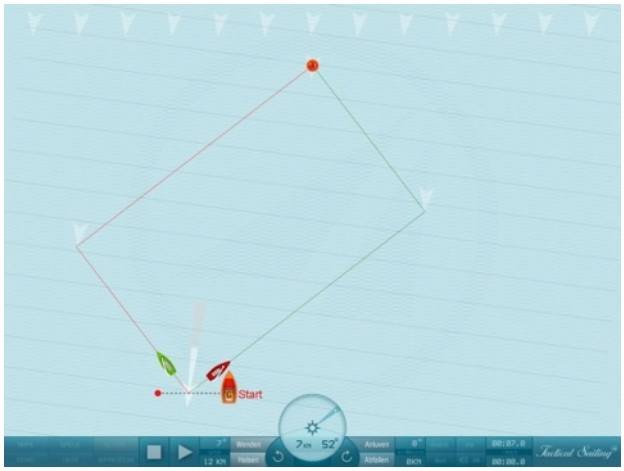




Determine the better side

5.5 Skewed Course

In exercise First Beat/Skewed Course you can move the windward mark to any position. The lines of the long and short legs towards the windward mark are adjusted automatically.

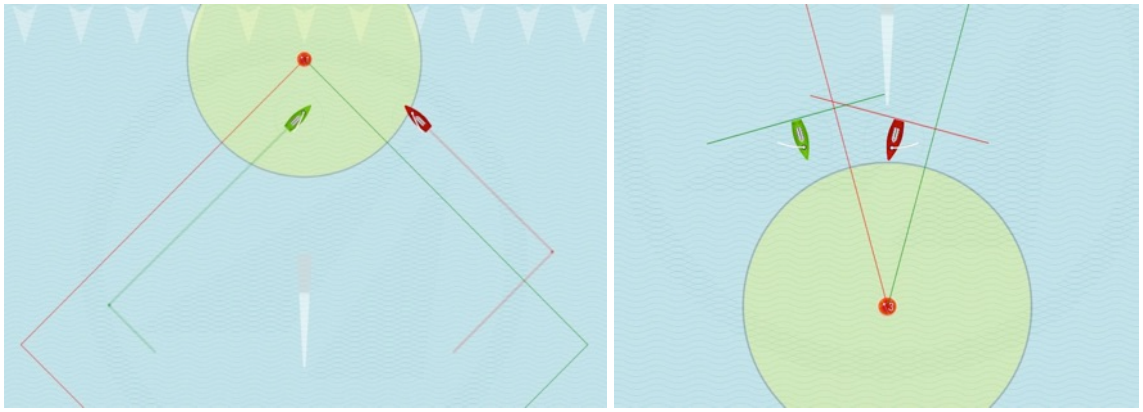


First Beat and Skewed Course

5.6 Buoys

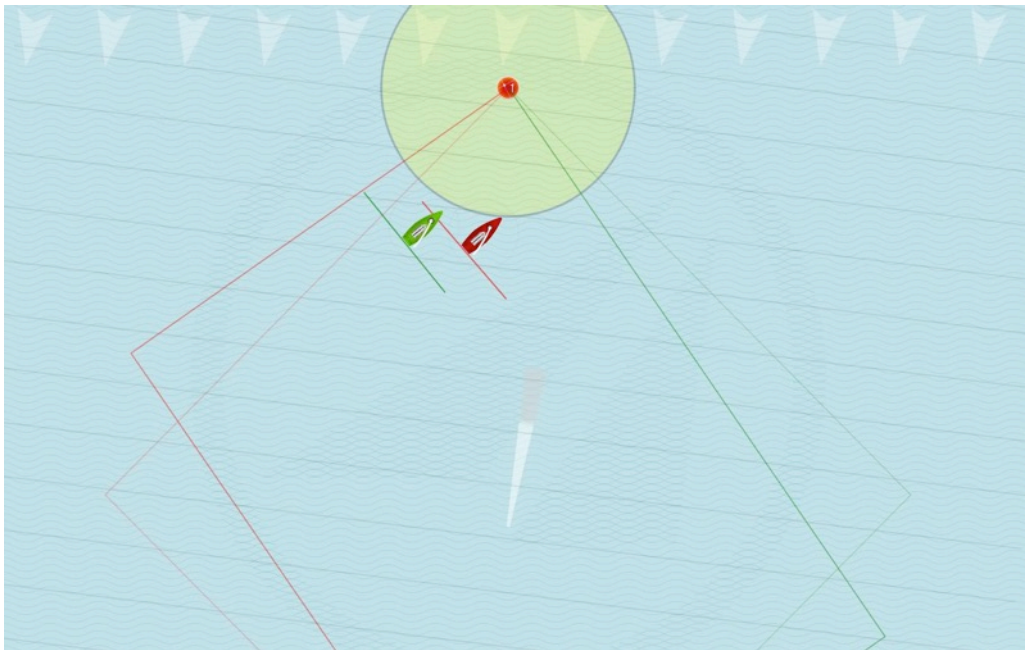
The boats sail to a fixed red marked buoy (1, 2, 3) and round it automatically on the port side at the tacking point of the lay line. Make use of your tactical position to the wind, opponent, or sparring partner. The direction of the wind can be changed to create new possibilities on how to react.

Windward and Leeward Marks



Functions: The boats can be positioned at the first and third buoys as required and moved in all directions. The direction of the wind is modifiable in these scenarios. You can display or remove lay lines, zone and turn the wind ladder on or off. You can display other options, e.g. overlap lines.

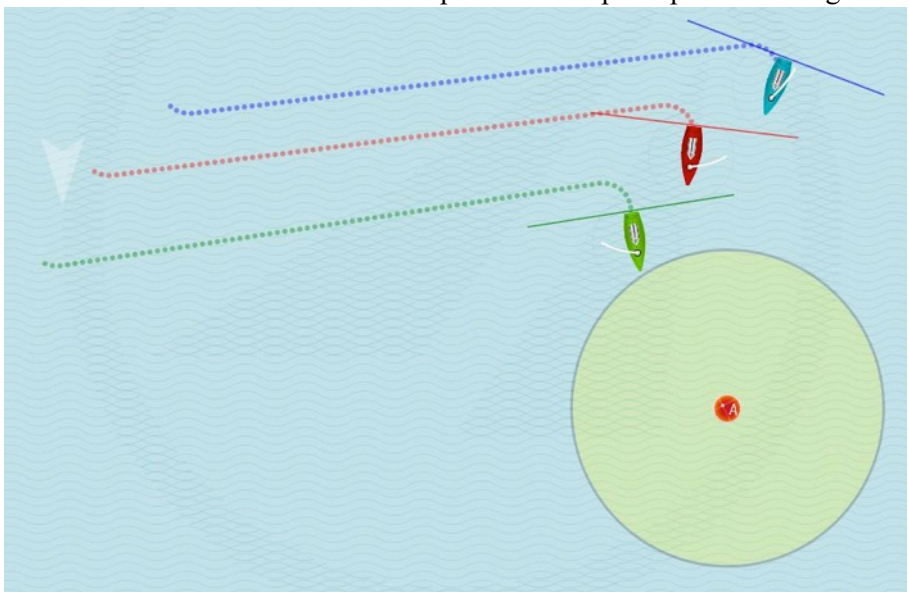
The radius of the zone as well as the length of the overlapping lines can be set. The grade of the wind ladder can be turned.
Note: For teaching purposes the lay lines are placed directly in the middle. The actual tacking point is an invisible calculated point next to a buoy in a proportionate distance, so that rounding the buoy is possible.



The grade of the wind ladder can be turned.

5.7 Zone and Overlap

The Coach's Toolbox includes many functions to teach the very complex topic, "Zone and Overlapping." This function assists the Coach to emphasise these principles according to the experience of the sailors.

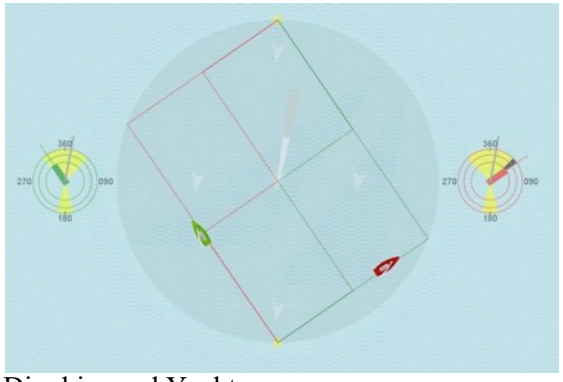


Function:
1) The red buoy (A) can be shifted to positions upwind, downwind or a beam.
2) Three boats can be placed in any position.
3) The direction of wind can be changed.
4) The sailed path can be recorded.

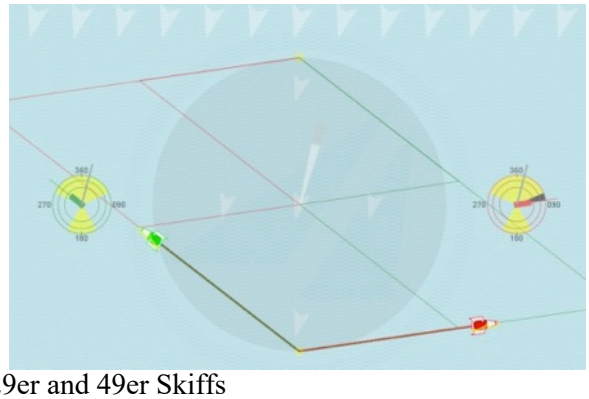
5.8 Field Tactics

In the following exercise possibilities, field tactics between a windward and leeward mark are described. You can display the sailed course either upwind or downwind as a rectangle or diamond in a circle. Also the direction of the wind can be indicated to the next course marker as well as the long and short legs, header, lift and lay lines. Tactical positions and manoeuvres in the entire field can be explained. You can use the compass and tactic disc with display segments for the lift and header. The skiff and the tactic disc with tack and jibe angles are adjusted respectively for dinghies and yachts.
Note: By changing the wind's direction to show a long and short leg you can simulate all aforementioned topics perfectly!

Example: Set wind direction (15°) to simulate a long leg. Start the boats! View the animation together, first with a constant wind! Pause the simulation from time to time and ask, "Which boat will reach the windward mark first?"
A high learning effect will be achieved if you:
1) Let the boat sail on with a constant wind (15°), discuss the result and then restart the exercise.
2) Restart and change the wind's direction (360°) to the left when boats are half way up.



Dinghies and Yachts

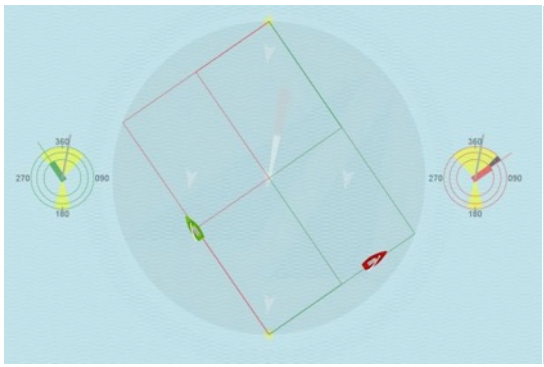


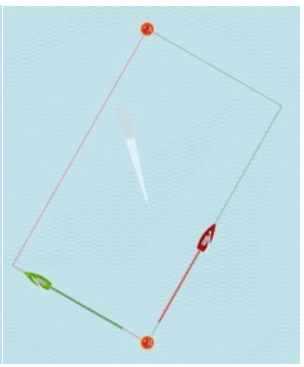
29er and 49er Skiffs

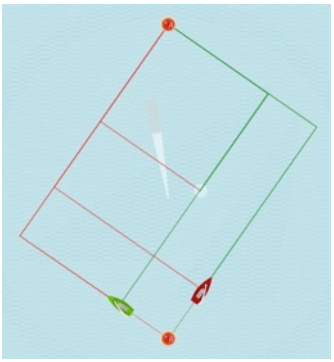
Due to various wind angles with dinghies and skiffs, different graphic dimensions (rectangle, diamond) of the regatta field arise, as well as for the long and short leg lines.
To Operate: You can change the direction and strength of the wind and position the boats as required. Observe the tactic discs of both boats! Use the compass and tactic disc with the display segments for the lift and header! The skiff and the tactic disc with tack and jibe angles are adjusted respectively for dinghies and yachts. To turn the wind (change the wind's direction, press key M or N or by drag&drop of the wind arrow (light grey) and by doing so, modify the boat's sailing path. The lay lines automatically shift and the "autopilot" steers the new course until the helmsperson tacks (click on the boat) or sets goal buoys and lays down a specific route.
Tips for operating the "autopilots": See Main Menu: "Help, Boats, Autopilot, ON/OFF".

5.9 Long Leg and Short Leg

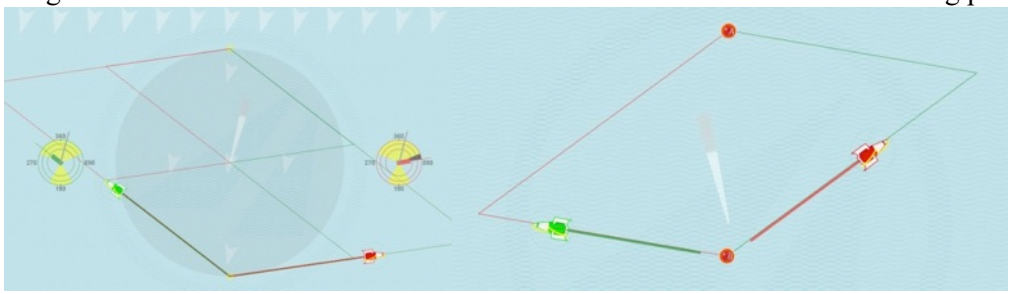
The rule: “Sail the long leg before the short leg” is descriptively simulated through wind shifts in the Coach Toolbox. The basis for this is the graphic shown here; long and short leg lines are clearly visible. The boats start. If, for example, the wind shifts to the left halfway to the lay line, e.g. 360°, you can recognize the advantage for the boat that sails the long leg first. The exercise “Long Leg and Laylines” allows the lines on a tactical turning point (round grey mark) to be shifted and be displayed directly on the boat. Likewise, the exercise “Field Tactics Upwind” shows the lines between the boat and the upwind buoy. For further details on “Long Leg and Laylines” see section „Risk and Reward“.





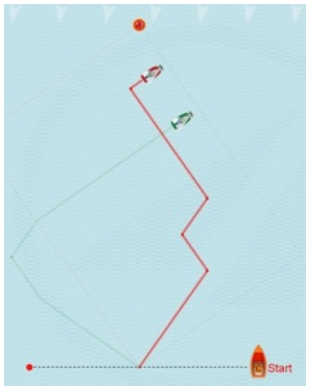


Dinghies and Yachts Tactical turning point (grey mark)



29er and 49er Skiffs

Due to various wind angles with dinghies and skiffs, different long and short leg lines arise. To Operate: Start the boats with a constant wind. Then, turn the direction of the wind to the left or right and observe which boat reaches the windward mark first. The lines can be turned on or off with the Options “View” or “Boat.”



You can also find tips in the Main Menu: “Rule of Thumb / Long Leg”

5.10 Playing field and Offside trap

“Staying in the field of play avoids the offside trap. In contrast to almost all other sports, the size and shape of the playing field changes in regatta sailing. This happens in sailing due to the constant changes in wind direction. If you always manage to stay in the field of play, you also retain all options on the way to the windward mark to benefit from wind shifts. It is therefore advisable to stay away from the edges of the playing field (i.e. the laylines) and move more towards the centre of the playing field. Close to the laylines, there is a risk of being caught offside if an unfavourable shift in the wind takes you out of the pitch.

© Tilo Schnekenburger http://www.schnekenburger.click

The new scene from Tactical Sailing is an excellent way of visualizing the problem of the offside trap (see Geometry of Regatta Sailing p. 185/195ff) and the change in the playing field.

The following screenshots and the corresponding explanations inside the simulation illustrate this.

Feature "Trainer Highlights", menu item “Long leg first”

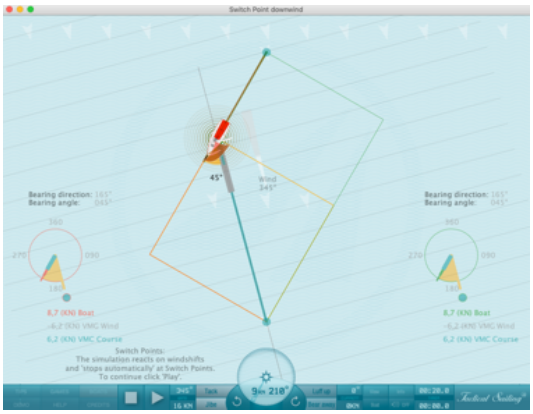
"Playing field with offside trap" - Basic scene

Options: "Playing field area per boat"

5.11 The “Switch Point”

See detailed explanations and tactical advice on “Switch Point” at:
© Tilo Schnekenburger*. The Tactical Sailing Simulation offers two special exercise in menu: “Racing sailor” as well as special options in “Tactic”: "Switch Point Mark and Bearing", that can be turned ON or OFF. Select the menu options: "Tactic / Switch Point Mark / Bearing ". The simulation automatically stops at a switch point, then click "Play" to continue. The 'Switch Point Mark' is the point at which the line of the 'wind axis' intersects with the line of the 'course axis' of the boat (J / 70).

Upwind: “The "switch point" is always exactly in the leeward of the windward mark, so exactly on the "wind axis". If you sail a long leg course until you cross the wind axis, the long leg at "Switchpoint" turns into a short leg”*. Example: The Switch Point (for example, 45 °) lies on the „long leg“ to the lay line, if sailing port or starboard tack. At this point the long leg is changed to the short leg, since the bearing from the course line to the windward mark at the switch point corresponds to the close hauled angle of the boat (eg 45 ° with the J/70) and bearing continues to grow further during further sailing. But from there on a lower approach of the absolute distance to the upwind mark takes place (see Distance Made Good). At these points, a tactical consideration makes sense: do I stay on the course or do I turn to the other side? What risk do I have if I go further to the lay line?

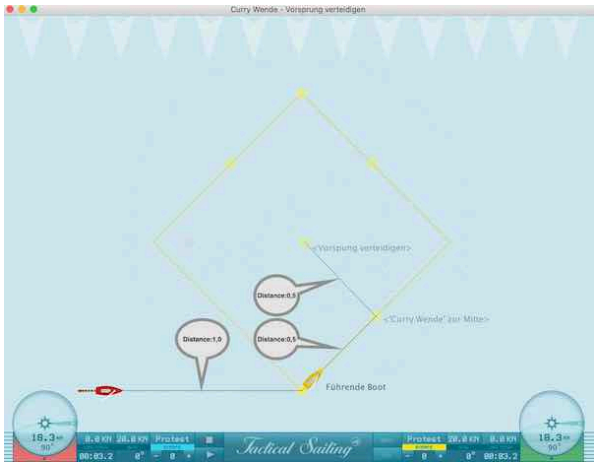


Downwind: The same logic of the Distance Made Good (DMG) applies similarly to the downwind course, but the special "downwind angle" of the boat (e.g. 45° at J/70) applies and the bearing to the leeward mark can be seen according to the angle. Note that the shortest distance (1000m) could be used to sail the direct line from the upwind to the downwind mark. But not with the maximum speed possible by the Polar Diagram of the respective boat during the downwind course (z.B. Bearing angle of J/70 at 135° or 225°).

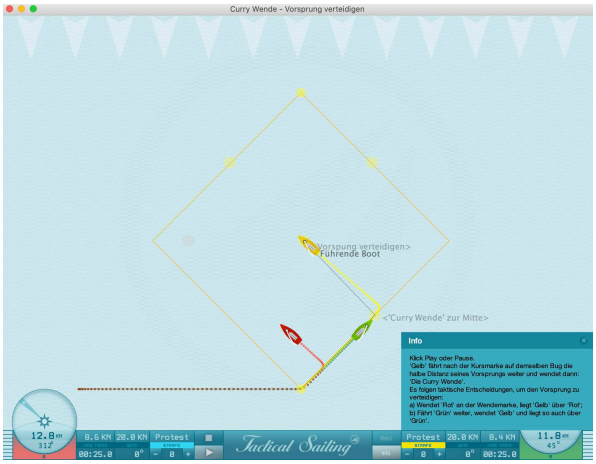
* Source: See detailed explanations and tactical advice on:
© Tilo Schnekenburger: Die Geometrie des Regattasegelns, (in German language).

5.12 The "Curry Tack"

Two special practice scenes in the menu "Regatta sailor" show how a leading boat can "defend its lead" or "avert a risk". In both exercises the leading boat will observe its pursuer(s) to maintain its lead under all circumstances – the Simulation of the so called **"Curry Tack".**



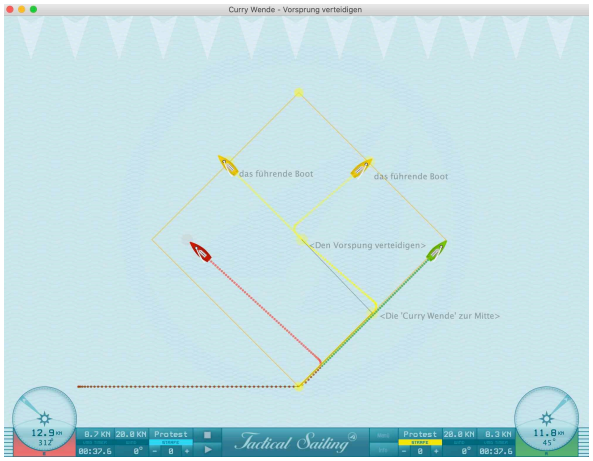
Originally distance as Boat (red) follows boat (yellow)



Boat positions after passing buoy

Defending the lead

The simulation shows two boats (red, green), they track the leading boats (yellow).
"How does 'the leading boat' (yellow) have to cover after the turning mark to maintain the lead in all circumstances?"

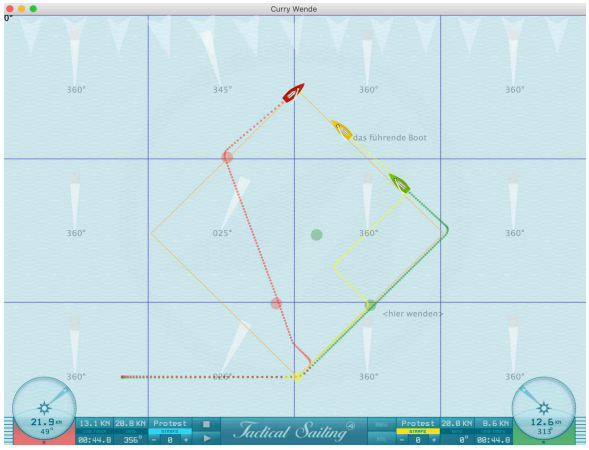


'Yellow' travels half the distance (50%) after the course mark on the same tack his lead continues to the "**curry-tack-point**" and then turns at this point to the middle: 'The '**Curry-Tack'**.
In the middle of the regatta field follows a tactical decision of the yellow boat to defend the lead:
a) Tacks 'Red' at the mark, 'Yellow' is above 'Red';
b) Continues 'Green', tacks 'Yellow' and is thus also above 'Green'.

Result of the so called tactical "curry tack": Boot A (yellow) always lays over boot B (red or green) and can claim the lead under all circumstances!

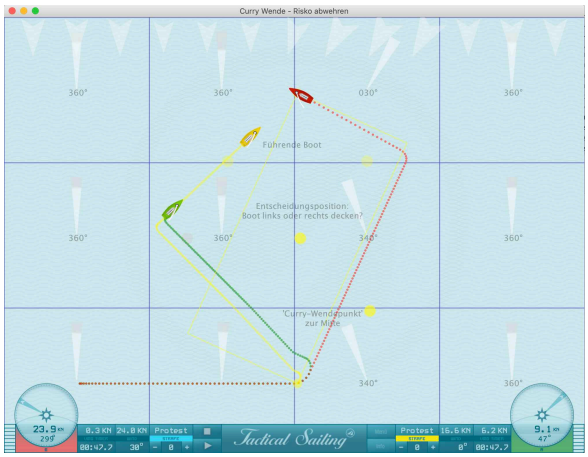
Prerequisite here: equal wind conditions on both sides, see the following scenes "Avoid risk".

Avoid risk
If the wind conditions on both sides of the regatta field are different, then other tactical decisions arise at the course mark and at the "curry tacking point", see the following scenes with wind regions 4x3.



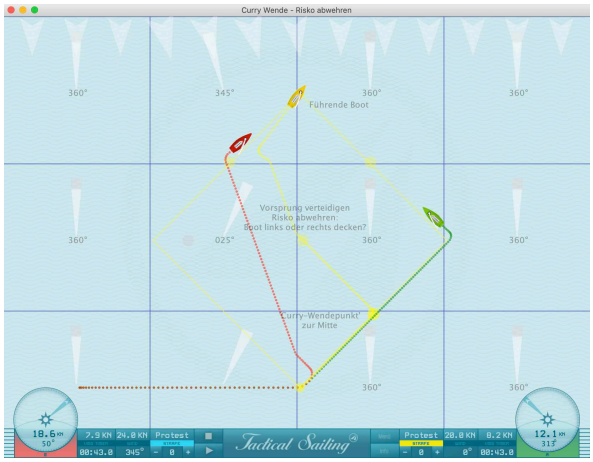
Risk (1) "The risk for boat A (yellow) are as follows: If it continues after the course mark, boat B (red) turns at the tacking point and thus crosses under other wind conditions on the left side", e.g. wind direction +25°, speed 24 KN, see fig. (1).

Fig. (1) Boat A (yellow) continues her course up to "position 1", then tacks.
B (red) tacks to the course mark.



Risk (2) "But if boat A (yellow) tacks at the mark immediately, boot B (red) will continue its course after reaching it and can also slip with some wind luck", e.g. wind direction 340°, speed 24 KN, see fig. (2).

Fig. (2) Boat A (yellow) tacks immediately, boat B (red) continues her course with other wind conditions.

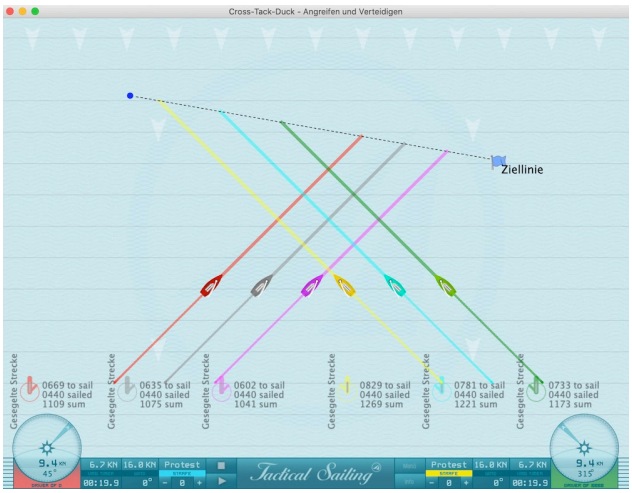


Risk (3) Boat A (yellow) continues at the course mark to the "Curry-tacking-point", tacks back to the middle of the field, observes subsequent boats (red and green) and then **decides** to cover one of the two opponents, e.g. Boot B (red) because it has already come very close due to the wind conditions on the left side.
Risk fended off for boot A (yellow), the "curry tacking point" optimally exploited as a tactical maneuver, due to other wind conditions, e.g. on the left side for boot B (red).

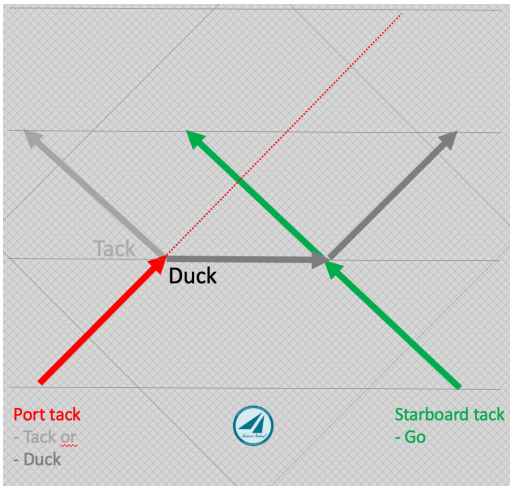
* Literature: "Regatta-Taktik: Frage und Antwort", Buoys-Manöver No. 60. Delius Klasing © Verlag, Reprint 2000 of the 1932 edition; ISBN-3-7688-1171-9; Page 222 - 225. This tactical buoy manoeuvre No. 60 is colloquially known as the "**Curry Tack**".

5.13 Cross – Tack – Duck

"On a superficial view, the meeting of two sailors with wind from different sides on the upwind course seems very simple – the sailor with wind from starboard has the right of way, who has to dodge with wind from port", is how Tilo Schnekenburger describes the "port-starboard encounter".
The complexity of the maneuver 'Cross-Tack-Duck', a detailed description for the strategic-tactical actions with usually 7 options, as well as the chain of follow-up actions are described at: Tilo Schnekenburger: www.schnekenburger.click (German language).
In excerpts we use his description below.
However, depending on the mutual position of the boats, the sailors can make the following strategic-tactical decision for their course:
1. Cross, i.e., to cross the course of the other in front of his bow,
2. Tack, to lie down laterally or in front of the others by a turn in leeward or windward, and
3. Duck, bear away, so behind the stern of the other to cross its course.
The sailor with starboard wind has the advantage of the right of way and can therefore force the sailor with port wind to dodge.



Boats are crossing on collision course

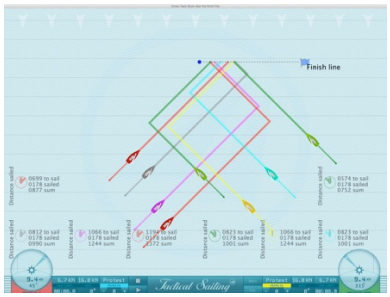


Principal-drawing „Tack“ and „Duck“

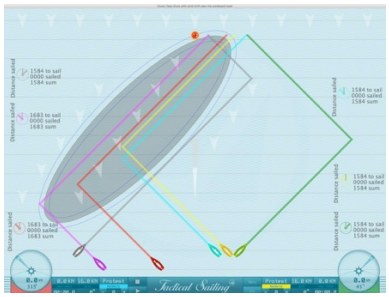
On a superficial view, one might think that with the solution of the right-of-way situation, the problem is solved. The sailor with port wind seems to be more or less dependent on the decision of the right-of-way sailor. He can therefore insist on its right of way and force the sailor with port wind to dodge, i.e. to turn away(tack) or around the stern to bear away(duck).
However, this is a situation that no ambitious regatta sailor accepts, everyone always wants to keep the reins of action in their own hands.

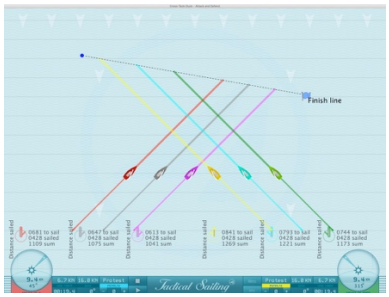
Positions on the regatta course – a highly complex decision-making situation:
For the strategical and tactical minded regatta sailor is "Cross - Tack - Duck" a highly complex decision-making situation. This means, that it is actually secondary to view the solution for a right of way situation. In this case, it is far more important to decide on the strategical-tactical solutions after viewing the right of way situation. Where are the positions on the regatta area, e.g. are they near the finish line or the windward mark? It is also just as important to compare (over the entire regatta area) where near and far opponents are placed. Could they, at any time, either attack or defend their position?

Tactical Sailing Simulations
The Tactical Sailing simulations show the maneuvers "Cross – Tack – Duck (CTG)" in the following scenes, select them in the menu RACING SAILOR:
A) Near the finish line,
B) Near the upwind mark,
C) Attack and defend - on collision course at any place during race.



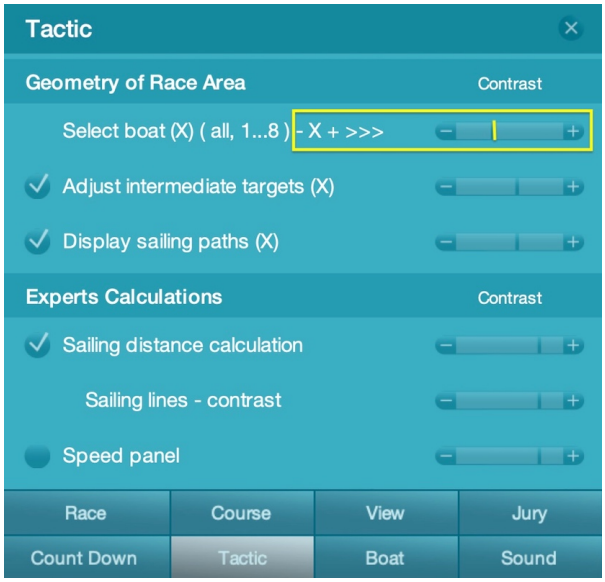
A) Finish line


B) Upwind mark including wind shift



C) Attack and defend

Tactic options: In each scene, the positions of the boats(X), adjust intermediate targets(X) and display sailing paths(X) can be displayed and changed by 'Drag&Drop'. This creates completely new strategic-tactical situations.



First switch in option menu ‘Tactic’, the ‘Adjusting intermediate targets(X)' and ‘Display sailing path(X)’ to ‘ON’.
Select then more 'Tactics' options, e.g., 'Select boat(X)' and ‘Adjust intermediate Targets(X)’ to display either the options of 'all' boats(X) or 'each' boot individually (1...x), click on - or + . This boat selection(X) is applied to the other options.
Change the intermediate targets(X) 'step' by 'step'. Make a 'screenshot' to help you memorize the 'collision points'.

In the 'Info' menu, click on 'more info <>' to read an explanation of the tactical maneuvers of this scene.

Normal Modus: **Original positions**
Click on 'Play', 'Pause' or 'Stop', no further operation required. This is the normal mode to display the set original positions of the boats(X) and intermediate targets(X).
The two scenes "Finish Line" and "Windward Mark" are set with their intermediate targets(X) in such a way that the advantages and consequences of the maneuvers "Cross-Tack-Duck (CTG)" are clearly visible.
In the scene "Attack and defend" the boats(X) and intermediate targets(X) are set in such a way that the boats first all cross on a collision course, but which can be changed to a conflict-free course by CTG maneuvers, see "Persistence mode".

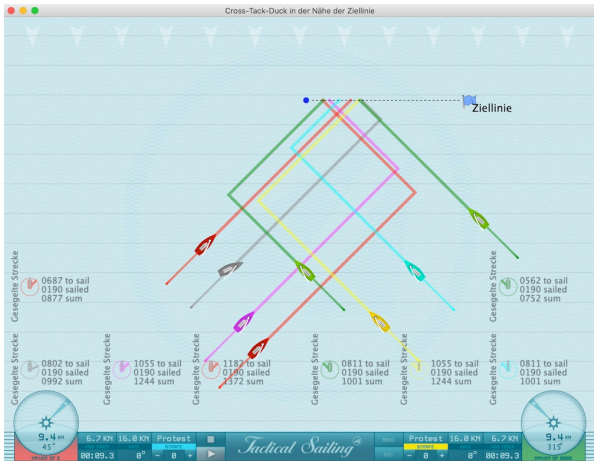
NEW - Persistence mode: **save own positions**
There is a new persistence mode for testing purposes for the scenes: Cross-Tack-Duck, as of July 2021.
First switch in option menu ‘Tactic’, the ‘Adjusting intermediate targets(X)' and ‘Display sailing path(X)’ to ‘ON’.
Changing the complete scenes by setting and adjusting the intermediate targets(X) and boats(X) by 'Drag&Drop' should be facilitated by the storage.
With 'Play' these "own positions" are stored.

Operating instructions:
Even after the termination of scene or the entire program – and a restart of the program, these own positions are reusable.
The scene starts with:
- the original headings or, if available,
- their own positions.

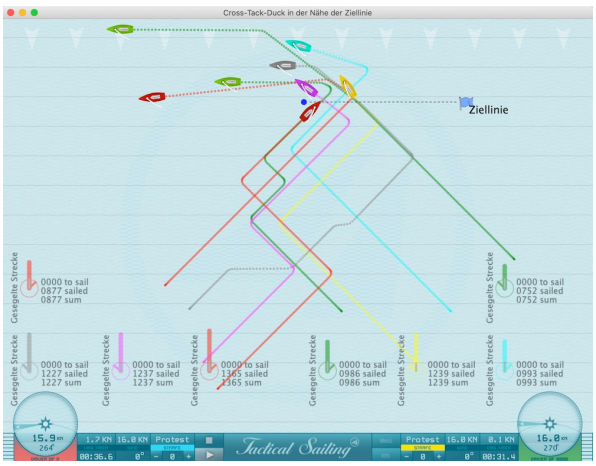
Special feature: However, you can restore the original positions, click again on the button 'Stop', the original positions will appear!
Switch between the original positions and the changed own positions:
- Click on 'Stop' again.

Scene A) Finish line - to be the first to reach

With these maneuvers, the strategic-tactical decisions in the regatta are given priority, namely the multiple maneuvers: cross, tack and duck to reach the finish line first.



Initial position of the paths



All paths lines to finish line

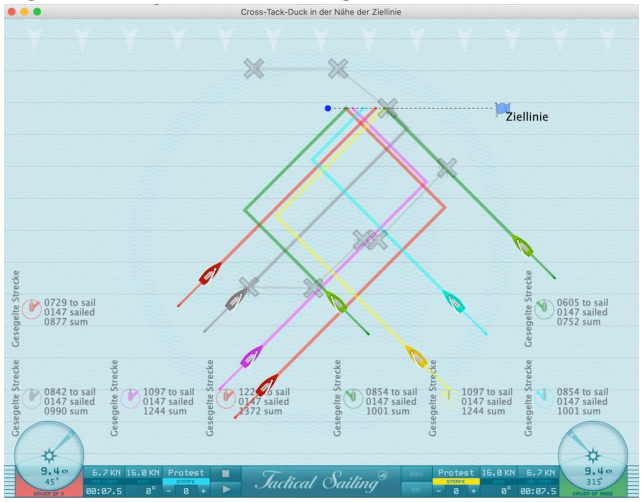
Observe the port sailors (left) and analyze their maneuvers ‘step by step’:

- red-1: Cross + Go
- grey: 2x Duck, 1x Tack + Go
- magenta: 3x tack - attack
- red-2: 2x tack.

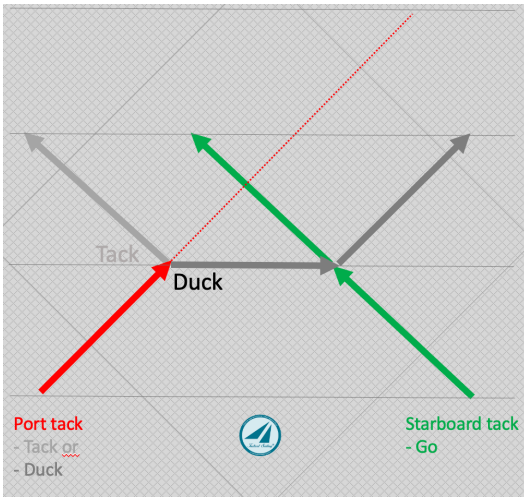
The starboard sailors (right) have right of way, they initially follow their original course, but make tactical turning maneuvers until reaching the finish line:

- green-1: Cross + Go,
- yellow: 2x Tack,
- cyan: 1x Tack, Cross + Go,
- green-2: 3x tack + go.

Compare the positions of the boats at the beginning of the scene on the windward ladder and the 'sailed distance' on their course to the target. Upon reaching the finish line, the sailed paths are automatically registered. Evaluate their height on the windward ladder and the sailed distance:



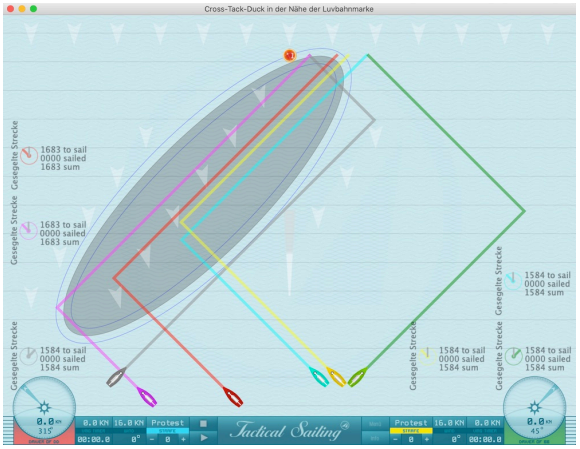
Intermediate targets(X) of the "Grey Boat"



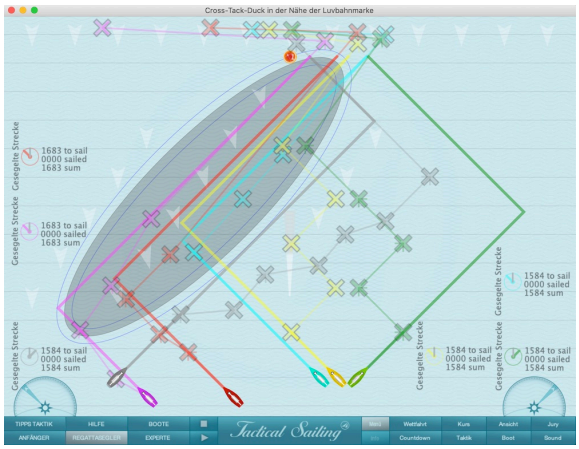
Principal drawing "Tack" and "Duck"

Comparison of maneuvers
- The maneuver 'Duck' causes a loss of level (1) on the windward ladder, it extends the distance to be sailed, e.g. see the grey **boat**, initially 990 dots to sail, then 1227 dots sailed on reaching the finish line, approx. + 24% extension of the distance in this example.
- Maneuver 'Tack' is almost neutral, compare the two boats **'Green + Cyan'**, they have same distances to sail to the finish line, namely 1001 dots to sail, as well as **'Magenta + Yellow'** 1245 dots to sail!
(1) See drawing of the maneuver 'Duck' – loss of height - below.

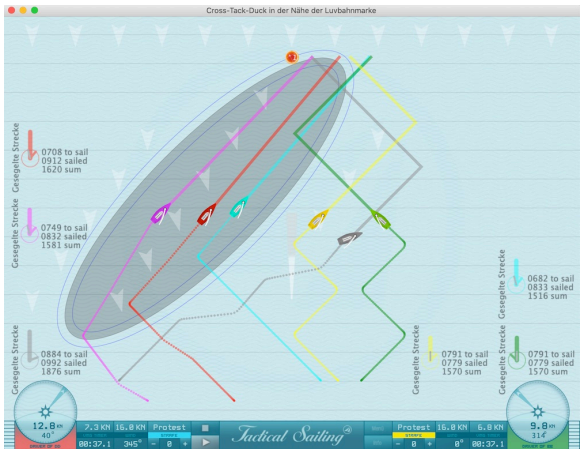
Scene B) Upwind mark – use wind pattern with 'lift'
With these maneuvers, the strategic-tactical decisions are given priority here, namely by a 'gust of wind' with a change in the wind direction (lift – 15°) on the left side, thus the path to upwind mark is best reached.



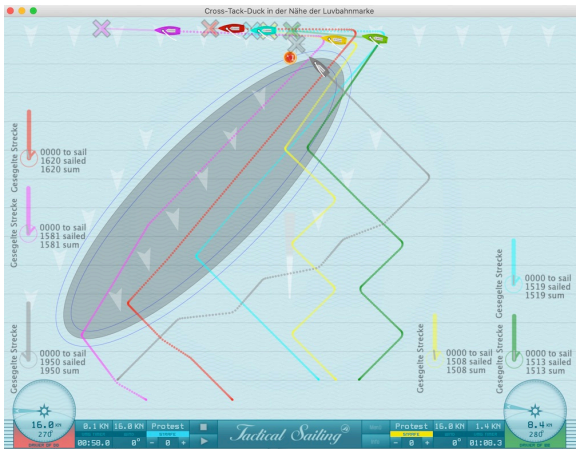
Initial position of the paths



Intermediate targes(X) per boat



Path lines to wind gust (lift – 15°)



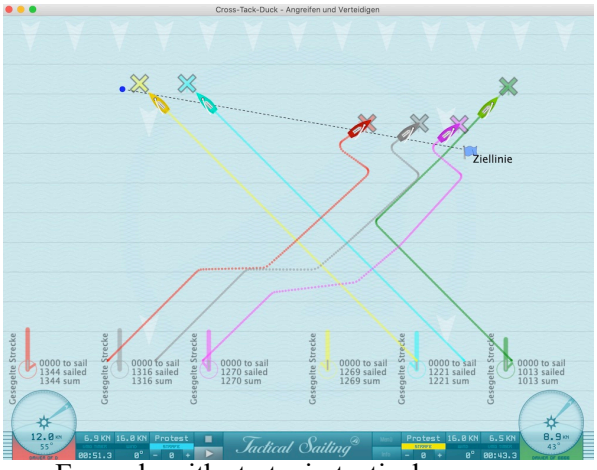
All paths lines to upwind mark

Tactical particularities:
1. Regatta area on the left with a special wind pattern through a "lift-15°".
2. Starboard sailors '**Magenta' and 'Red**' absolutely want to go to the left side.
With a view to the tactical goal of reaching the left side of the regatta area, the starboard sailors renounce their right of way towards 'Grey' and tactically bear away behind the stern (Duck) in order to be able to continue the course without a 'duel with grey'.

3. Port sailor '**Grey**' stays on its course.
Grey makes: 3x 'Duck', he has NO 'right of way', he remains consistently on his original course on the right side.
4. Starboard sailor '**Cyan**' also recognizes the presumably better left side (Go + Tack).
5. Sailors '**Yellow' and 'Green**' first stay on the right side with a '**tacking duel**' (3 x tack), then head for the upwind mark.
Compare the sailed distances of the boats at the start on the same windward ladder level, the result by the maneuvers on the paths, and when rounding the upwind mark.

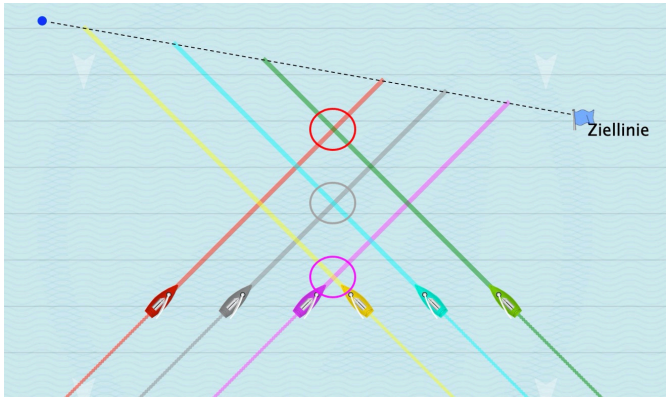
Scene C) Attacking and defending – exercise to control the opponent
Design your own exercise in such a way that you can reach the finish line first through your strategic-tactical decisions. By 'Attacking and Defending' you can control opponents.

Initial situation with collision course

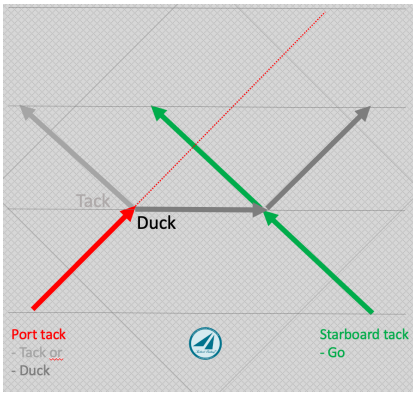


Example with strategic-tactical maneuvers

Change the paths by suitable maneuvers: Cross, Tack or Duck.
First switch in option menu 'Tactic', the 'Adjusting intermediate targets(X)' and 'Display sailing path(X)' to 'ON'.
Then select more options to change the scene, e.g., 'Select boat(X)' and, display either 'all' boats (-) or 'each' boat individually (1...x), click therefor on - or + . This selection is applied to the other options.



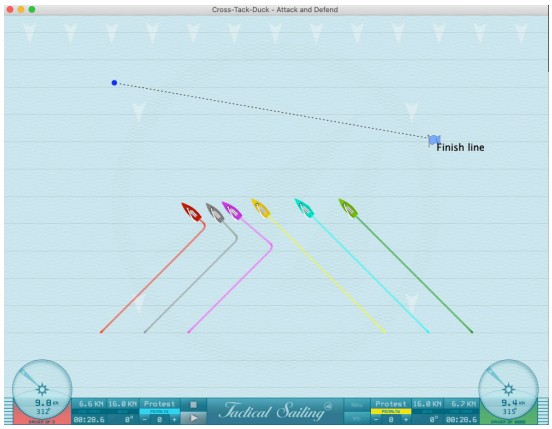
Boats with NO right of way: Red, gray and magenta



Principal drawing "Tack" and "Duck"

Note this drawing with the paths of the sailors with wind from starboard, they have right of way, the sailors with wind from port must dodge.

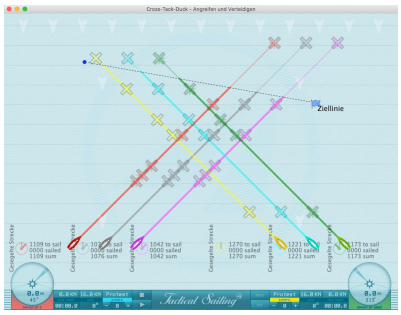
Tactical exercises:
All boats are in the starting position on the same **wind ladder level.** The port and starboard sailors are **on a collision course** on the way to the finish line.



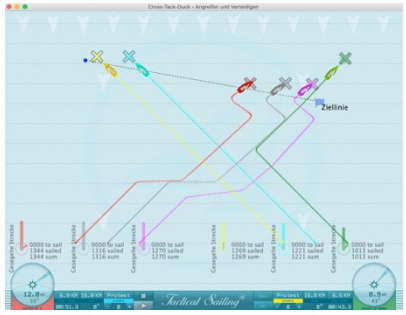
The port sailors would make a big tactical mistake if they
- would only follow the right-of-way position, namely tacks to the "left" side and
- would not pay attention to the skewed finish line*.
The starboard sailors would first reach complete control of the port sailors. But then the port sailors would provoke a "leeward before windward battle" to reach the finish line first.
* The finish line could be skewed in this example, or the wind direction might have changed to right on a “straight finish line”, so that the committee boat is favored and the pin-end is hardly to be reached.

The port sailors (red, gray, magenta) made a big tactical mistake, when they tacked to the left side.

With this scene, several tactical exercises are possible:
First switch in option menu ‘Tactic’, the ‘Adjusting intermediate targets(X)' and ‘Display sailing path(X)’ to ‘ON’.
By 'Attacking and Defending' you can control opponents and reach the finish line first:
- change the positions of the intermediate targets (X) for the 6 boats,
- direct the 'boats' to the finish line, e.g. paths to the left and right sides of the finish line (a),
- direct the 'boats' to the tactically preferred right side of the finish line (b),
- pay attention to each opponent to 'control', 'attack' or 'defend' him,
- change the position of the finish line (position and inclination) and evaluate the result,
- why can port sailors – without right of way anyway – reach the finish line first?



Intermediate targets(X)



(a) Paths: left and right side

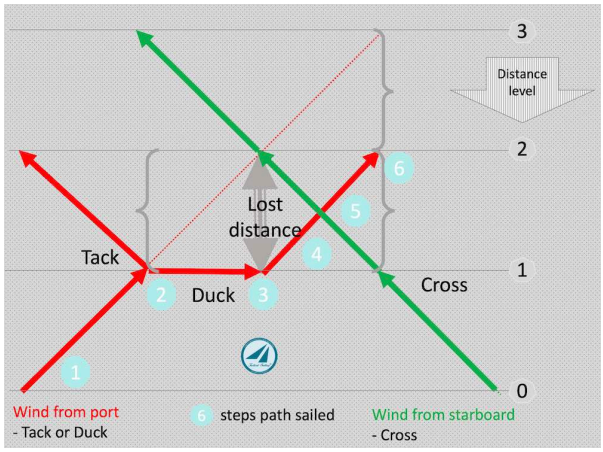
(b) Paths only right side

Now change the intermediate targets(X) 'step' by 'step'. Make a "screenshot" to help you remember the 'collision points'. Finally, you can also create a "video clip" of your own scene, if all intermediate targets(X) are positioned correctly.
Compare the sailed distances of the boats at the start on the same wind ladder level and the result by the maneuvers on the paths, and when reaching the finish line.

Note on the maneuver 'Duck' – loss of wind ladder level and extended distance

The maneuver 'Duck' causes a loss of wind ladder level and extends the distance to be sailed, the maneuver 'Tack', on the other hand, is almost neutral!

The distances of the maneuvers can be represented geometrically as follows.



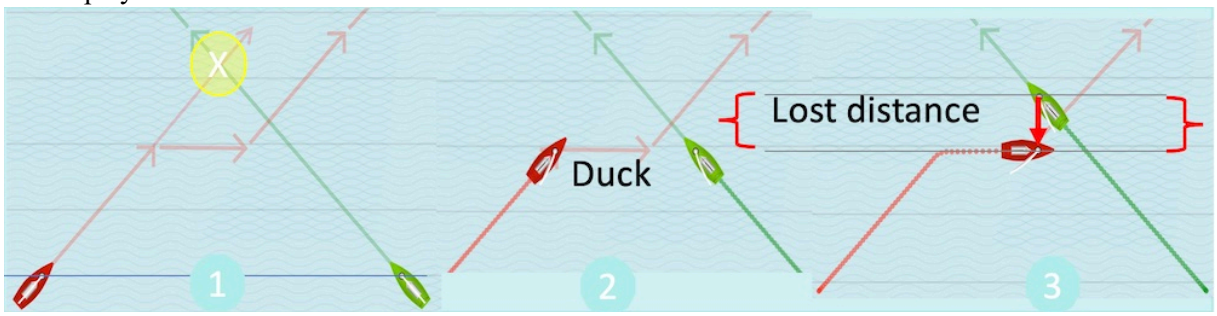
The theoretical "loss of height" (lost distance) can be seen in the drawing between the wind ladder levels 1 and 2, which is the distance at the point at which two boats stand vertically on top of each other.

For simplicity, this geometric drawing does NOT take into account the increased speed (duck points 2-3) of the port sailor (red) when it no longer sails "on a beat of the wind (45 °)" but on a "beam reach (90 °)". Likewise, the losses during tacks and luffing up after the "duck" maneuver are not taken into account.

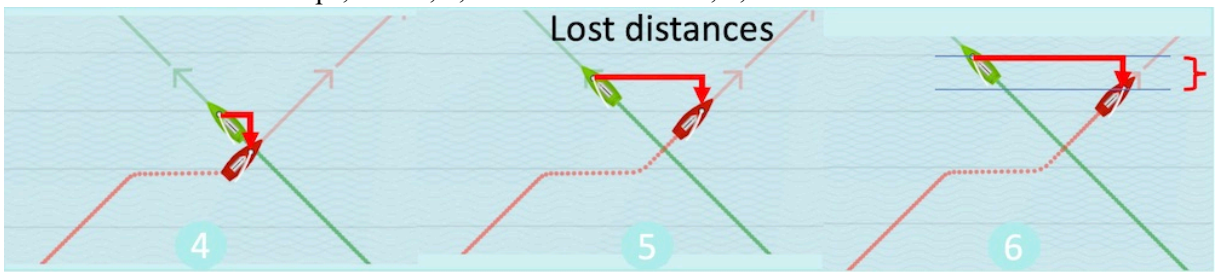
Principle drawing: Loss of height (Lost distance) and "distance sailed" 1 to 6 of the port sailor.

Example: With the help of the Tactical Sailing Simulation, the "loss of hight" and "course of the sailed path" can be shown in 6 steps during the "Duck" maneuver, see below:

1. Boats on the same wind ladder level on a collision course beating upwind towards point 1(X).
2. Boats on the same wind ladder level, beginning of the "Duck" maneuver, the red boat “bears away” at point 2 and sails with wind at 90° (Beam reach) on the way up to point 3.
3. The green boat continues its course on the “beat” (315°), the red boat sails beam reach (90°) to the point where the green boat lies exactly in windward – here the vertical distance from the "mast foot to mast foot" is counted as a "loss of height" (lost distance).
4. The red boat can then “luff up” beating again at 45° at point 4 and pass the stern of green with a safe distance.
5. Collision avoided, boats sail on different level of wind ladder with lateral distance.
6. The theoretical "lost distance" is only an approximate measure of the loss. However, it is up to the fine control of the sailor, when and at what angle he starts to dodge, i.e. overall what distance he has to sail additionally (Distance sailed) to reach a target point. These distance values are calculated and displayed in the simulation.

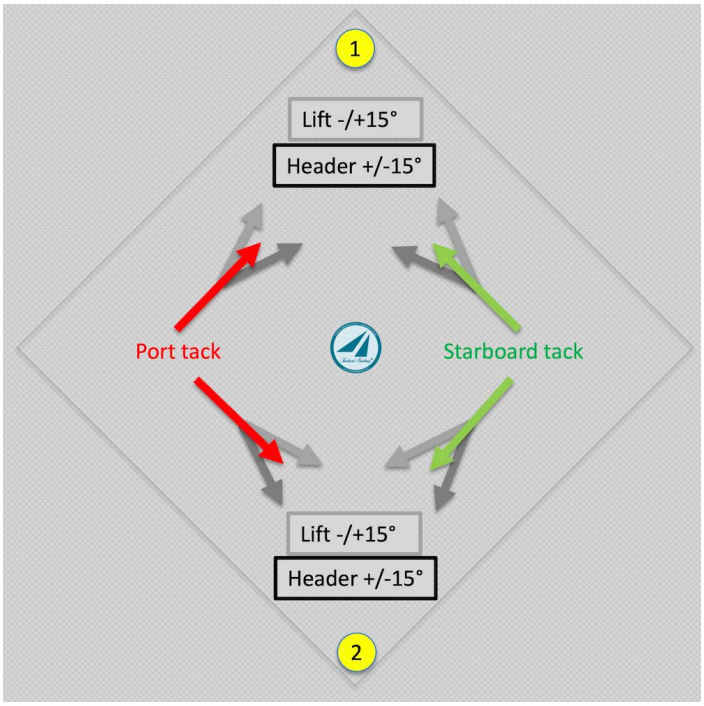


"Duck" maneuvers in 6 steps, here 1, 2, 3 as well as below 4, 5, 6



5.14 Lift and header

Definitions: "Lift and Header" are changes in wind direction measured on the boat in relation to the previous wind direction, which can then cause a change in the boat's direction of travel. Tactically, they have different tactical effects depending on the course the boat has sailed (Port tack red or Starboard tack green color) on the upwind or downwind course, namely whether they are of advantage or disadvantage.



Upwind to mark-1:
A change in wind direction can be advantageous if the course change occurs in the "direction of the windward mark", it "pulls" you towards the windward mark-1 (light grey line, Lift -/+ 15°).
A change in wind direction can be disadvantageous if the course change does NOT occur in the "direction of the windward marker", it "pushes" you away from the windward marker (dark grey line, Header +/- 15°).

Downwind to mark-2:
A change in wind direction can be advantageous if the course change occurs in the "direction of the leeward mark", it "pushes" you towards the leeward marker-2 (dark grey line, Header +/- 15°).
A change in wind direction can be disadvantageous if the course change does NOT occur in the "direction of the leeward course mark", it "pulls" you away from the leeward course mark (light grey line, Lift -/+ 15°).

Note for practice: With the compass, the direction of the buoy(!) is first taken and then the current direction of travel is read on the compass. Wind shifts become visible on the compass through luffing or dropping in the form of a lift or header and then require the direction of the boat to be adjusted.

Reading Lift and Header on the compass course

Note for practice: With the compass, the direction of the upwind mark(!) is first determined, because the buoy is your first target point – not the wind direction, because it changes constantly on the playing field! The downwind mark (Gate) is your 2nd destination point and is usually at +/- 180° from the upwind mark for the downwind course.

A compass with digital or analog display can be used for lift or headers, such as Tacktick Racemaster, Micro Compass, Silva 85, etc. These compasses either display a lift or header with +/- 2° or 5°.

Racemaster

Micro Compass

Silva

Example Racemaster: Lift by + 10°: Bar chart and numerical display + 10

Example Micro Compass:

Tack on + (plus deviation +10°, e.g. 106° from middle course with wind from port

Tack on - (minus deviation -10°, e.g. 86° from the middle course with wind from starboard

See the manufacturers' instructions for setting the tactics information.

You can also use a mechanical tactical disc such as use the tactical discs of Musto, Elvström, TackingMaster (to wear on the wrist like a watch) or Wot-tac.

On the upwind course, the "tacking angle" of the boat determines the course to be steered in order to maintain the optimal speed, e.g. with a J/70 it is 90°, this corresponds to a steering angle of 45° or 315° on the upwind course.

On the downwind course, the "jibing angle" of the boat determines the course to be best steered in order to maintain the optimal speed, e.g. at a J/70 it is 90°, this corresponds to a steering angle of 135° or 225° on the downwind course.

The following figure shows a regatta field divided with 4 regions North(N), South (S), East(E) and West(W). The compass shows the "Lift (light grey line) and header (dark gray line)" as follows (+/- x°), e.g. +/-15°:

- Upwind or Downwind course with wind from:
  - Starboard (green line): Lift +15° turning right, header -15° left-turning
  - Port (red line): Lift -15° turning left, header +15° turning right

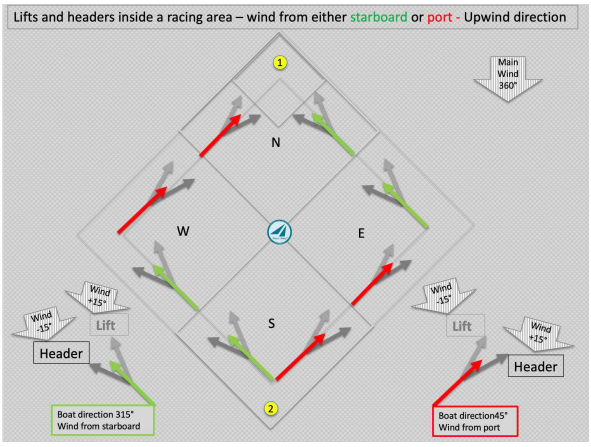


Fig. Upwind – Lifts and Headers

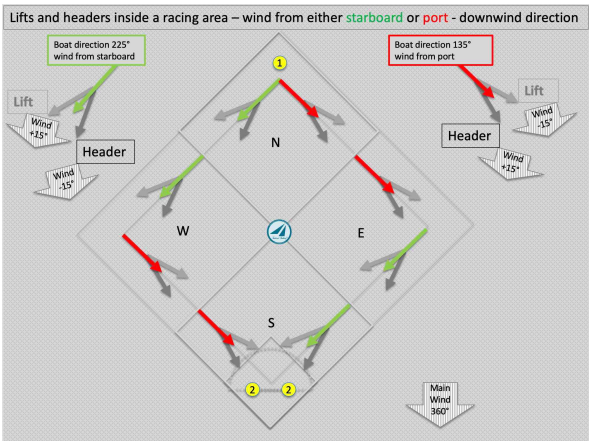
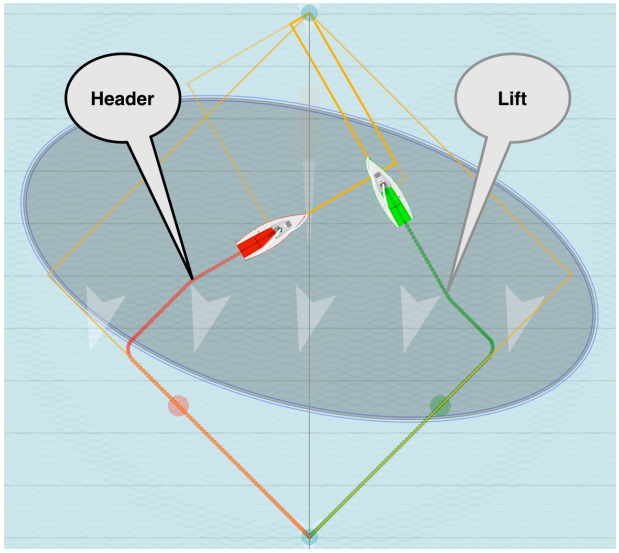


Fig. Downwind - Lifts and Headers

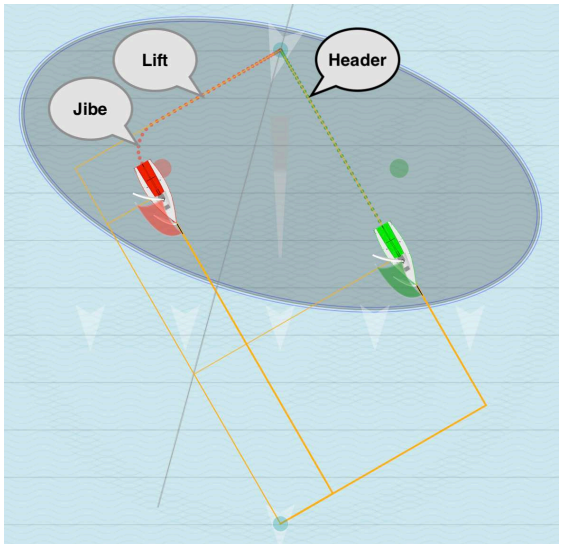
Tactical exercises with Lifts and Headers

The Coach's Toolbox contains exercises with "Lifts and Headers". In the menu "Experts" are scenes with a passing gust at up- and downwind as well as scenes with wind 4x3, i.e. 12 "wind regions" present. In each region, the wind direction can be changed manually so that you can simulate lifts and headers.

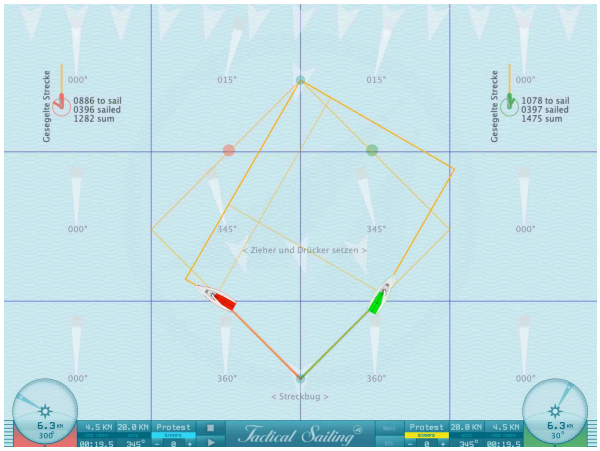
Detailed explanations and tactical advice on "lift and header as well as the so-called offside trap" are described at: Tilo Schnekenburger: The geometry of regatta sailing, page 110ff.



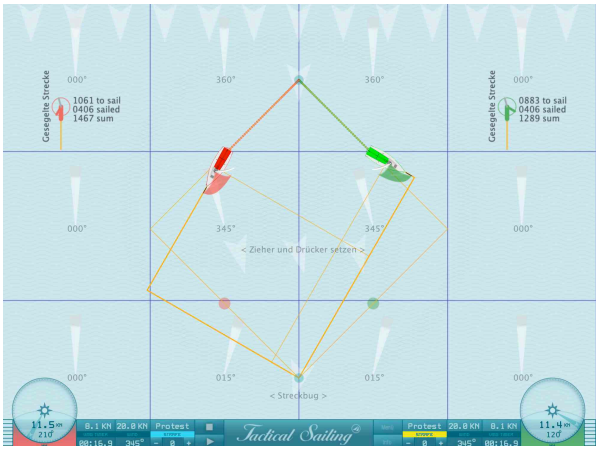
Header + Lift in a gust Upwind



Header + Lift + Jibe in a gust Downwind



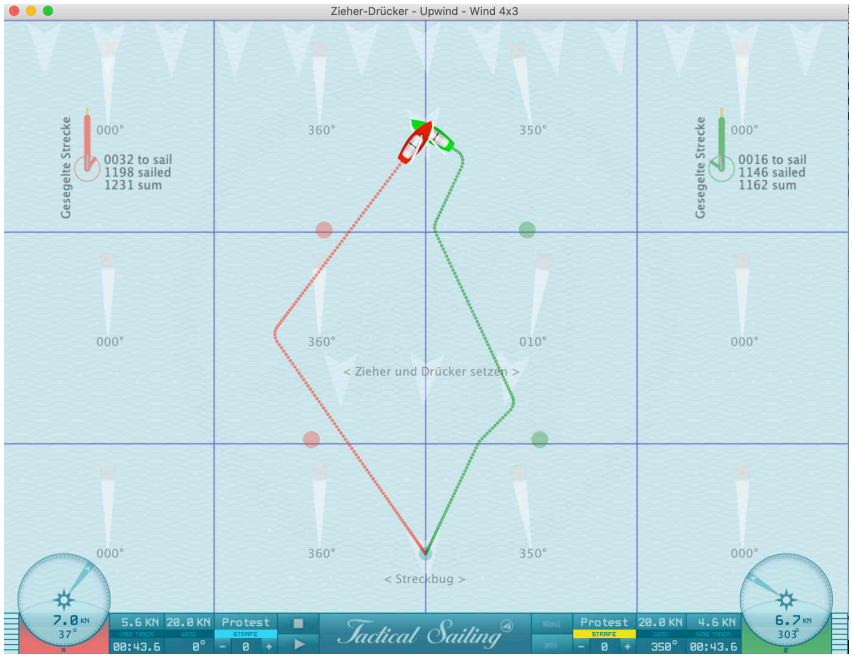
Header and lift in wind regions 4x3 to windward



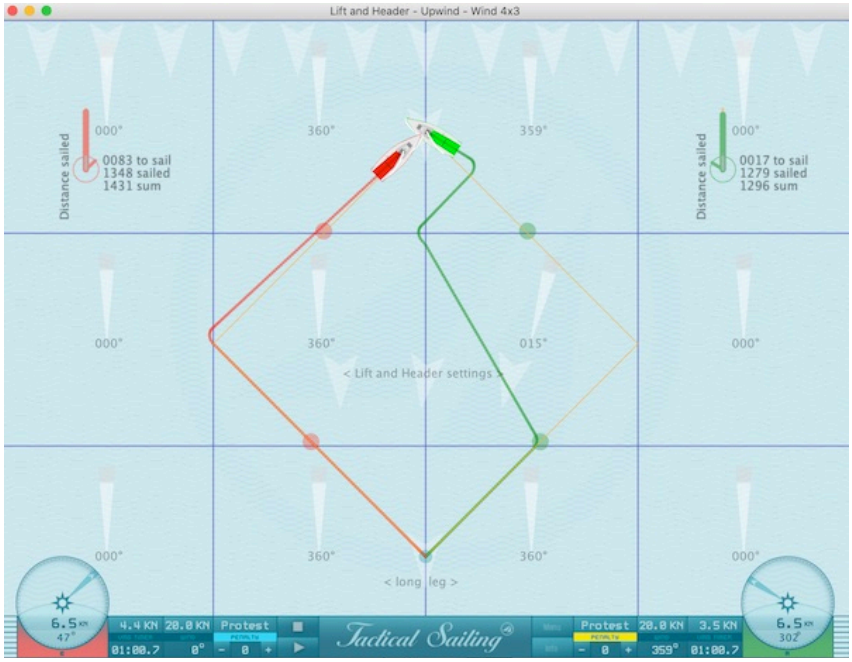
Header and lift in wind regions 4x3 to leeward

Rough rule of thumbs:

- At the windward course, "tack" when a header pushes you.
- At the downwind course "jibe" when a lift lets you pull up.



Practice session for comparing two courses with stable wind(red) and oscillating wind(green).
Scene in the menu for "Experts" with header and lift in wind regions 4x3 to windward:
- Oscillating wind 350° .... 010° .... 350° (+/- 20°) on the green boat
- Medium stable wind 360° on the red boat.
In comparison to the "sailed routes, the green boat has sailed through the "lifts" a shorter path (1162 pixels) than the red boat (1231 pixels).

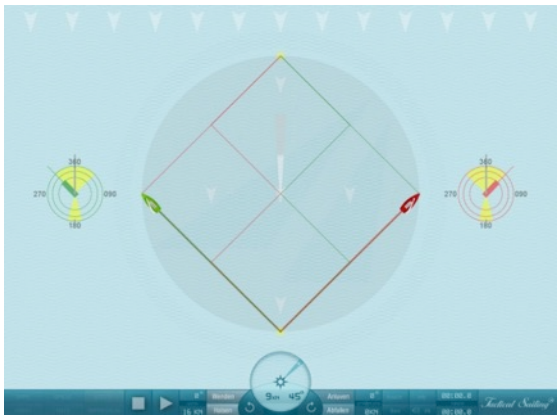


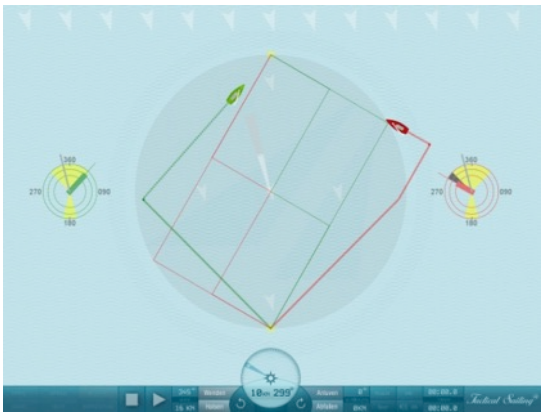
Example J/70, tacking angle 90°: In the comparison of the "Distance sailed", the green boat sailed a shorter route (1296 pixels) than the red boat (1431 pixels) through the "Header" with immediate tacking on the long leg.

5.15 Lay Lines

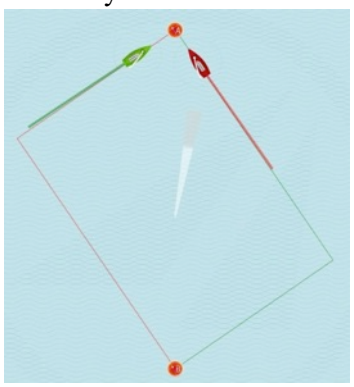
The rule: “avoid lay lines and corners” can be very clearly simulated with the help of the wind shifts in the Coach-Toolbox. In the following graphic the lay lines and tacking points in the corners (across from the buoys) are clearly visible. The boats begin and if the wind turns to the left, for example 350° shortly before the boats reach the lay line, the disadvantage for the boat that sailed on the “wrong side” (here the red boat) becomes very clear.

To operate: Start the boats, turn wind to the right (M key) or the left (N key), and observe which boat reaches the upwind marks first!

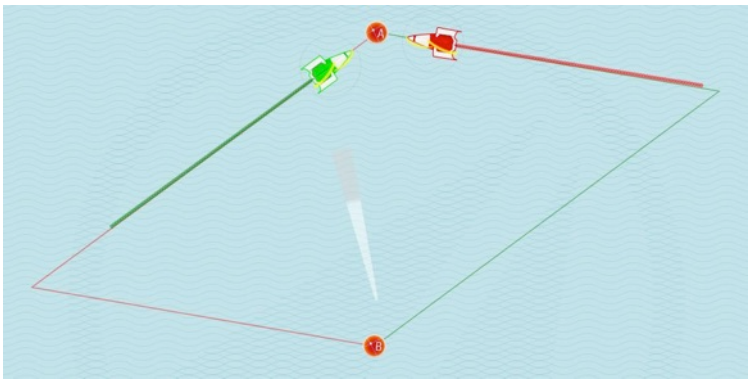




Avoid lay lines and corners



Dinghies and Yachts



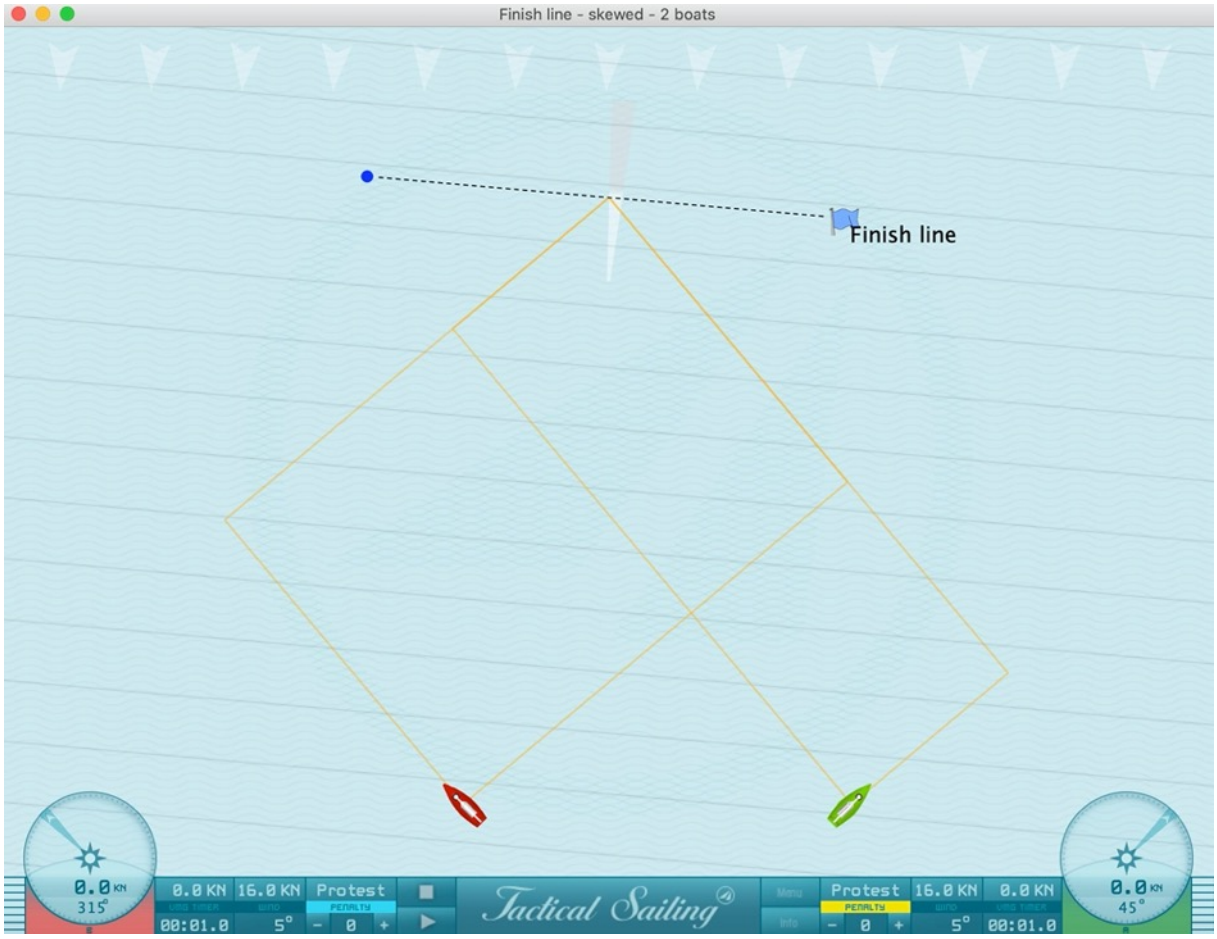
29s and 49s Skiffs

Note: The lay lines are placed directly in the middle of a buoy for teaching purposes. The actual tacking point is a calculated point (yellow mark) and usually next to the buoy to allow for proper rounding.

See also Tips: Avoid lay lines and corners

5.16 Finish line

Screwed course at finish line due to a wind shift of +10°.



6 Expert – Boat against Boat

6.1 Start to Finish – Training with 10 boats

There are four training boats and another six sparring partner boats available for exercises to create a realistic situation with several competing sailors. The most important regatta scenes at the starting line. You can steer the boats on a course or put them "in to a waiting position" at the starting line until the count down is zero. Further exercises at the buoys in windward and leeward, and the finish line will be offered as exercises to practice tactical manoeuvres.

Four training boats - without fixed goals - are steered manually by the keyboard with the X/V, 1/2, 8/9 and K/L* keys, as in the game.
* Note: The keys (←arrow→) are activated in all games with 2 boats, but they are replaced in all games with 4 boats by keys: K-L (from version 1.160.316 as of March 2016). Use keys "K and L" instead!

You can further assign each of the 6 sparring partner boats a sequence of 4 tactical goals it will steer to. They are shown as symbolic arrowheads, which act as intermediate goals.

- The so-called floating marks lie directly under the arrowheads (small crosses **X**,**X**,**X**,**X**),

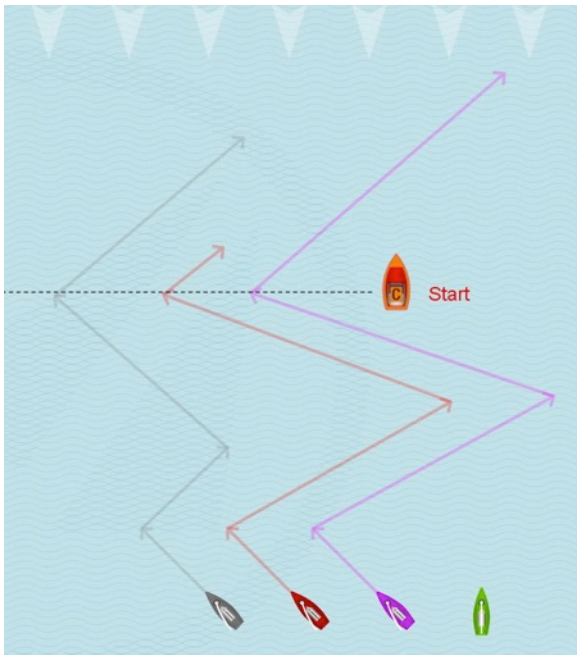
which serve as intermediate goals for the preparation of an individual scene. The crosses can be easily moved with the mouse (drag&drag). Four drifting buoys (arrowheads) lie ready in straight succession for each boat. You can pull the arrowheads in both length and direction. They can be set or shifted to the required position with the mouse (left click+drag&drop). You can set individual "intermediate goals" on the water for each boat. Each arrowhead (boat`s colour) heads directly to its respective boat.

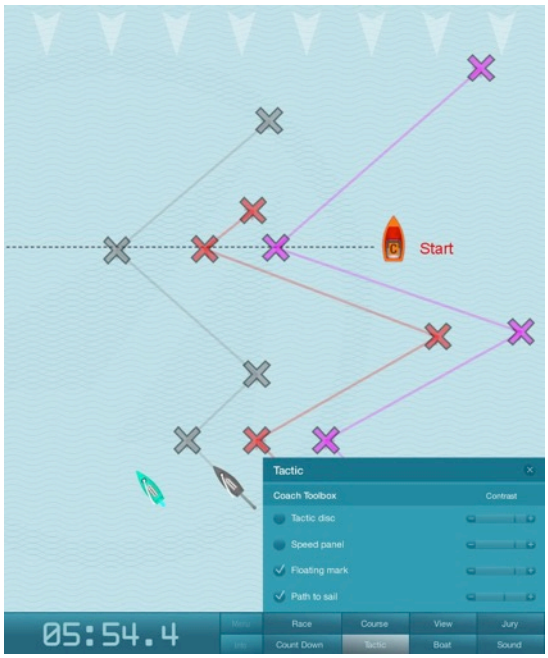
6.1.1 Starting Phase

The starting phase begins with the countdown, which can be set from 1-6 minutes. In Stop Mode you can roughly position each boat with its respective arrowheads, thereby fixing a path that corresponds to your tactical exercise. During Play Mode, you can shift arrowheads as required with drag&drop and carry out fine-tuning. You can also take advantage of the Countdown-Timer in order to lead multiple boats along the start line until start.

6.1.2 Prepare a starting situation

Caution: The wind plays a crucial role. If you lay the floating marks too "close to the wind," the boat will slow down. If you lay the floating marks head to wind, the boat will come to a stand still ("in irons"). The boat follows its polar diagram, which distinctly loses speed from 45° at close reach, but then accelerates, with the floating marks at broad reach.





In the "Tactics" Menu, the floating marks and arrowheads can be made visible or invisible by switching On/Off.

- The so-called floating marks lie directly under the arrowheads (small crosses **X**,**X**,**X**,**X**).

Example: You can move a boat's first arrowhead back and forth in front of its bow to bridge a longer time span during countdown, (e.g. to sail on the start line to start buoy). During the last minute before the start use arrowheads 2 to 4 to achieve the optimal position on the starting line at the start boat. Click "Pause" in order to create a new situation, use the countdown "Timer" then "Play" to head for the next intermediate goal.

In Menu “Tactics”, the floating marks and arrowheads can be made visible or invisible by switching On/Off. Four training boats - without fixed goals - are steered manually by the X/V, 1/2, 8/9 and K/L keys, as in the game. You can steer the boats on a course or put them “in to a waiting position” at the starting line until the count down is zero.

6.1.3 Beating to windward marks

Typical scenes at the windward mark can be shown with up to 10 boats. The program provides basic settings for fleet and match races, which can be adjusted and modified by the coach. (See section: “Floating Marks”)

- The so-called floating marks lie directly under the arrowheads (small crosses **X**,**X**,**X**,**X**).

With these functions, it is easier to illustrate and discuss many tactical scenes that are otherwise difficult to explain. As well as the basic ground rules, it can perfectly simulate a variety of further, more difficult manoeuvres and their consequences.

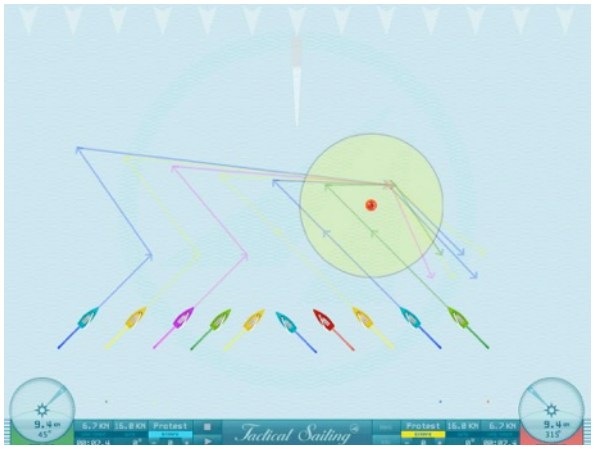
Example: Shift the windward mark to the right or left, as well as above or below. This will also change steering to the lay line. As a result, diverse tactical manoeuvres will arise.

Fleet Race with 10 boats

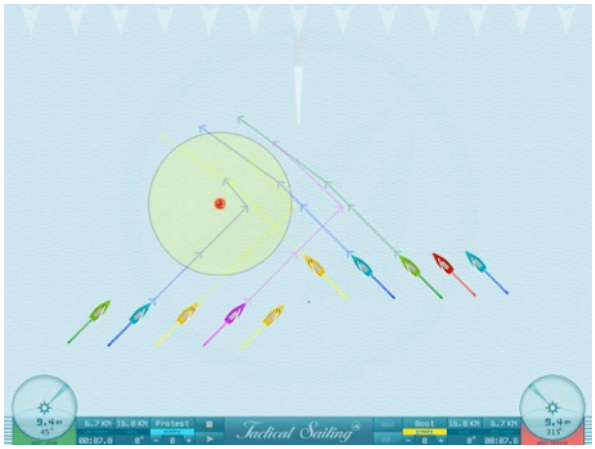
In the Menu “Options/View” the radius of the zone for its respective boat class is adjusted.
In the Menu “Options/Boat” the sailed path and the overlapping lines as well as their lengths can be switched On/Off.

6.1.4 Lay Lines on windward marks

This Toolbox provides coaches with optimal explanations for not only simple rules such as “Wind from Starboard” but also offers complicated situations at the windward buoy with multiple boats. A selection of scenarios is available under “Tips Tactic” in the Main Menu.



Match race with 10 boats



Fleet race with 10 boats

The lay lines of the boats change when the buoys are shifted. By using drag&drop multiple tactical manoeuvring situations arise before the boats can reach their intermediate goals. This is dependent on whether or not the boats’ lay lines are reached. These scenes are prepared for Fleet and Match Race and round the buoy accordingly from either starboard or port.

6.1.5 Leeward marks - the Gate

As before, typical scenes at the gate can also be displayed with 10 boats. The program supplies basic settings, which can be adjusted and modified to coach´s requirements (see Section: “Floating Marks”).

- The so-called floating marks lie directly under the arrowheads (small crosses **X**,**X**,**X**,**X**).

With these functions, it is easier to show and discuss many tactical scenes that are otherwise difficult to illustrate. Beyond the basic rules, it can perfectly simulate a variety of sequences showing more difficult manoeuvres.

Example: Shift the gate marks above or below, as well as to the right or left. Now steering towards the lay line is also different. Various right of way situations arise in this case. The location and length of the line can also be modified with “Right click + drag&drop.”

Zones and Giving Mark Room, 10 boats are competing

In Menu “Options/View” the radius of the zone for its respective boat class is adjusted.
In Menu “Options/Boat” the sailed path and the overlapping line as well as their lengths can be switched On/Off.

6.1.6 Tactical Manoeuvres with/without overlapping

This Toolbox gives umpires and coaches the possibility to explain complicated situations and rules at buoys with several boats. A selection of scenarios is available under “Expert” in the Main Menu. The options to make zones, overlap lines and the sailed path visible is recommended.

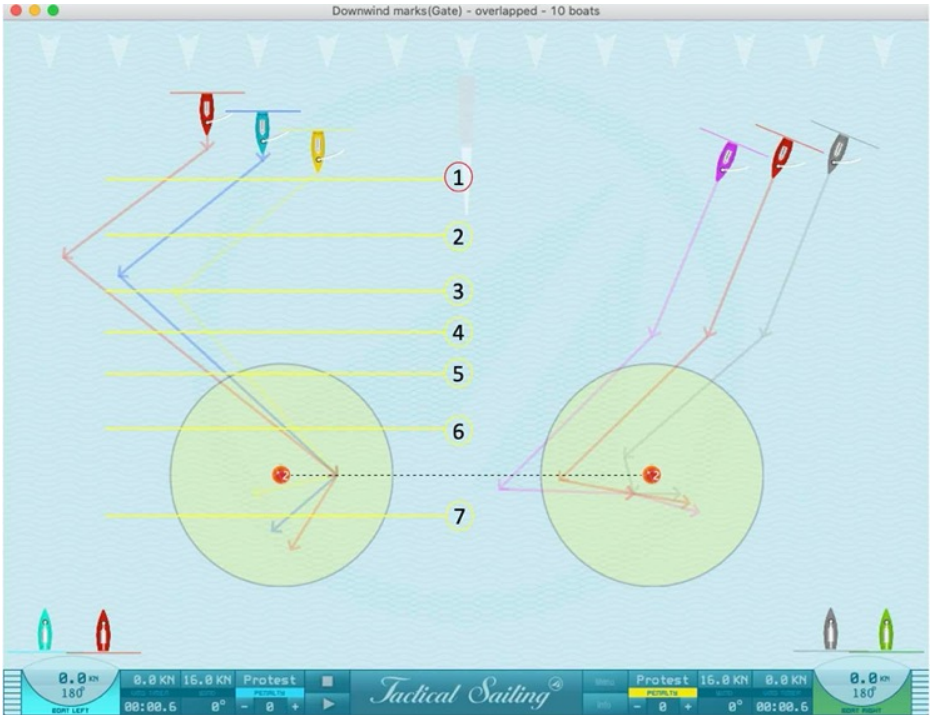
6.1.7 Zone and Overlap

Not only the ground rules, but even more complicated manoeuvres and their decisive consequences can be perfectly “simulated”.
Example: Overlapping or not overlapping
The simulation from the view of an experienced umpire*: Luffing up in good time, followed by the boat with right of way tightly bearing away, is a good manoeuvrer for tackling the overlap before entering the zone. See the yellow boat’s sailing path to the left buoy on the simulation!

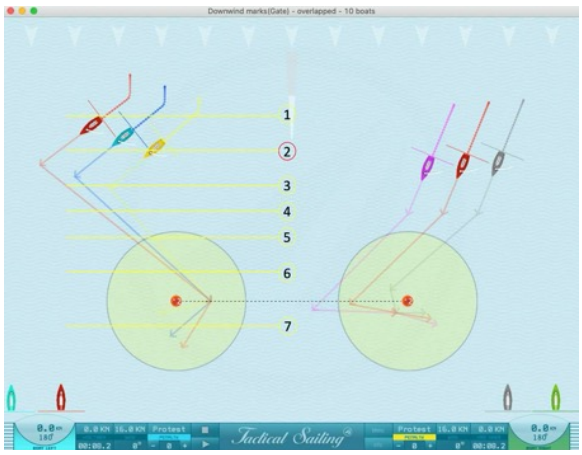
Comments regarding the applicable rules** at positions 1-7:

1. Rule 11: First rule 11 applies, boats on the same tack - **and** overlaped - a *windward* boat shall *keep clear* of a *leeward* boat.
2. Rule 16.1: Yellow must still observe the Rule 16.1 that when luffing up and leave room clear.
3. One can jibe at will when yellow is sailing away from the other boats.
4. Rule 12 states that after the other boat’s jibe, yellow is clearly ahead on the same tack and **not** overlapped - has again right of way. All boats *clear astern* shall *keep clear* of a boat *clear ahead*.
5. Rule 18.2(b) states that when entering the zone, yellow is clearly in the lead, and therefore gets mark room.
6. Rule 18.2(c) states that when a boat is required to give *mark-room* by rule 18.2(b),
   (1) she shall continue to do so even if later an *overlap* is broken or a new *overlap* begins;
   (2) if she becomes *overlapped* inside the boat entitled to *mark- room*, she shall also give that boat *room* to sail her *proper course* while they remain *overlapped*.
7. Rule 10 states yellow can jibe at will and has the right of way with wind from opposite tack.

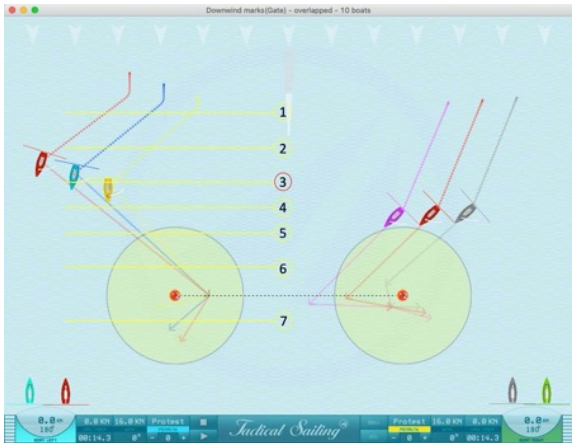
* Hannes Diefenbach, World Sailing Umpire in an interview with “Tactical Sailing”
** World Sailing Rule book 2021 - 2024.



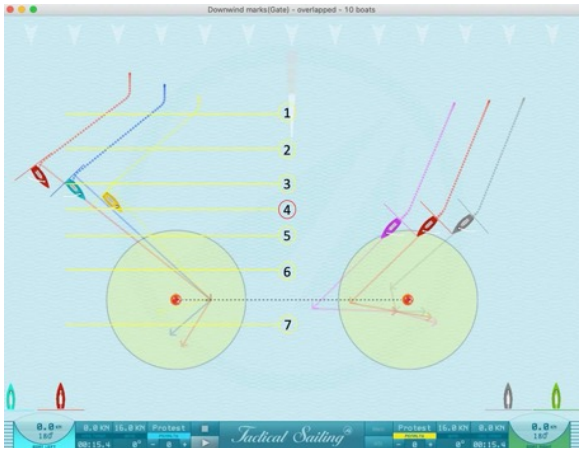
Position 1: Rule 11



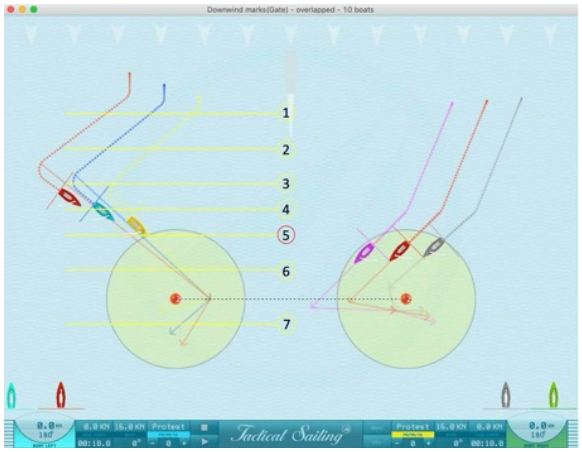
Position 2: Rule 16.1



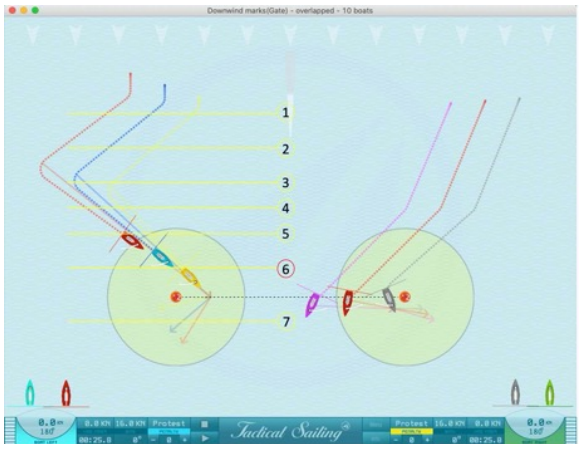
Position 3: Jibe



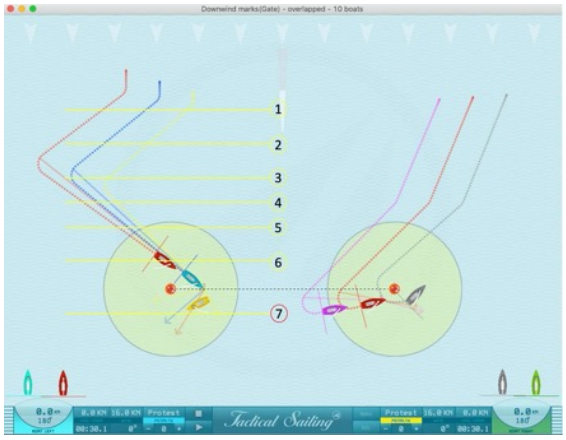
Position 4: Rule 12



Position 5: Rule 18.2(b)



Position 6: Rule 18.2 (c)*



Position 7: Rule 10

* Rule 18.2(c) states that when a boat is required to give *mark-room* by rule 18.2(b),
(1) she shall continue to do so even if later an *overlap* is broken or a new *overlap* begins;
(2) if she becomes *overlapped* inside the boat entitled to *mark- room*, she shall also give that boat *room* to sail her *proper course* while they remain *overlapped*.

6.1.8 Finish line

The finish line can be moved into position, in favour of the preferred side at the committee boat, or finish buoy. Situations at the finish line can be changed as follows: wind direction, course of sparring partner boats and the four training boats are steered manually. The program supplies basic settings, which can be adjusted and modified to coach´s requirements (see Section: “Floating Marks”).

- The so-called floating marks lie directly under the arrowheads (small crosses **X**,**X**,**X**,**X**).

With these functions, it is easier to show and discuss many tactical scenes that are otherwise difficult to illustrate. Beyond the basic rules, it can perfectly simulate a variety of sequences showing more difficult manoeuvres.

10 boats are crossing at finish line

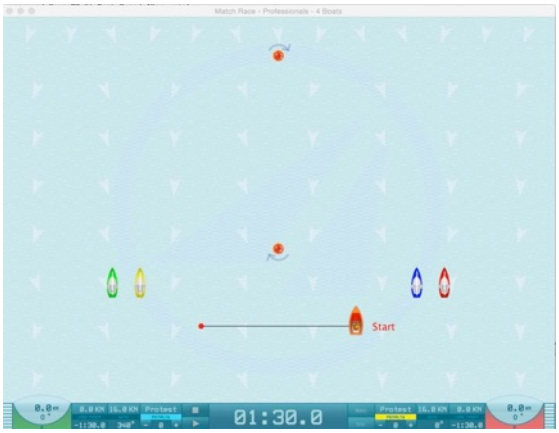
6.2 Fleet-, Match-, Team Race, League, Championships and Cups

6.2.1 Fleet Race

For the fleet race several scenes were developed with different wind conditions. The windward buoy is to be rounded on the portside - a gate lies on the leeward side of the starting line. The starting phase begins with the countdown, which can be set from 1-6 minutes. The finish line is located at the head of the starting ship and is to be crossed upwind. You can choose each class and colour of boat - from Optimist, Laser, 470er, 49er all the way to yacht TP 52.

6.2.2 Match Race

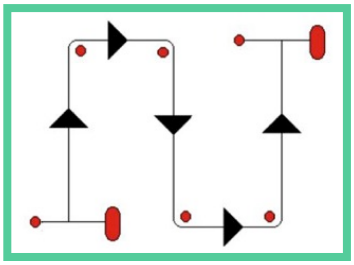
For the match races several scenes are prepared for different wind conditions. The buoys lie beyond the start line, and are to be rounded on starboard. The starting phase begins with the countdown, which can be set from 1-6 minutes. The race begins on entering the “Start Box,” which is located beneath the starting line. The finish line is located on the start boat and is to be crossed downwind.



You can choose each class of boat and colour - from Optimist, Laser, 470er, 49er, all the way to yacht TP 52. (For match races, “blue and yellow” are the most appropriate colours.)

6.2.3 Team Race

Team race scenes are available in two course tomatoes: Q-format and S-format and in two difficulty levels, which can be chosen by the wind 1x1 or 4x4.
- for beginners (Q-format, wind 1x1),
- Advanced (S-form, wind 1x1) and
- Professional (S-form, wind 4x4).



Team Race is developed for four boats - Two against Two. The buoys are to be rounded on either starboard or port. The sequence corresponds to the course "S" form, which is used at world and national championships: Start-1-2-3-4-Finish Line. The wind conditions are "Wind 1x1" for beginners and "Wind 4x4" advanced. The starting procedure begins with the countdown; the time can vary between 1 and 6 minutes. You can select from one of the boat classes Optimist, Laser, 470er, 49er to Maxi-Yacht TP-52. Team A chooses a boat colour (1,2), and Team B chooses a boat colour (3,4).

The boats can be controlled by the keyboard* and/or by a programmable game-pad:
Team A right boat-1: (K-L)keys; Team A right boat-2: keys (8-9),
Team B left boat-3: keys (X-V); Team B left boat-4: keys (Q-A),
* depending on the layout of your keyboard, you can choose different keys on the left and right sides of the keyboard. Further instructions are explained in the "Info Window."

Beginners: Q-Form, Wind 1x1

Advanced (S-Form, Wind 1x1)

Professionals (S-Form, Wind 4x4)

"Tactical Sailing" developed the Team Race because, not only "it's fun," but increases the "learning effect" even if only small teams, such as "Two against Two" play. Chris Atkins, Chief Umpire IODA Team Racing European Ledro 2008 and supporter of "Tactical Sailing" gave us his five reasons for playing "Tactical Sailing":

- It's fun! Lots of short, exciting races, and it's fun to be part of a team rather than always sailing as an individual.
- It's exciting! The winning team is the winner of the final race, and the winner of the final race is usually decided up the final beat.
- You have a better chance of winning! In any team race there is one winner and one loser – therefore you can win half the races.
- It is the best way of learning! Lots of starts, close tacking, jibing, overtaking and being overtaken. Being able to handle your boat, and knowing the rules makes you a better sailor.
- It encourages teamwork! When you make a mistake your Team partner will help you put it right.

Published in the **IODA Yearbook 2008**.

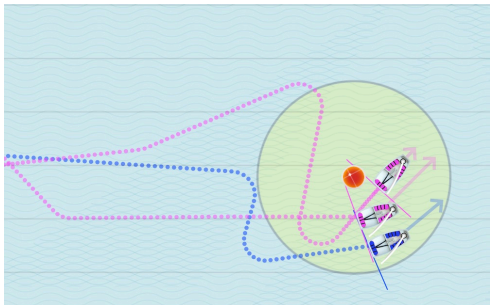
Team Race Taktik
Tricky tactical tips for your team, such as attacking, hindering, giving 'space' or forcing 'space'. Also at Tactical Sailing, we offer the formats of Team Racing - 2 vs. 2 or 3 vs. 3 boats - a lot of communication, excitement, and lots of suspense, because "...everything is open until the end", says Mathias Rebholz (International Judge).

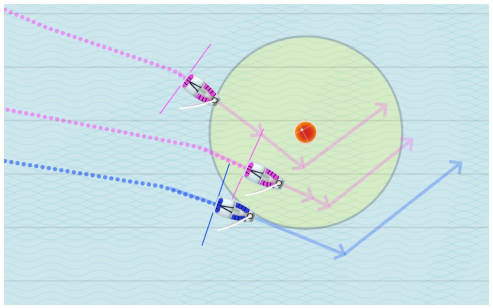
Exercise examples:
Watch the sailed paths in the exercises and learn the maneuvers of the teams while watching them, see video clips in the program in the menu:

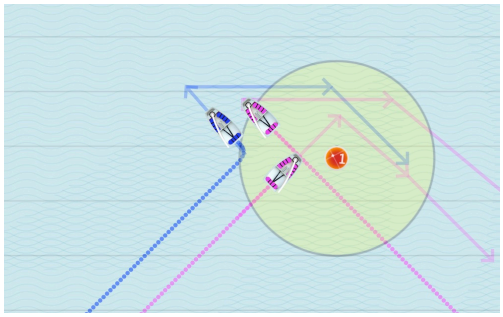
- Coach's Toolbox / TIPS TACTIC / Tactic ‚Team Race'

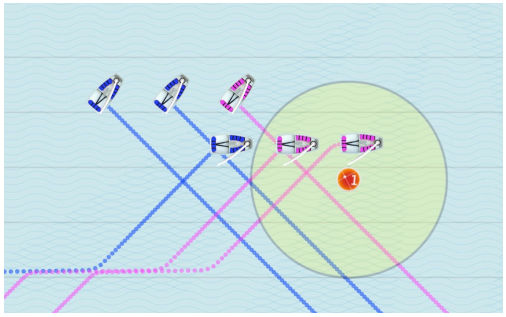
oder bei „you Tube": https://www.youtube.com/user/TacticalSailing/playlists .

"Attack and obstruct." Tactics at the leeward mark. The leading boat attacks, obstructs an opposing boat, forces the right of way in favor of the team boat.
"Make room." Tactics at the leeward lane mark. The goal: 'Make room' for the team boat! Leading boat defends its position, no overlap, no inside position.
"Forcing room." Tactics at the upwind layline to the windward lane mark: use your right of way and force room for your team!
"Attack 3 on 3". Tactics at the starboard windward mark. Team Race tactics exercise to the windward lane mark, 3 vs. 3 boats. Team Pink' vs. Team Blue'.


Attack and obstruct


Make room


Forcing room


Attack 3 on 3

6.2.4 Sailing Champions League Format

Together with Joachim Hellmich from the "Heinz Nixdorf Verein Academy" www.hnv.de/die-hnv-academy . We have developed various Regatta situations especially for "League Sailing". This simulation, with different levels of difficulty for tactical training, was developed in preparation for Club Championships. As in a real regatta the "Up and Down" courses are sailed with a One Design J/70. The "Tactical Sailing-Model" of the virtual J/70 was developed on the basis of a polar diagram of a J/70, thus making it identical to a real J/70. Regattas can be sailed with 2 or 4 boats (Modus: "Boat against Boat"). A sparring partner is steered by the PC's "Autopilot", for comparison with the course of the sailor's own boat (Modus: "Game Against the Wind"). The wind has a format of "1x1" and "4x4", but can be individually adjusted to specific sailing conditions for training purposes. In compliance with the "Sailing League Rules"*, a sailing time limit of 15-20 minutes has been set. The "Tactical Sailing Simulator" has developed a complete race, covering various laps, in keeping with this time limit.

With constant changing wind conditions, through a random generator, each race sets new demands on the sailor right at the starting line.

These so-called "15 Minute Flights" are very challenging, and necessitate full concentration and a high tactical skill. The training accomplishment of a sailor in the J/70 can be recorded with a "Tracking Line System" for later analysis and assessment. For example: the course that was chosen, active, maximal and average boat speed. Also the number of tacks and jibes required. In the Menu: "Boat" all these options can be displayed and selected.

* see for more details: http://sailing-championsleague.com

League Format with ‘Tracking Line System’

League Format “Boat Against Boat’

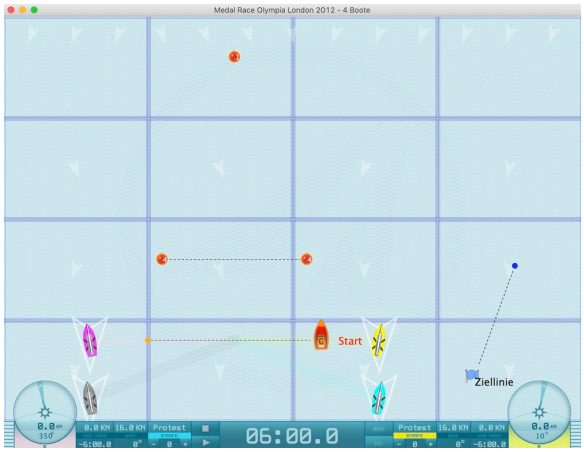
6.2.5 Sailing areas – Championships and Cups

We have provided the experiences of regatta sailors on special areas at championships and cups in the following exercises:

- Hamburg Outer Alster - First and Gold Fleet
- London to Rio 2016 - Medal Race Olympics London 2012 - Belcher&Ryan
- Auckland Cup - Gusts
- Lake Constance Cup – Wind fields - Races in Lindau, Ueberlingen and Constance

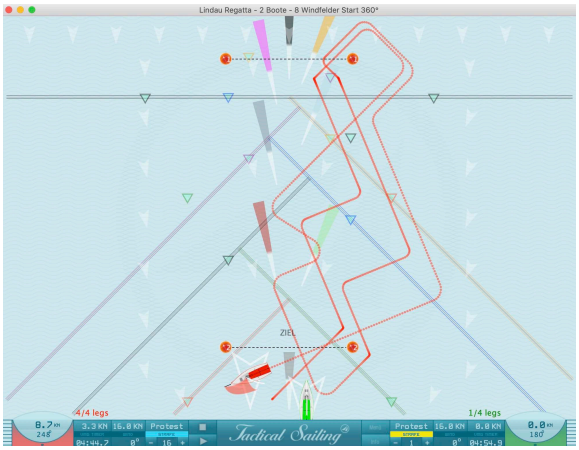
The scenes are stored in the "Expert" section:

Hamburg Outer Alster Gold Fleet

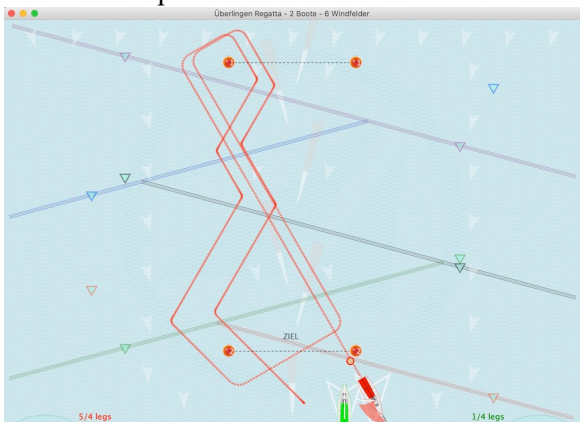


London – Olympics 2012

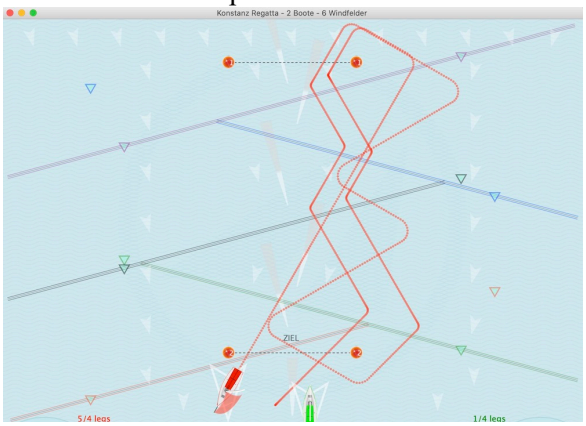
Auckland Cup - Wind 4x3



Lake Constance Cup – Lindau race 8 Wind fields



Exercise examples: Sailed route Ueberlingen



Sailed route Lake Constance

7 Strategy and Tactic

The strategy and tactic for a successful race with many competitor boats is focused on 4 themes:

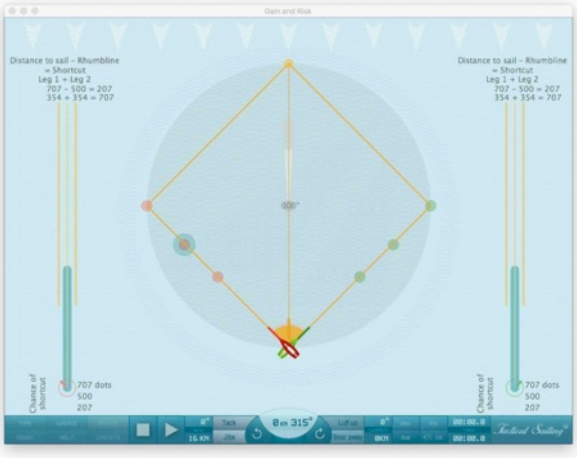
- Speed optimization
- good start, perfect timing, on time at starting line
- long leg identified
- right of way to steer to!

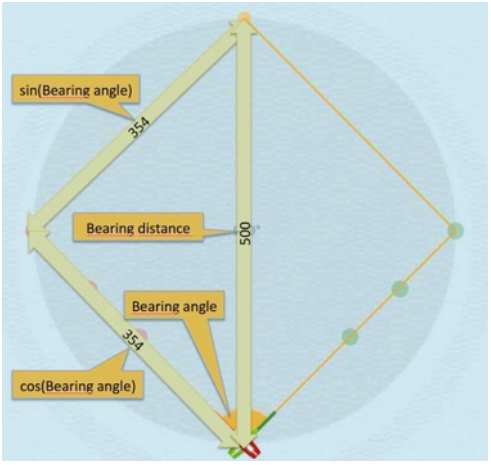
7.1 Decision-making tools

The decision-making tools are geometrical drawings, e.g. marks, lines and areas on the regatta field. With their help, we can simulate and clearly distinguish the situations of "Reward and Risk" for training purposes. The graphics are complemented by calculated facts.

7.2 Geometry of Regatta Field

"Dynamic geometry environments are computer programs which allow one to create and then manipulate geometric constructions, primarily in plane geometry*", which are used in Tactical Sailing simulations. The base of a regatta field is the **circle**. A boat can reach each point on this circular area. The diameter of the circle is the imaginary line from a downwind- to windward mark. This is in the initial situation - also known as the line of bearing (bearing line, rhumb line or "as a crow flies") - at the leeward mark.
Through wind, in particular its direction and change of direction, the trigonometric functions, e.g. geometrical law of Pythagoras come into play - the isosceles **triangle**. For boats with tacking angle of 90°, the lay lines are the sides of the triangle, the adjacent side and the opposite side. The bearing line from the boat to the windward mark is the hypotenuse. The sine and cosine sets use the bearing angle between the flanks of the triangle.
* Source: Wikipedia: https://en.wikipedia.org/wiki/List_of_interactive_geometry_software

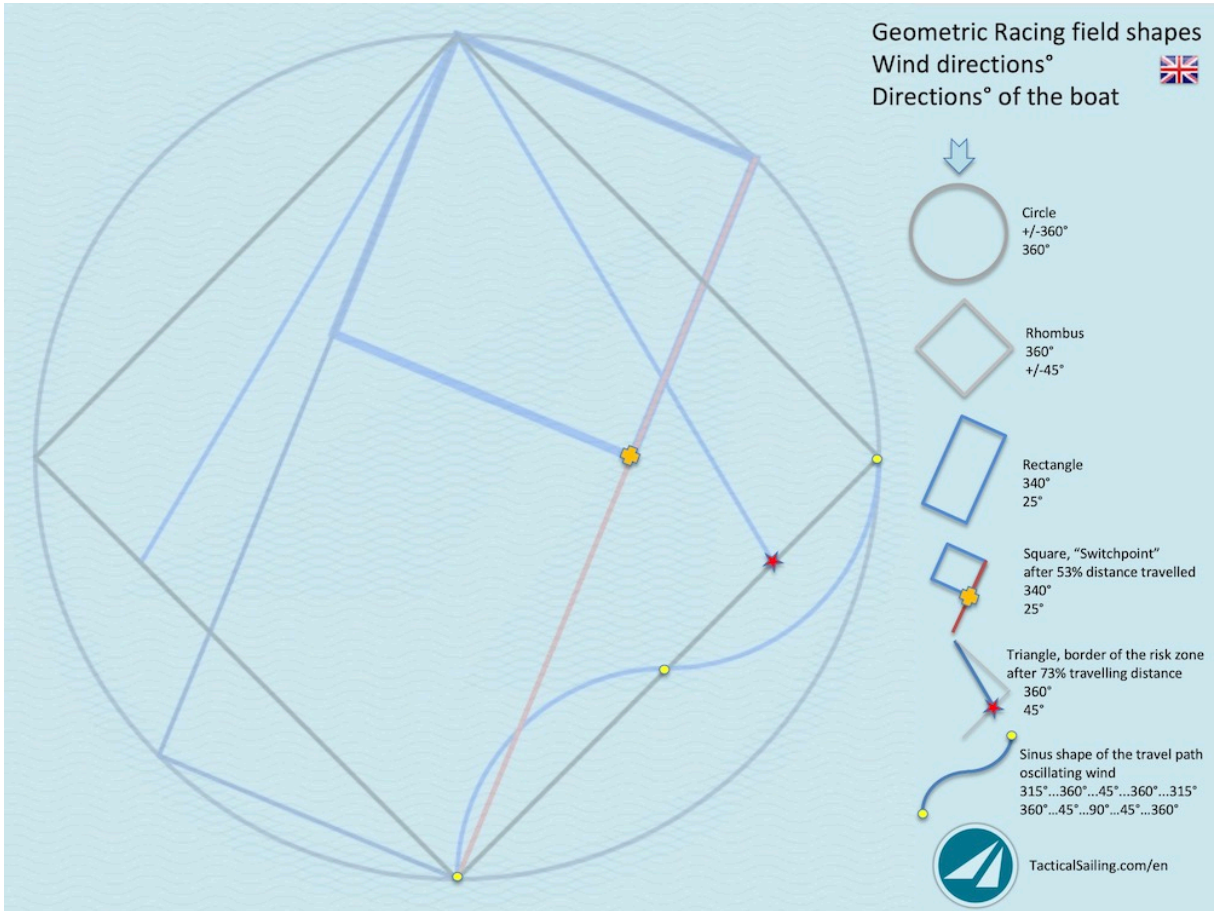




7.2.1 Shapes

Geometric shapes and figures, such as points, lines, and areas, additionally help us to make the right strategic/tactical decisions on the regatta course.
"Looking at the geometry of a course makes sense, because various changes in external conditions can be clearly visualized and understood."
© Tilo Schnekenburger: "The geometry of regatta sailing", chapters 3, 4 and 5.5 The playing field.

In the Tactical Sailing program, various geometric shapes are shown under the following conditions:
- the boundary of the racing field by two buoys,
- The influence of wind direction and wind shifts,
- the definition of a specific tacking/jibing angle of a boat.
(We use a J/70 with a 90° turning/neck angle to create comparable conditions for visualizing the geometric figures using a concrete example).



In the Tactical Sailing program, 6 basic geometric shapes can be displayed on the regatta field: Circle, rhombus, rectangle, square, triangle, sine line.

Circle:
The simplest geometric shape on a regatta course is the circle.
When laying out a regatta course, the windward and leeward buoys form the so-called course axis. The **course axis** also represents the **diameter** of the circle. The wind direction is orientated at 360°. A boat can reach any point on the circle, and it makes it possible to observe the entire regatta field: in the start area and in the finish area, on the left or right side of the course.

Rhombus:
When sailing against the wind with a wind direction of 360°, a new inner shape is formed within the circle: the rhombus. After the start, the sailor steers his course according to the direction of travel +/-45° at an optimum speed to windward. He steers the course - the "**height to windward**" - to the "layline" and then makes a "leeward tack" onto the course to the windward buoy.

Rectangle:
When the wind direction changes from 360° to 340°, the sailor must also change his course - a course that takes the boat closer to the windward mark. The diamond now becomes a new geometric figure: a rectangle. In this example, the sailor can steer the boat in a wind direction of 340° at an optimum speed to windward - the so-called "**reaching bow (Streckbug**)".

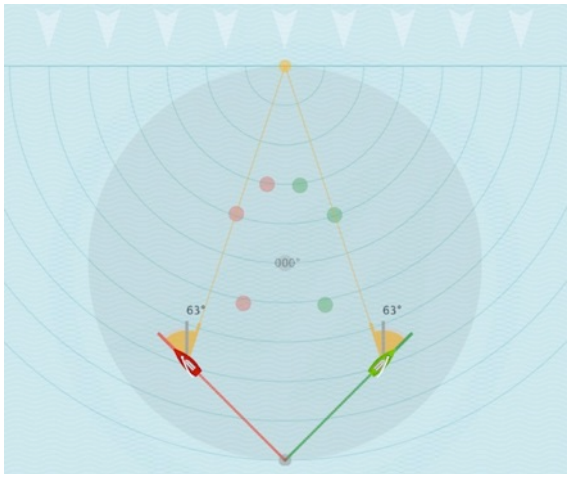
Square:
At the so-called "switch point" - the point at which the line of the "wind axis (340°)" and the line of the "course axis (25°)" of the boat intersect - a new distinctive shape is formed: the square. The "**switch point**" is an opportunity for the sailor to decide to change direction: he changes ("switches") his course from 25° by tacking to a course of 325° in the direction of travel towards the center of the field.

Triangle:
On the windward leg towards the "layline", a new figure is created from the previously sailed geometric figure of the diamond: a triangle that defines the boundary line to the "**risk zone**". Up to this boundary line, the sailor steers in the so-called "safe diamond"; it protects against getting "**offside**" when the wind shifts. The shape of a triangle is limited by the legs to the tacking point at the layline and from there to the windward buoy.

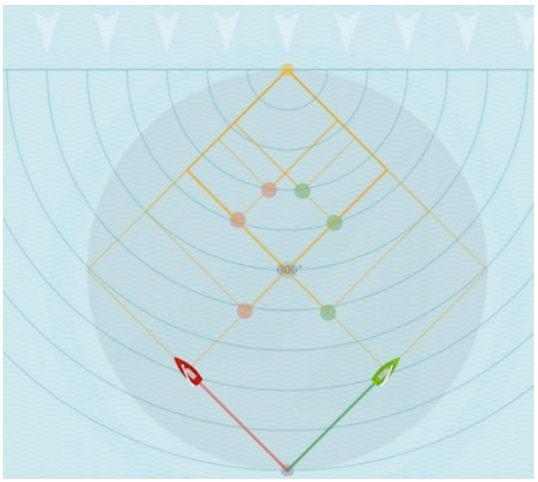
Sinusoidal line:
The assumption of a rhythmic change in wind direction in sinusoidal form can only be seen theoretically. A "straight" geometric boundary line then becomes a "curved" geometric boundary line, as with the rhombus. With **oscillating wind direction** changes, the sailor can adapt the course and direction of travel to the course of a "sine curve" and thus optimize his speed. Example:
Windrichtungen: **315**°...360°...45°...360°...315°
Fahrtrichtungen: **360**°…45°…**90**°…45°…**360**°
Starting from the wind direction 315°, the boat initially follows the direction of travel 360° and then falls further and further to the right in the direction of 45° and 90°. Then the wind direction begins to turn back to the left - and with it the direction of travel - at the same rhythm to 45° and 360°.

7.2.2 Concentric Circles

Ten additional concentric circles of equal distance from downwind to upwind mark can be switched on/off. These concentric circles can lead to interesting discussions about tactical tacking points. The idea of concentric circles was invented by © Tilo Schnekenburger, Youth Seminar "Didactics and methodology of sailing with a focus tactics" (November 2015)*.



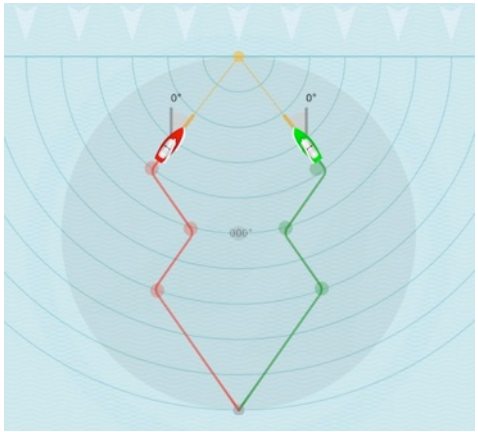
Boat “Laser”: tacking angle 90°



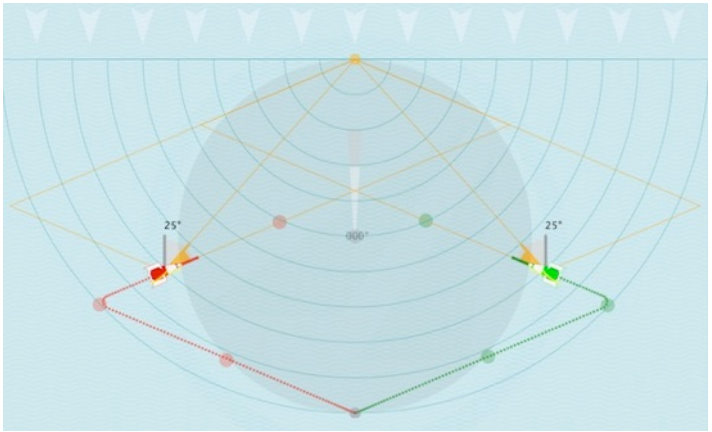
Tactical tacking points at the concentric circles

The distance and time a boat must sail towards upwind mark depend on her tacking angle, e.g. a Laser 90°, Kielzugvogel 70°, and Skiff 49er 134°, see sailed path.
The number of concentric circles (“rings”) she climbs up towards upwind mark differs on her tacking angle. Therefore, two different boats will not climb the same number of rings for the same duration of sailing time. Unless one of the boats is much faster, and climbs the same number of rings in the same time, like e.g. a Skiff 49er compared to a Laser.

A dinghy “Laser” (90°) climbs up 2 rings, her sailing path looks like a square,
the dinghy “Kielzugvogel” (70°) climbs up 3 rings, her sailing path looks like a very narrow diamond and Skiff 49er (134°) climbs up 1 ring only, then she is leaving the first ring again (!), she sails further away from upwind mark, until she tacks towards the middle of the field. Her sailed path looks like a very flat diamond.



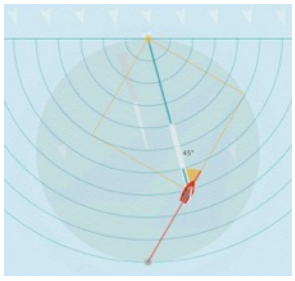
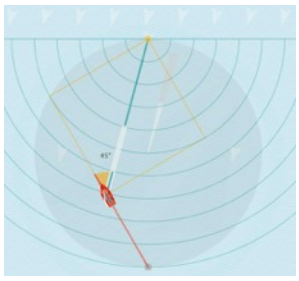
Boat “Kielzugvogel”: tacking angle 70°

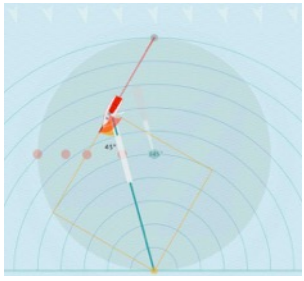


Boat “Skiff 49er”: tacking angle 134°

The examples show the sailed path at constant wind from the direction of 360 °. Under the influence of wind shifts other tactical tacking points and other distances result (see Option. Wind ladder rotating).

For an assessment of risk and reward, an "extension" or "shortcut" of the path to sail is also considered on the downwind course, but the max. "Speed" and "shortest route" have to be optimized.

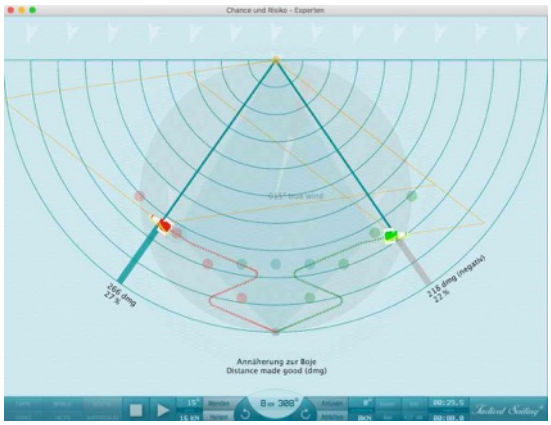


Switch point 45° upwind on starboard or port tack


Switch point 45° downwind

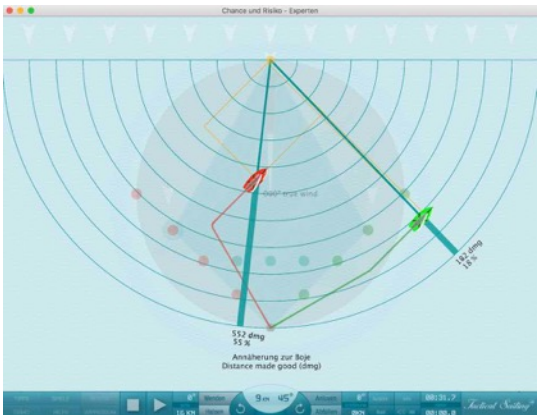
See detailed explanations and tactical advice on:
* Source: © Tilo Schnekenburger: Die Geometrie des Regattasegelns, (in German language).

7.2.3 Distance Made Good (DMG)

The option: Distance Made Good is an approach to the mark – upwind or downwind - shows the absolute, already achieved approach to a target mark. The positive approach is shown in a "turquoise" line, a negative approximation (distance) in a "grey" line, see example 49er on starboard or port. By means of the concentric circle rings and the numerical length specification (DMG) approximation or distance can be observed. In the case of wind rotation, the tactical position of two boats can be assessed with regard to the target track, see example of the 470s with 55% and 18% approach, respectively.
See detailed explanations and tactical advice on "Distance Made Good" on:
© Tilo Schnekenburger: Die Geometrie des Regattasegelns, (in German language), chap. 5.2.



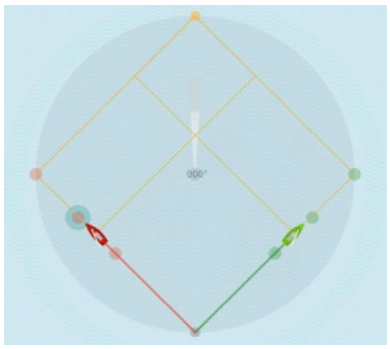
The red 49er getting closer, the green sails away



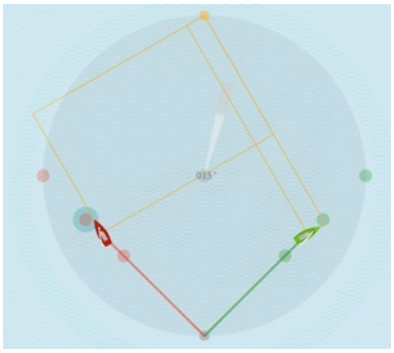
Red 470er with DMG 55%, Green with DMG 18%

7.2.4 Path to sail to upwind mark

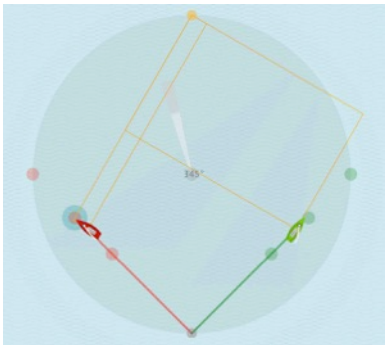
The distances to the upwind mark are dynamically drawn in each position of the boat in the direction of starboard and port. When changing the wind direction, new adapted path distances are automatically obtained, here in the example at 15 ° and 345 °, respectively.



Wind direction 360°



Wind direction 15°

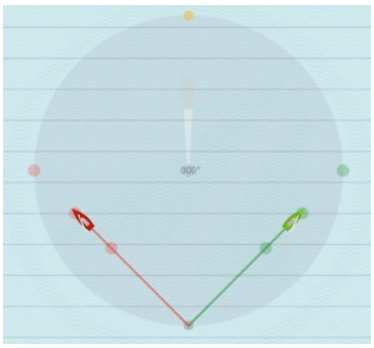


Wind direction 345°

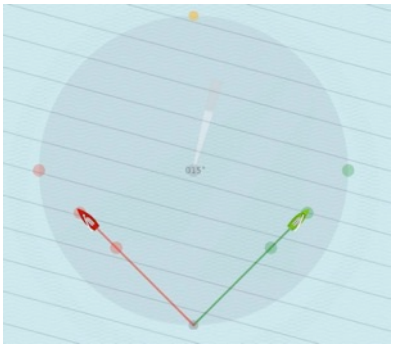
The distances are described in the literature with different terms, eg:
The path from the leeway mark to the tacking point (cos(bearing angle)) is referred to as "leeward line", "Leeline", "Downwind Layline", "Lazyline". We use the term "leeward line".
The path from the tacking point to the Upwind mark (sin(bearing angle)) is called "Layline", "Upwind Layline". We use the term "Layline".
The shortest connecting line from the boat to the upwind mark is called the "Bearing line", "Rhumb line", "line a bird can fly". We use the designation "Bearing line" or -distance.

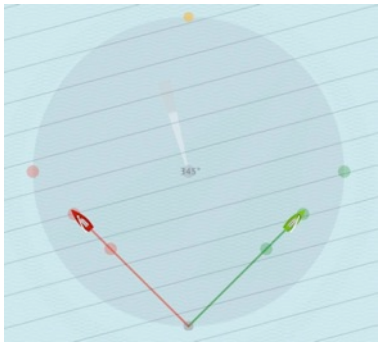
7.2.5 Wind ladder rotating

The wind ladder shows lines (grey) perpendicular to the wind direction. It symbolizes the steps of a ladder towards the windward mark, which have already reached a boat or not reached. The lines are rotating in the direction of the wind shift. In the following examples, the green or red boat has reached a higher rung on the ladder as the other boat, because the wind shifted around +/- 15 °.



Boats on the same level





Wind ladder with boats at various levels (15°, 345°)

7.3 Where should I tack?

There are the following important "decision-making points" on the way to the lay line in terms of risk:

a) Halfway to the layline (50%, 63 °). At this point you can decide whether you are heading towards the centre with increasing risk in the direction of the line or with a tack towards the centre. At this point, geometrically equal rectangles are obtained, so that the distance to be sailed is of the same length in both cases. In the middle, you can decide again, because geometrically equal rectangles are again produced.

b) On the "Safety Diamond" at three quarters of the distance to the lay line (75%, 75 °). At this point, you must decide whether you are really heading towards the lay line with the highest risk - or better with a tack towards the centre. It is advisable not to sail above this point, because with a wind shift of +/- 15 ° (345 °), the chances of a maximum shortcut or the increased risk of an extension of the lay line to the upwind mark are obtained at this point!

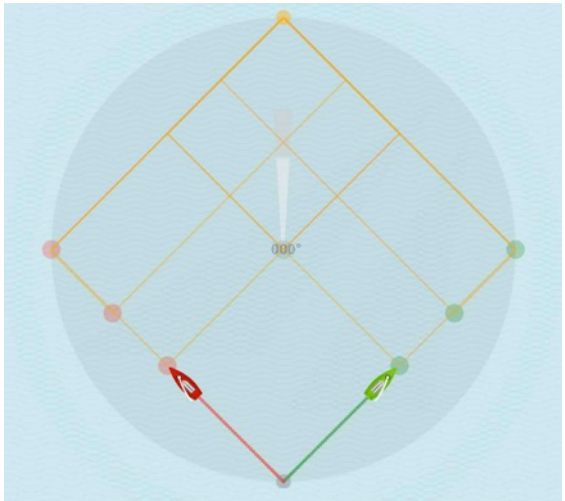
c) At the “Switch Point *: The Switch Point (e.g., 45 °) is located on the “long leg” line to the lay line. At this point, the “long leg is changed to the short leg, since the bearing from the course line to the windward mark at the Switch Point corresponds to the close hauld angle of the boat (eg 45 ° with the Laser) and bearing continues to grow during further sailing to the lay line. But from there on a lower approach of the absolute distance to upwind mark takes place (see Distance Made Good).

* Please refer to the chapter “Switch Point” and “Distance Made Good (DMG)” for more information.

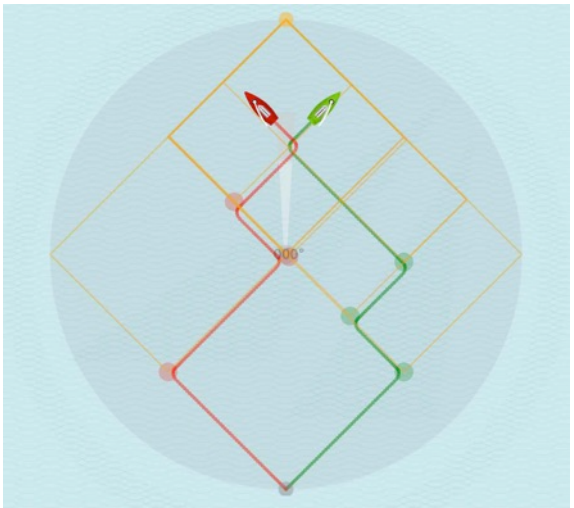
The tacking points are described below.

7.3.1 Tactical tacking points

Halfway to the leeward line (50%, 63 °), you can decide whether you are heading towards the centre with increasing risk. At this point, geometrically equal rectangles are obtained, so that the distance to be sailed is of the same length in both cases. In the middle, you can decide again, because geometrically equal rectangles are again produced.



Standard Tactical tacking point at mark 50%

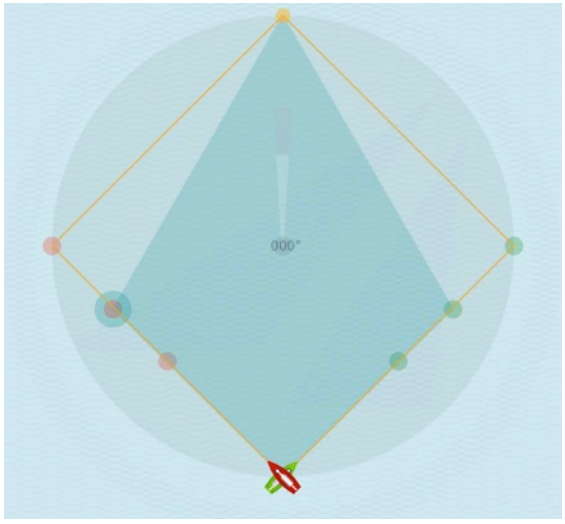


Individual tactical points

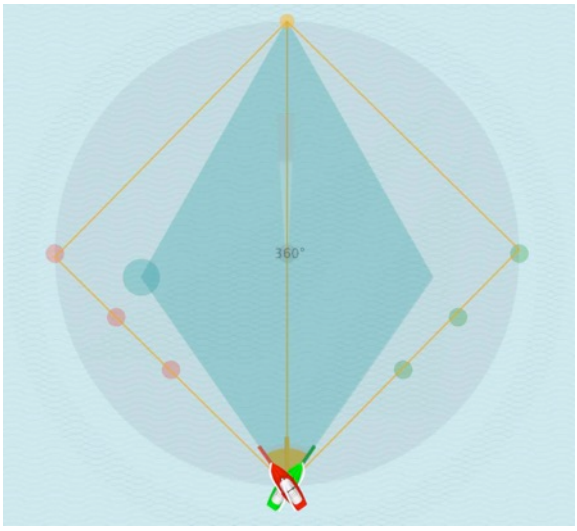
Towards the lay lines, two additional marks (red and green) are placed tactically at 50% and 75% on the way to the lay lines. They are equipped with drag&drop and movable, so that you can mark them as tactical tacking points in the exercises. The lay lines are automatically placed in position. In the following examples, the green or red boat has reached standard tactical mark 50% and goes on towards individual tacking points for red and green to sail towards centre.

7.3.2 The “Safety Diamond”

The dark green area in the form of a “diamond” is limited by the leeward and windward mark and the leg towards the lay lines to starboard and portside and the windward mark.



Boat class „Laser“ with tacking angle of 90°



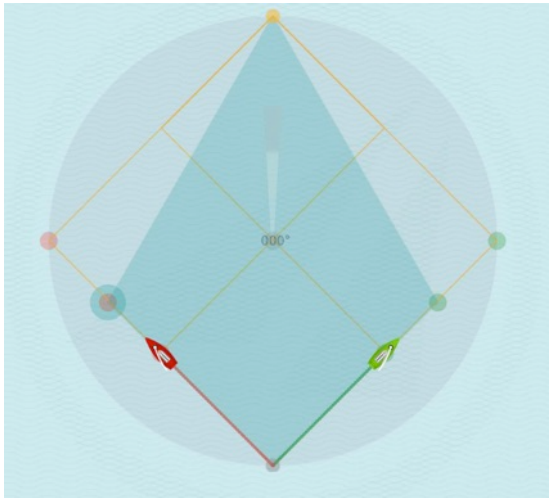
Boat class „Kielzugvogel“ with tacking angle 70°

Wind shifts to +/- 15 °

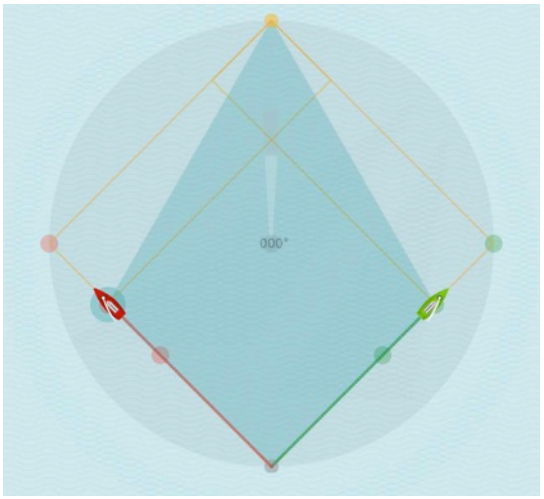
If you sail within this area, you can sail to wind shifts to +/- 15 ° without loss of distance, therefore it is considered a "safe area of the Regatta". Outside this area, you increase the risk of extending the distance, thus risking a loss. You can adjust the "diamond" in its shape, to indicate other wind direction changes and its lay lines (e.g. at 5 ° ... 30 °). By using drag&drop the big green marker on the left side of the diamond can be put in the required position.

There are two important "decision points" on the way to lay lines:

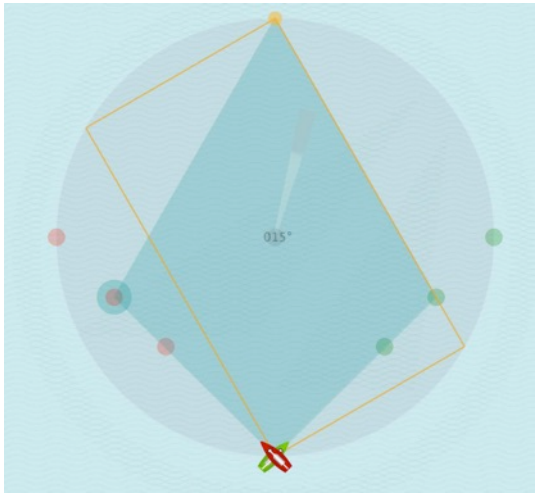
1) Half the path sailed to lay line (50%). At this point you can decide whether you sail on towards the lay line or with a turn toward the centre. At this point arise, namely geometrically equal rectangles, so that in both cases the sailing distance is of equal length. On arrival at the centre, the geometrically equal rectangles arise again.
2) Three-quarter of the path sailed to lay line (75%). At this point you must decide whether you really steer in the lay line direction or towards the centre. It is advisable not to sail beyond this point, because at a wind shift to +/- 15 ° (345 °), a new lay line arises at the windward mark.



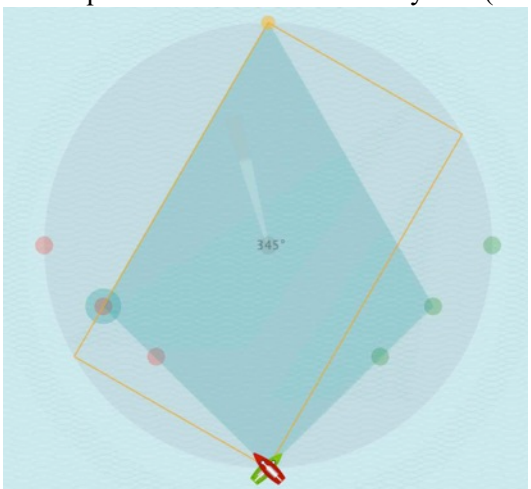
Half the distance to lay line (50%)



Three-quarters of the distance to lay line (75%)



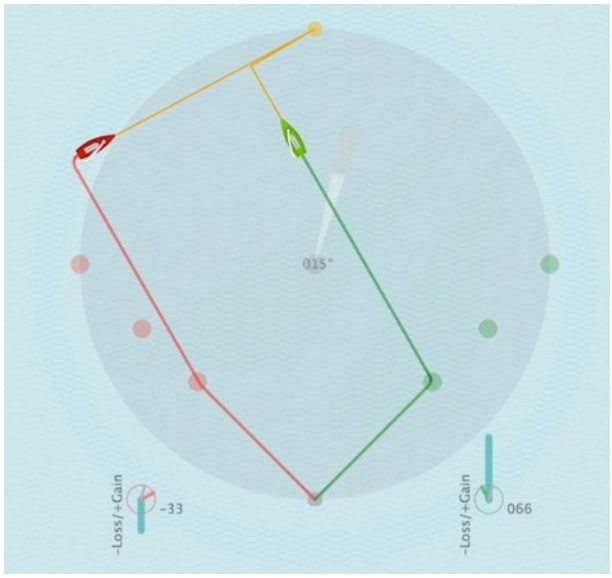
New lay line at + 15 ° wind shift



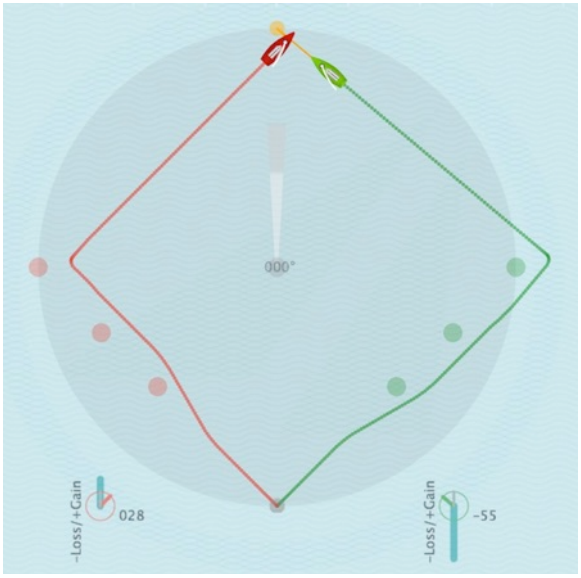
New lay line at 345 ° wind shift

7.3.3 Gain and loss

See gain and loss, tack to tack. Observe the calculated figures for your manoeuvres. Decide to tack when the wind shifts or oscillates to sail the shortest path and make the most of your opportunities and risks against the sparring partner. The sailed way is measured (value in the graph), until a boat has reached the windward mark and stops the simulation. The value is either a gain (+) or loss (-) and displays all accumulated gains or losses due to all manoeuvres on the way to upwind mark, see examples below.



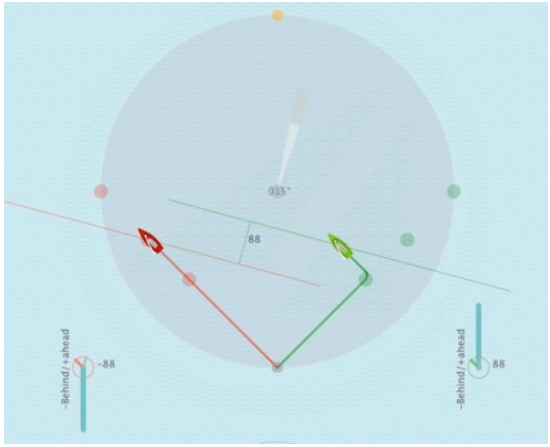
Loss of – 33 and gain of +66 dots



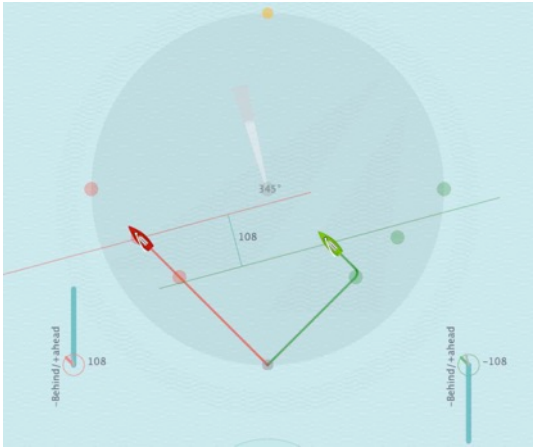
Gain of +28 and loss of -55 dots

7.3.4 Behind or in front

We also simulate your tactical options to analyse alternative decisions. In addition, a second boat is supplied as a sparring partner for you to compare as an opponent. The simulation shows positioning lines of the boats on the regatta field and the lines of the distance (+/-) to each other, like the lines painted on the water in the America's Cup TV coverage or in GPS-Tracker and - transmission.
The calculated values are positive (+) for the boat sailing ahead and negative (-) for the boat behind. The absolute values are identical. They represent the "direction of view of the position from boat to boat".
The calculated value is the difference of paths to sail, the geometric distances of the boats sailing towards upwind mark as long as they are within the lay lines.



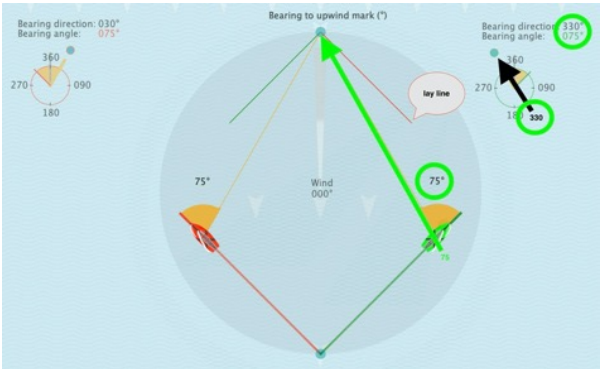
The boats are 88 dots behind or ahead



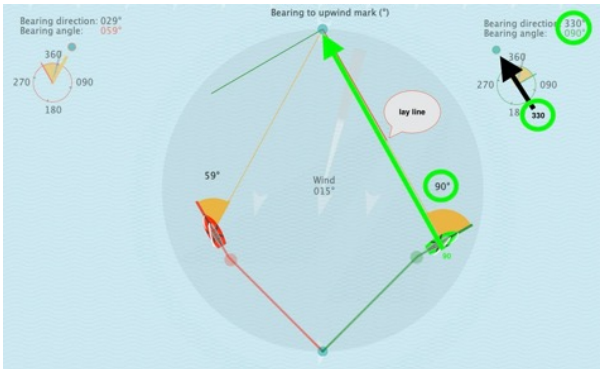
The boats are 108 dots behind or ahead

7.3.5 Bearing to the windward mark

The bearing of the boat to the windward mark can be a useful tool for making tactical decisions in determining the position of the boat on its way to the lay line. The bearing direction (orange line) and the bearing angle (orange segment between the direction of the boat and the direction of the mark) are displayed on each boat.
Example on the green boat: At the "decision point 75%" amounted to the bearing angle of 75 ° and the bearing direction of 330 °. With a wind shift to the + 15 ° the bearing angle is 90 °. In a bearing angle of 90 ° one has definitely reached the lay line! The values can be displayed using the bearing compass (see below).



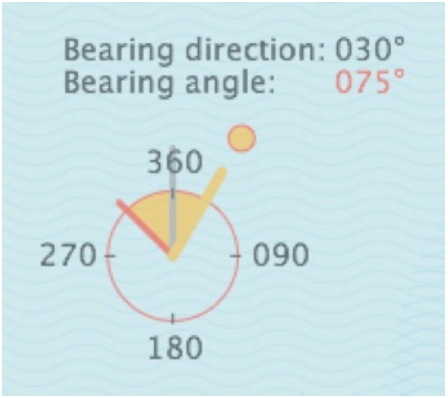
Bearing angle of 75 °



Bearing angle of 90 ° on the green boat

Bearing compass to windward mark

The bearing compass shows for each boat the bearing direction (orange line) to the windward mark and the bearing angle (orange segment between the sailing direction of the boat (colour of boat) and the direction of the windward mark). The grey line shows the wind direction.



In practice it is helpful to determine its position by a bearing from the boat to the upwind mark, e.g. by pointing to landmark points, "eye-to-shoulder" estimates, on-deck-drawings, and analogue or digital instruments. E.g. You can estimate the position of the layline at the "right angle" of 90 ° from the boat with a view to the upwind mark!

7.3.6 Bearing to wind axis

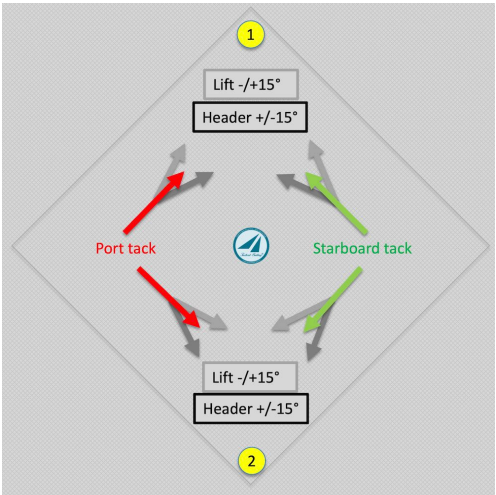
In the exercise scenes with the wind region 1x1, the ‘wind axis’ can be selected as an "option" in the menu "Tactic", here for example in: Long leg and lay lines.

On the meaning of the wind axis Tilo Schnekenburger * writes (here an excerpt):
"The wind axis is probably the most important line for the geometric understanding of strategic tactical relationships on a regatta course.
By definition, the wind axis is the wind line that passes directly through the next mark to be approached. On the upwind beat, the line on which the wind blows exactly from the windward mark. It is indispensable that you, as a regatta sailor, can estimate the position of the wind axis quite accurately, because some decisive strategic-tactical considerations depend on your own position to the wind axis. For example, you are on the strategically favorable long leg, as long as the wind axis is in front of the bow. If you are exactly on the wind axis, the long leg ends, you are at the "Switchpoint", the previously favorable long leg "switched" to less favorable short leg ".

See the description in the chapter "Switch-Point" and separate practice scenes for up- and downwind.
"On the wind axis the ‘race field’ has its largest extent and therefore offers the greatest chance to adapt your course to catch wind or gusts.
On the way to the wind axis, the racing field is getting wider and wider. Beyond the wind axis, however, it is getting smaller and narrower. You narrow your freedom of choice until you end up in the "offside trap".
You sail to the wind axis in the virtually risk-free triangle. After the wind axis, the zones begin with a steadily increasing risk of wind shifts losses.
If you have the wind axis in front of you, you sail with a "VMG to Course", which is higher than the "VMG to Wind". Beyond the wind axis, the "VMG to Course" is smaller than the "VMG to Wind".
Practical training: Above all the junior sailors must be taught to recognize the wind axis. This is especially easy when you are mounted as a coach on the practice buoys flags. In training with advanced regatta sailors, the much more difficult detection of the wind axis without the flags is then trained as an aid with special exercises".
* Source: © Tilo Schnekenburger: Die Geometrie des Regattasegelns, (in German language)

7.3.7 Lift and Header

Definitions: "Lift and Header" are changes in wind direction measured on the boat in relation to the previous wind direction, which can then cause a change in the boat's direction of travel. Tactically, they have different tactical effects depending on the course the boat has sailed (Port tack red or Starboard tack green color) on the upwind or downwind course, namely whether they are of advantage or disadvantage.



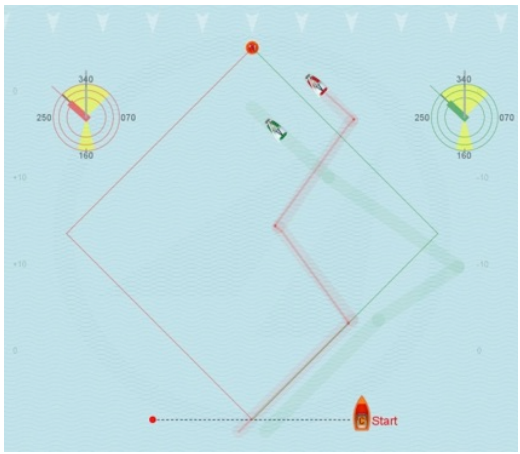
Upwind to mark-1:
A change in wind direction can be advantageous if the course change occurs in the "direction of the windward mark", it "pulls" you towards the windward mark-1 (light grey line, Lift -/+ 15°).
A change in wind direction can be disadvantageous if the course change does NOT occur in the "direction of the windward marker", it "pushes" you away from the windward marker (dark grey line, Header +/- 15°).

Downwind to mark-2:
A change in wind direction can be advantageous if the course change occurs in the "direction of the leeward mark", it "pushes" you towards the leeward marker-2 (dark grey line, Header +/- 15°).
A change in wind direction can be disadvantageous if the course change does NOT occur in the "direction of the leeward course mark", it "pulls" you away from the leeward course mark (light grey line, Lift -/+ 15°).

Note for practice: With the compass, the direction of the buoy(!) is first taken and then the current direction of travel is read on the compass. Wind shifts become visible on the compass through luffing or dropping in the form of a lift or header and then require the direction of the boat to be adjusted.

7.3.8 Tactic using a Compass

Jörg Diesch (FD Olympic Champion and many-time national and international Champion) developed two exercises for experienced regatta sailors, which show tactical manoeuvres on the beat. They explain beating with the compass as well as with the use of the long leg and the defence tactic of remote coverage.



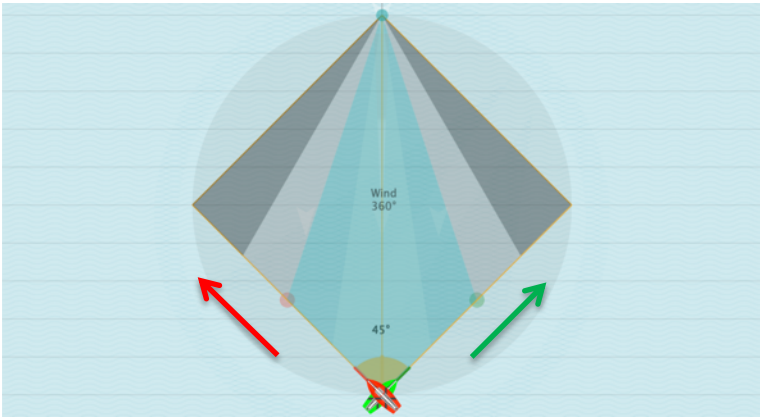
Beating with the compass © Jörg Diesch

Long Leg and Remote Coverage © Jörg Diesch

Functions: The scenes are animated and offer comments. No operation is necessary.

7.4 Risk Management – Reward and Risk

Strategic and tactical decisions in Regatta sailing are made with similar consideration to that of conventional Risk Management. A sailor must already be decided at the starting line whether to take the right or the left side of the Regatta Field. Jochen Schuemann, Germany's most successful and prominent sailor tells us: "The Physics of sailing permanently compels precise decisions". The objective of a race is obvious: at the beginning, sailing upwind to reach the buoy first. The basic decision here is, in which direction to beat. This is an entirely strategical decision, as the sailor is permanently manoeuvring under changing conditions such as wind direction - wind force and currents. It is essential, in an instant, to make a new decision: "should I stay on this course or tack and veer off in another direction?" (Capital, 26.11.2014). The Toolbox provides on this topic a special scene "Reward and Risk", which is available since March 2016 (Version 1.160.316 or higher).



There is no absolute security in the side selection, you cannot calculate the optimal way in advance, but theoretical training can help to make the right decisions in practice. The assessment of opportunities and risks is concerned with the extent to which the expected event (Wind shift) occurs or not. Thus, it becomes possible to calculate the gain or loss in its size in the case of a wind shift which necessarily leads to an opportunity or a risk.

The probability value of whether the wind shifts in its direction as it is hoped is between 0 and 1, as well as the values between them: value "1" applies, intermediate value e.g. "0.5" is 50% and / or "0" does not apply.

Without risk there is no chance! There is no need for risk-taking. However, the risk is greater, the higher the potential reward.

"Risk and opportunity" as measurable variables - represented by loss and gain - only arise as soon as you have decided on a side and removed you from the central line.

"Risk and Chance" are the same - whether you are sailing on starboard (green) or port (red) on the beat towards layline.

➢ By "risk" we mean the case that the distance to be sailed could be extended.
➢ By "chance" we mean the case that the distance to be sailed could be shortened.
➢ By "loss" we mean the calculated extension.
➢ By "gain" we mean the calculated abbreviation.
(See the calculations in the chapter "Calculated facts").

Gain means:
If the wind shifts to the side you originally chose, you should take advantage of the opportunity. With a header that actually takes you further away from your target, the chance is here to shorten the distance to be sailed with a tacking and turn it into a win.

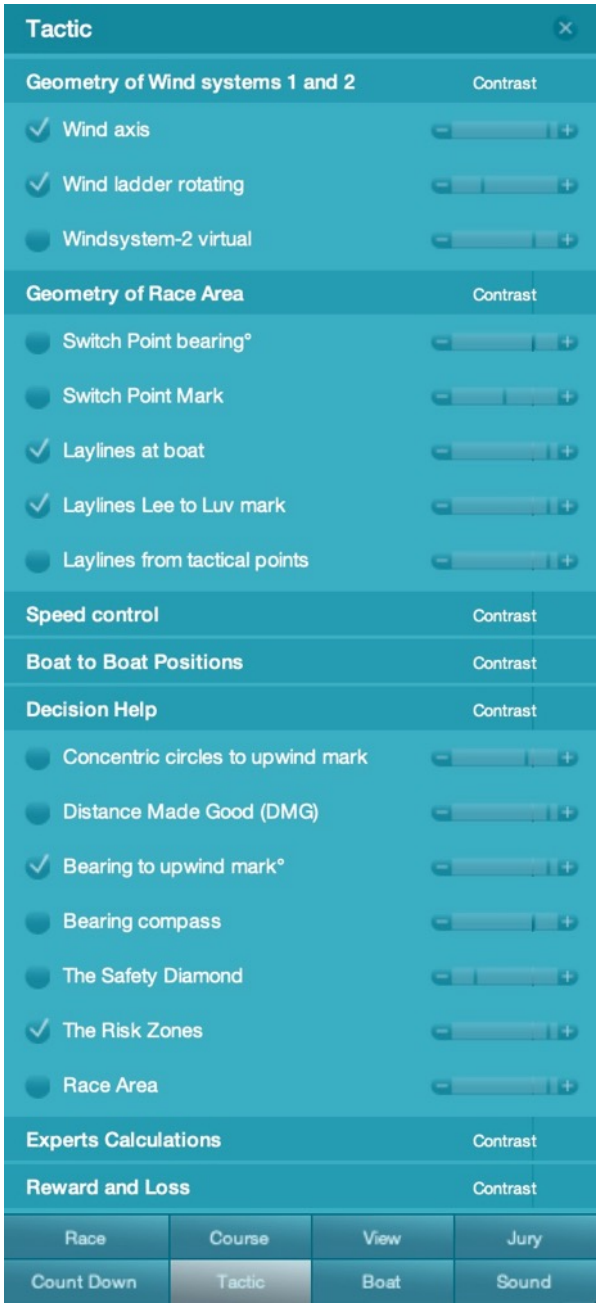
Loss means:
But if the wind turns to the side for which you have not decided, then you must accept a lift. This lengthens the distance to be sailed and thus becomes a loss.

Options

In the Main **Menu: Expert / Reward and Risk** is the scene "Reward and Risk".
The following exercises are offered:

- Upwind and Downwind for practical regatta sailing and learning the basics,
- Upwind for Experts with theoretical explanations, geometric drawings and calculated facts.

The functions and their operation for the options: Decision Help and Calculated Facts are explained as follows.
In "Options Tactic" menu you can choose more optional illustrations (ON/OFF):



• **Decision help**:
- The Safety Diamond
- Path to upwind mark
- Concentric circles to upwind mark
- Switch Points at 45°
- Distance Made Good (DMG)
- Bearing to upwind mark
- Bearing compass
- Wind ladder rotating
- Tactical marks - tacking points

• **Calculated Geometry**:
- Distance to sail – shortcut
- Distance sailed
- Gain or loss
- Behind or ahead
- Distance boat to centre line
- Distance boat to boat
- … continued

• **Geometry for Experts:**
- Windsystem-1 and -2
- Chance for shortcuts
- Gain or Loss
- Behind or Ahead

In the following examples boats (Laser) are used with a tacking angle of 90° for the geometrical diagrams and calculations in the form shown.

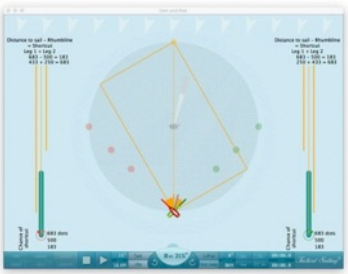
The exercises "Reward and Risk" are brought about mainly by wind shifts. The wind direction is changed most easily using the keys "N" and "M" or by drag&drop of the wind indicator in the centre of the regatta field. This is visible when the option "View/Wind/Region" is turned on. Use Keys “H and J” for Windsystem-2 if selected to ON in “Tactic”.

7.4.1 Shortcuts and Extension of the path to sail

Typical questions by means of the simulation "Risk Management - Reward and Risk" can be explained:

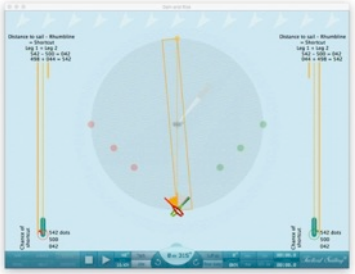
- When should I tack?
- How long is the distance a sailboat must sail from the Leeward mark to the Upwind mark?
- Is there a shortcut?
- What influence does the wind direction have?
- In the worst case, is there an extension of the path to sail?
- When does it occur?
- What is the significance of the distances to the right or left of the centre line?
- What is the significance of the distances to the lay line?
- What is the significance of the distances from boat to boat?

Examples: **Shortcuts** of distances in wind direction changes



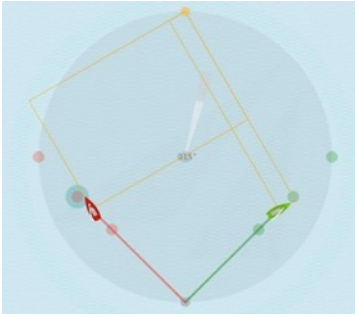
Wind direction 15°

Wind direction 30°

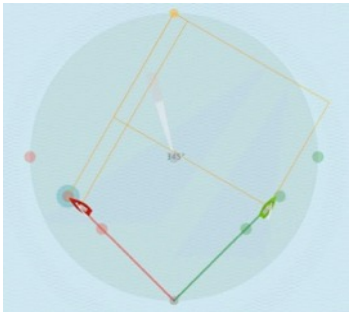


Wind direction 40°

Examples: **Extension** of the distances during wind direction change, the "long leg traps into the offside".



Wind direction 15°- Offside



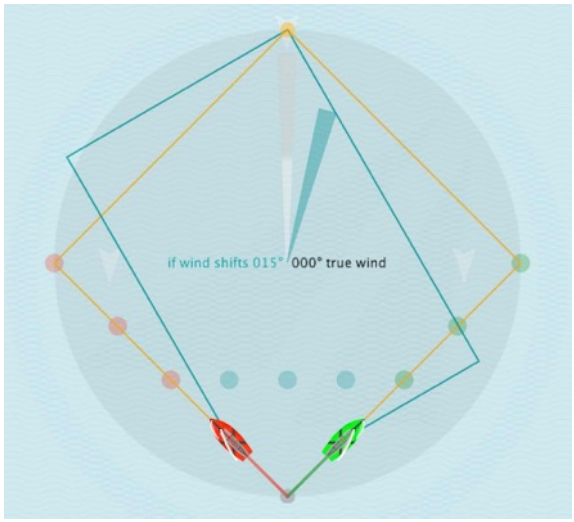
Wind direction 345°- Offside

7.4.2 The Wind system-2

For all mathematically particularly interesting experts, additional options for the calculation of "shortcuts and extension" were developed in the simulation: the additional **virtual** wind system-2. With the Wind system-2 it is possible to carry out parallel calculations in direct comparison to the wind system-1 and to analyse distances.

Activate Wind Systems-2

With a special option the additional virtual "wind system-2" can be activated. The usual wind system-1 is marked "true wind" (grey wind region) and acts on the sailboat (orange way). The additional wind system 2 is marked with "if wind shifts x°" (turquoise wind lines).



Operation: The wind direction can be changed in the wind system-2 with the turquoise wind direction pointer: With the mouse with "drag & drop" - or with the keys "H and J" - in 5° steps. The turquoise-collared distances to be explored theoretically are displayed.

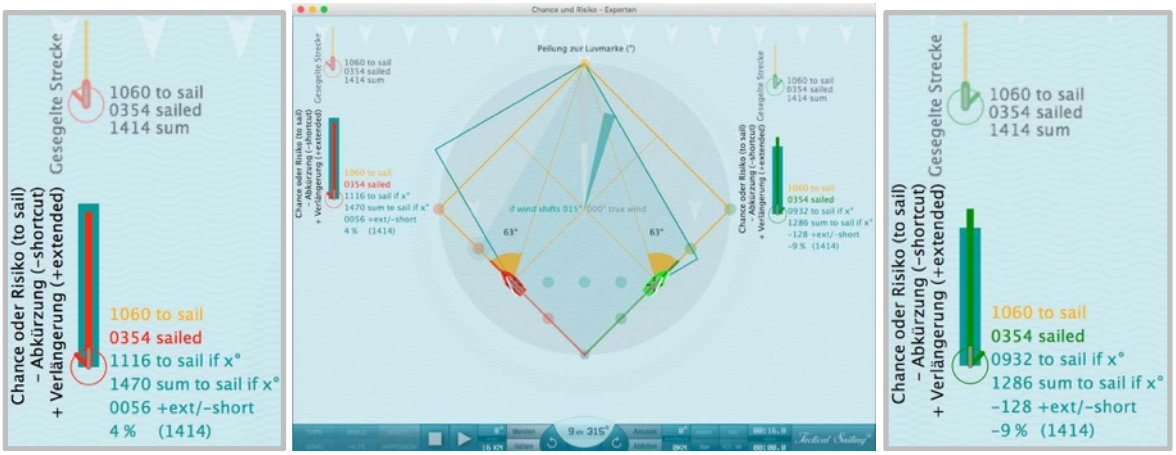
Calculations: In a direct comparison, they show the differences in the length of the path still to be sailed when using wind system-1 / or wind system 2:

- the still-to-sail path in normal wind system-1 (orange value "to sail"),
- the already sailed path in the normal wind system-1 (sailed "on the boat's color)
- the still-to-be-sailed path, in the wind system 2 (turquoise), if the wind would shift in the set direction ("to sail if x °"),
- sum of the calculation: already sailed route (wind system-1) + still to be navigated way (wind system 2, turquoise color "sum to sail if x°"),
- Calculated value for + extended path or -shortcut,
- Relative value (%) for + extension or shortening, always compared to the route to be navigated in normal wind system-1 (orange to sail) at the downwind mark.

Note: Observe the direction of the wind direction in the wind system-2, which is to be compared in the wind system 1, either to the right +15° or to the left -15° (345°) **ext**ended path or negative abbreviation (-s**hort**cut). The positive and negative values are easy to confuse when comparing the wind system-1 and -2!

Example: Wind shift is halfway with a bearing of 63°
Wind system-1: 360°, "Orange to sail" (1414) at the leeway mark;
Wind system-2: + 15°, distance "Turquoise to sail if x°" (1366) at the leeway mark, (-48 short);
Assumption: Sailed path (sailed 156) in the wind system-1, the bearing angle at this position is 63°.

Result: Red boat left: extension (+ ext): 56 (+ 4%); green boat on the right: abbreviation (-short): -128 (-9%), if the boats were sailing the still-sailing way in the wind system-2.

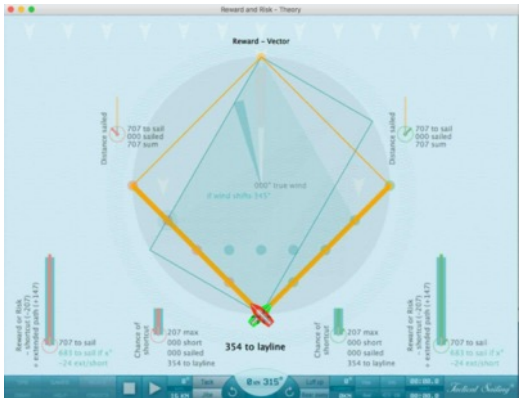


Red boat left: Extension (+ext): 56 (+4%); green boat right: abbreviation (-short): -128 (-9%)

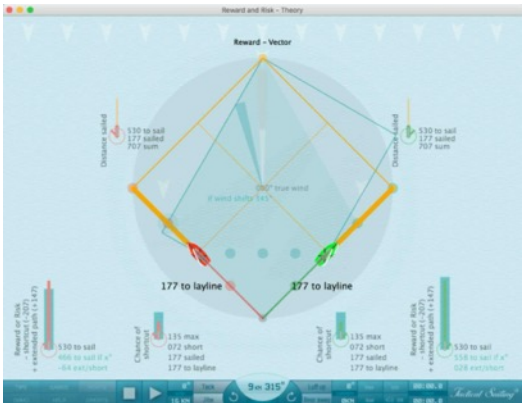
Use the "N" and "M" keys on the "Windsystem-1" with the "H" and "J" keys on the windsystem-2.

Note: Other wind shifts and other positions of the boats can be adjusted and calculated in the program. Also, other boats may be selected with tacking angles other than 90 ° (Laser, 420, 470, J / 70, etc.), e.g. Korsar 100 °, Kielzugvogel 60 ° and skiffs with 134 °.

Example: Wind shift -345° (-15°)



Wind shift -15 ° and calculation at downwind mark



Calculation halfway to lay line

Note: Other wind shifts and other positions of the boats can be calculated in the simulation.

8 Speed

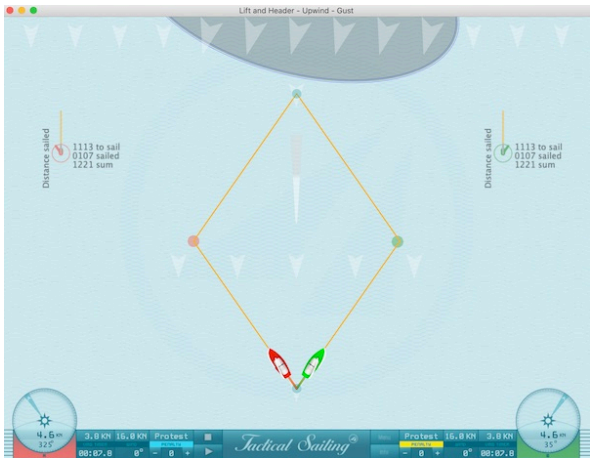
8.1 Speed lines in the regatta field

The screenshots on the topic "Lifts and Headers" have shown that the previously frequently used term of the "lay line" is unsuitable to describe the geometry and "lines" within a regatta field completely. There are only four situations in which a sailing boat can use the layline, namely a buoy without changing tack:

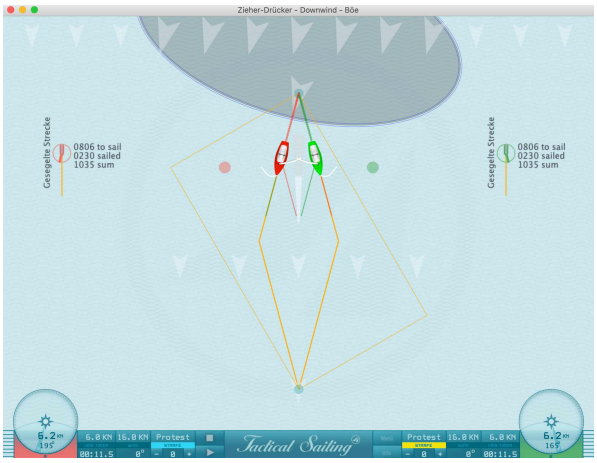
- Course line to the concern of the upwind mark with wind from starboard
- Course line to the concern of the upwind mark with wind from port
- Course line to the concern of the downwind mark with wind from starboard
- Course line to the concern of the downwind mark with wind from port

Lay line - Fetching

Definition of "Fetching" according to World Sailing:
A boat is fetching a mark when she is in a position to pass to windward of it and leave it on the required side without changing tack.
Here it is always determined according to the polar diagram of a boat, which appear "at the edge" of the regatta field to direct the boat to a buoy either downwind or windward direction. The course lines - and their course angles - to the concern of the buoys are determined by optimal the angle of the tacking and jibing angle of the respective boot type, if she is sailing “Close hauled” or “Running”.



Windward - Close hauled



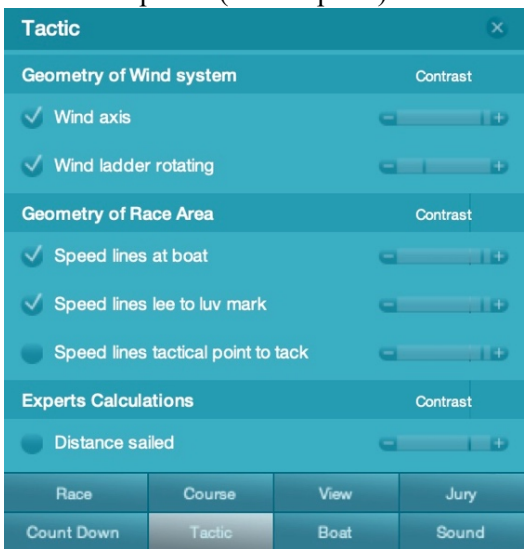
Downwind - Running

However, if a boat wants to sail for tactical reasons in the middle of the regatta field or should even stay away from the lay line, because it wants to avoid the so-called risk zone, then the polar diagram determines the "best possible course lines" with optimal "speed" depending on the wind direction to enable the boat to reach the buoy either on a downwind or windward course.

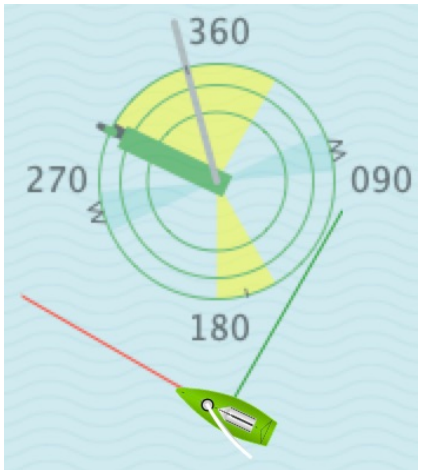
By tacking and jibing within the regatta field, the sailing boat always follows its optimal "speed line" to downwind or windward marks with a course, without touching the "laying lines" until it gets close to the mark.

Speed line
This general meaning of the optimal "speed line" is particularly clear on the downwind course, because it is physically possible to steer directly on a downwind course to a downwind mark, but it is recommended to observe an "optimal speed line" according to the polar diagram. The polar diagram also determines the "optimal speed line" for the upwind course "against the wind". From this, the so-called tack and jibe angles result, in order to always control the "optimal speed line".

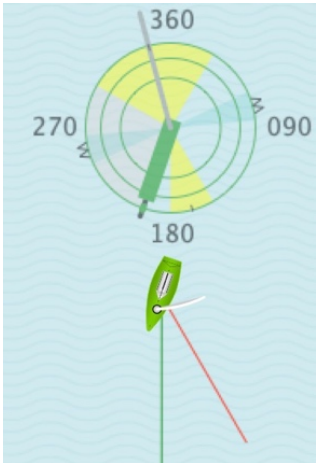
In the practice scenes of Tactical Sailing, therefore, so-called "Speed lines" of the respective boat are always offered for selection in the "tactical options", namely:
- at the boat (tacking or jibing angle)
- at marks (downwind or windward)
- at tactical points (Switch point).



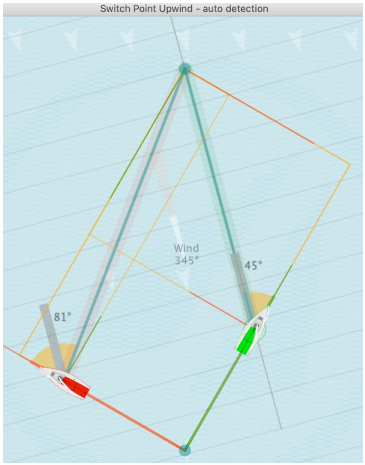
Option menu “Tactic” Speed lines



Tacking angle Speed lines



Jibing angle Speed lines

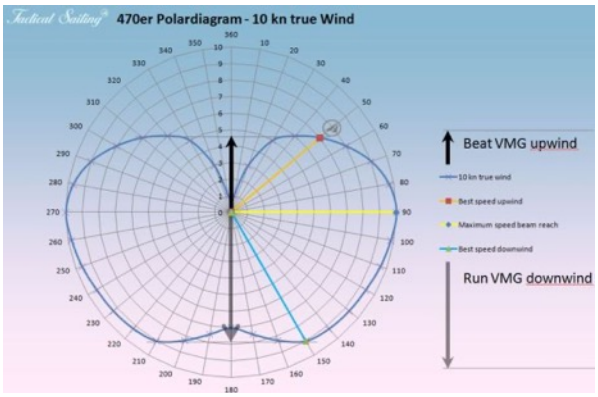


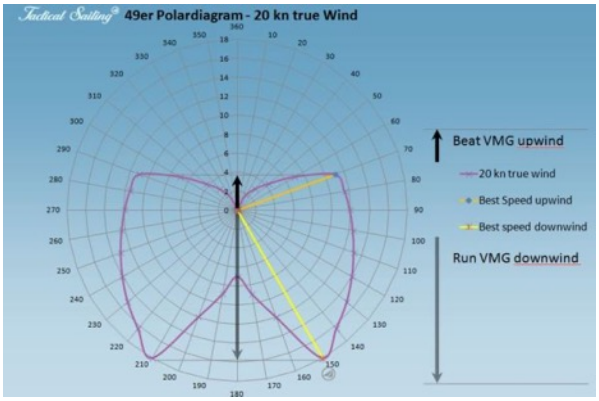
Switch Point Speed lines

The following basic theory of velocity (VMG) shows effects for optimal boat speed. A good start will be explained in “Starting Phase” followed by scenes approaching marks and the finish line.

8.2 VPP - Boat Speed - Velocity prediction program

The speed of each boat is shown by a polar diagram - velocity prediction program (VPP) for each class of boat, that is simulated, e.g. dinghies (Optimist, Laser, Finn, etc.), Skiffs (29er, 49er) and yachts (H-Boat, TP 52).

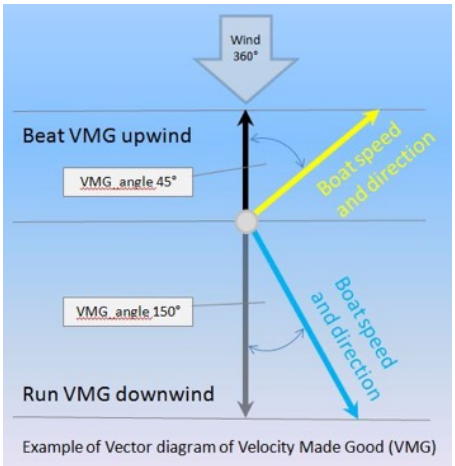




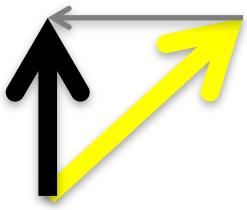
Examples of polar diagram for 470er and 49er -Velocity prediction program (VPP)

8.3 VMG - Definition Velocity Made Good towards Wind

Definition of VMG as vector diagram:
1) Boat speed depends on values of a polar diagram as in the boat shown in diagrams above. It is derived as a vector in length and direction (yellow arrow).
2) VMG (black arrow) is a mathematical projection (grey pointer) of boat speed (yellow arrow), the VMG_angle (radian measure (rad)) is the angle between direction of the wind and the direction of the boat, the VMG is the speed of the boat v (yellow arrow) multiplied with 'cos(VMG_angle(rad))', e.g. VMG_value for length and direction is a black arrow. VMG_value = V_value*COS(VMG_angle(rad)).



Example of Vector diagram of Velocity Made Good (VMG)



VMG - Animation of sailed paths

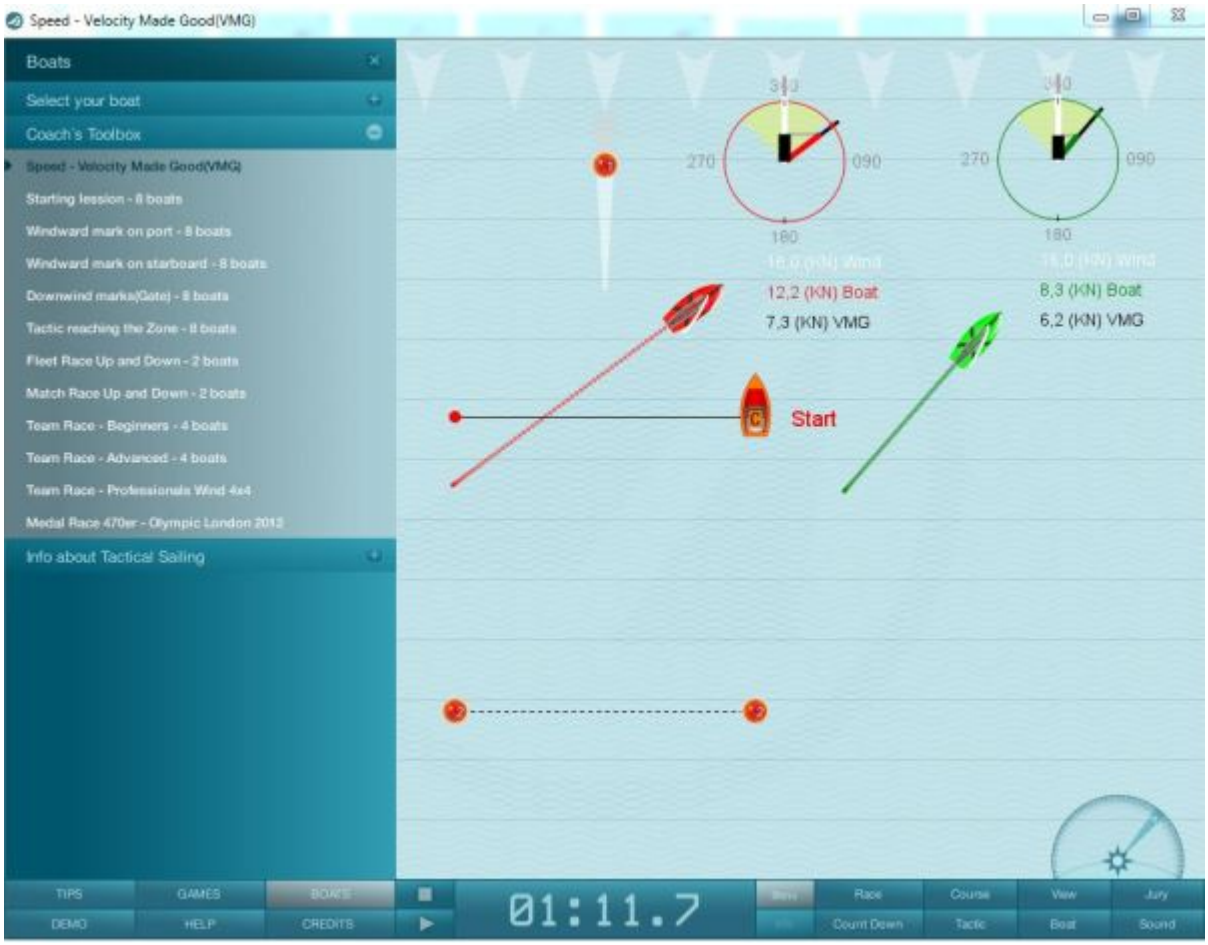
Function: Select Main Menu **Expert/ Speed VMG/VMC**: Definition VMG and watch the animation.
The green boat is going smoothly to windward until nearly head to wind and bears off again.
The red boat is luffing up and bearing away in an “S-shape curve” whilst travelling windward to optimize her VMG.
This animation displays the range of VMG greater than 7.0 KN as a coloured vertical-bar diagram on the sailed path. The actual values of wind speed, boat speed, and Velocity Made Good are displayed underneath the VMG Tactic-Disc.

Watch the fastest speed on Beat or Run VMG - Velocity Made Good - this always arises from the optimal combination between:
- luff up and bear off
- pointing and boat speed.

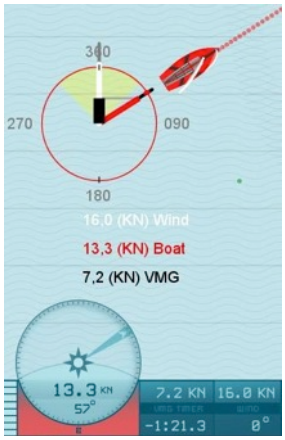
Select Options: Main Menu Option-Tactic- VMG-Disc - display and position it by drag&drop.

VMG - Tactical manoeuvre
Function: Select Main menu **Expert**: Tactic VMG and watch the animation.
The red boat is heading to windward extremely by luffing up with little speed and VMG values.
The green boat is tactically bearing away to run an optimal VMG-value. It is climbing the windward ladder (grey lines) much faster. Again, tactically with wind from port, it tacks to continue on a starboard tack with right of way!

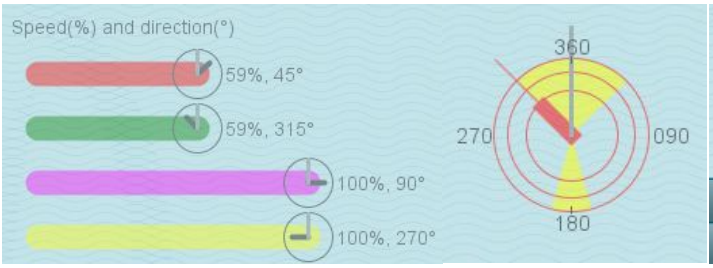
VMG - Exercise
Function: Select Main menu **Expert**: Speed on VMG.
Run 2 boats with optimal VMG.



Select Options: Menu Options-Tactic- VMG-Tactic-Disc select by drag&drop.



There are three possibilities to show the sailing direction and the speed. The displayed values are the relative % to the maximum possible speed (100%) according to polar diagrams or knots (KN).



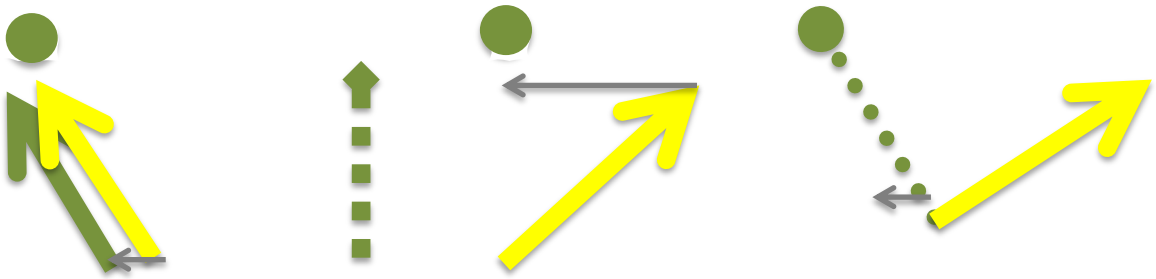
1) Speed indicators (%) in the colour of the boat, and the “clock” at the end of the bars symbolize the direction of the wind (minute hand, grey) and the direction of the boat (hour hand, black).
2) Tactic-Disc in the colour of the boat (see: Compass and Tactic-Disc)
3) A digital display of the log (KN) in the compass. The compass and speedometer on the control panel in the cockpit show the data of the training boat that you have chosen.
Note: Main Menu Options, the Tactic disc and Speed bars can be switched On/Off. They can be placed on the race area you have selected by drag&drop.

8.4 VMC - Boat Speed – Velocity Made Good towards Course

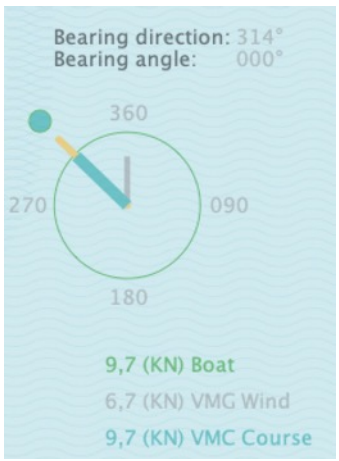
Depending on the boat type, the boat speed depends on a polar diagram - Velocity Prediction Program (VPP), which is used in the tactical sailing simulation, e.g. especially for dinghies (Opti, Laser, Finn, 470s, etc.), skiff (29er, 49er) and yachts (H-Boat, TP52).
See typical VPP sketches of the Velocity Prediction Progarm in o.g. Chapter VPP.

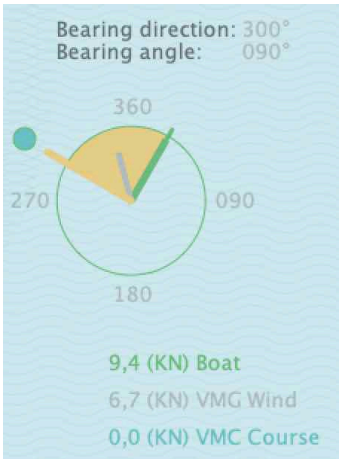
Definition of the VMC as a vector diagram:
VMC (turquoise bar) is mathematically a projection (gray hands) of the boat speed VPP (yellow arrow), the VMC_angle (radian in (rad)) between the bearing of the mark and the direction of sailing of the boat, multiplied by the 'cos' (VMC_angle (rad)), eg VMC value and direction of the turquoise arrow.

- Bearing to the mark (turquoise dot)
- VMC value and direction (turquoise arrow)
- Boat speed VPP (yellow arrow)



Bearing ahead: max. VMC=VPP Bearing 45°: VMC=VPP * 0,707 Bearing 90°: VMC=0

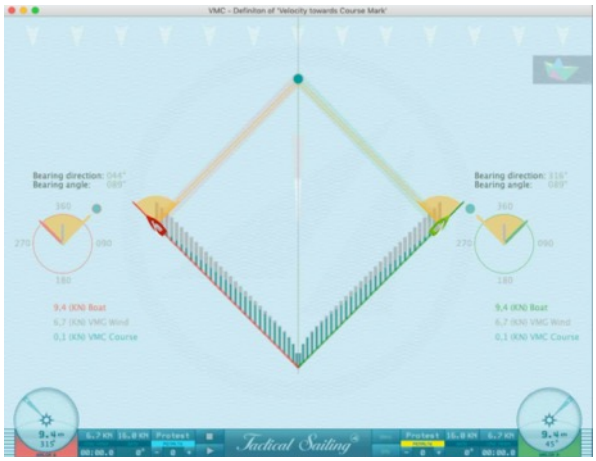


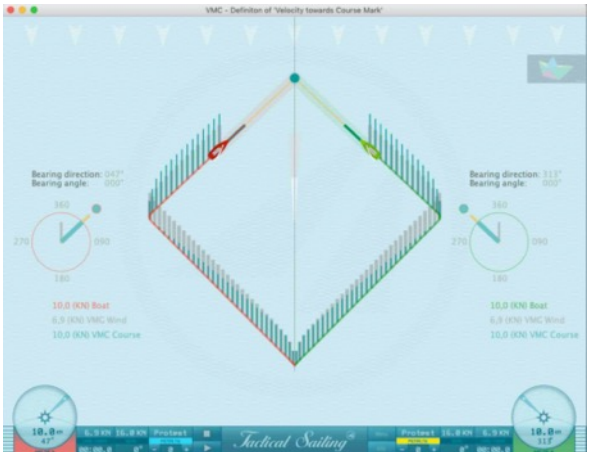


Bearing angle 0°: VMC= max.VPP Bearing angle 45°: VMC=VPP*cos(45°) Bearing angle 90°: VMC=0

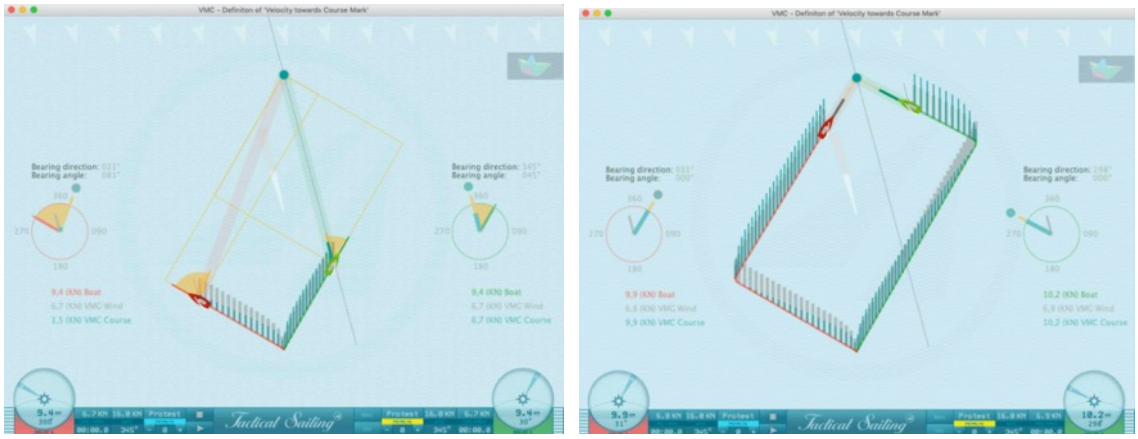
Animation of sailed path – watch the maximal VMC
Function: In the main menu, select **Expert**: Velocity VMC. Watch the animation. Change the wind direction.
The boat speed in the direction of the mark (VMC) changes depending on the position and direction of the boat.

A) Wind and mark are in the same direction.
Example: At the downwind mark the value of the VMC is about the value of the VMG. The boat drives towards the layline. On the way to the layline the VMC (turquoise bars) decreases and reaches the value zero at the tacking point at the layline! After the boat tacks and moves directly towards the upwind mark, the maximum value VMC is reached, namely VMC is equal to the max. possible speed of the boat according to polar diagram.


On the way to the layline, VMC -> 0


Max.VMC in the direction of the mark

B) Wind direction and mark are in different directions, e.g. at a long leg tack
Observe the course of the VMC on the way to the layline line. The advantageous approach to the mark is recognizable. VMC is significantly larger than VMG until reaching the wind axis, at the bearing of 45 ° the values VMC and VMG are identical, then VMC becomes smaller than VMG and the approach to the mark becomes smaller and smaller.


VMC is significantly larger than VMG until it reaches the wind axis

The wind axis and the "Switch Point" are of great importance for tactical decisions, in particular for a risk assessment. See the sections „Distance Made Good (DMG)“ and „Switch Point“.

9 Experts - Calculations

9.1 Gain and Loss in sailing practice

Several "Risk Situations" can be calculated with our simulator:

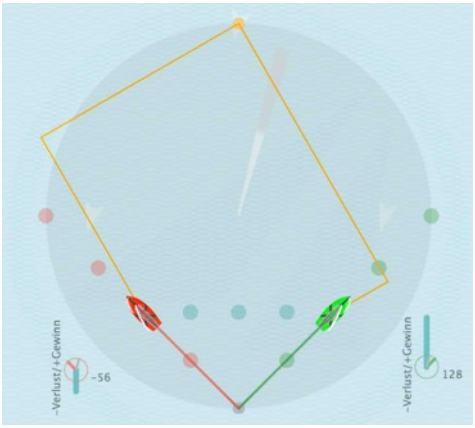
- a change in wind direction
- an extended distance to a layline,
- distance to the middle line,
- the distance away from an opponent,
- the distance made good (DMG),
- the Leverage,
- Wind ladder rotating,
- Wind axis.

A possibility for the abbreviation (Gain) of the path to be sailed is obtained by means of wind shifts on the "right" side for the sailor - always outgoing from the middle line of the regatta field. Thus, the distance to be sailed is shortened - the sailor "gains" against the other boats and thus is an advantage. In other words, the "distance of the boat to the lay line or the middle line" is an indication that can be calculated and displayed with the aid of our simulation.
The approach to the upwind or downwind mark shows the absolute, already achieved approach to a target mark (distance made good (DMG)).
Under oscillating wind conditions, a gain on the path is only considered as fully secured and thus against the opponent as "cashed", if we cross directly upwind before the opposing boat and so to speak "geometrically crossed".
In practice, the middle and laylines are not visible to the sailor on the water. They represent fictive connecting lines which can only be generally estimated. A useful aid to a sailor is, therefore, the "bearing" to a windward mark in a range of 45° to 90°.
With some practice and experience, bearings can be taken, from a dinghy/skiff with 15° stages, from 45°, 60°, 75°, and 90°. With larger yachts there is usually the "bearing compass" or GPS controlled instruments available.
The contrast here is, that the direct distance to the opponent is distinctly visible.
The risk of an extended sailing distance is usually caused by a sudden wind shift. This can catch the sailor on the "wrong" side - left or right - of the estimated middle of the regatta field, thus extending the distance still to be sailed (Loss). The extent of the "Loss" is dependent on the distance the boat is from, either the lay line or middle line, which the Simulation calculates and displays.
Another risk which could arise is the position of the sailor's own boat compared to that of a direct rival, or the position of other boats in the regatta field. A too larger gap between boats can lead to a disadvantage (Loss). Likewise, several boats together at close quarters will also experience a "loss". Willingness to take risks can pay off. The higher the "Risk" means a higher potential "Gain" - and consequently - "Loss" for other competitors!

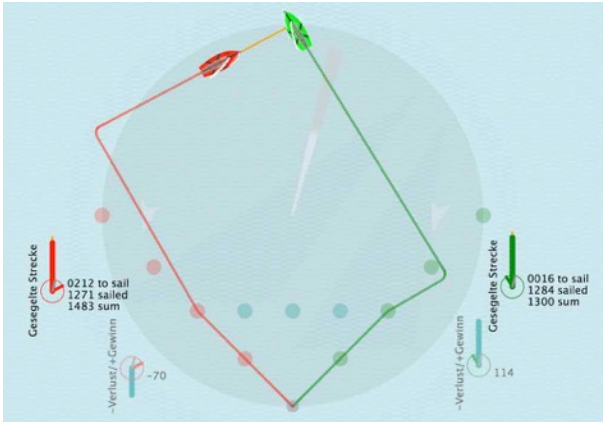
The following is a brief description of the practical use (examples, screenshots and tips). See detailed explanations and tactical advice on geometry on the race area at:
Tilo Schnekenburger (in German) and Marc Rushall (in English).
See following example!

9.1.1 Changing the wind direction

In the case of a wind shift, the distance to be sailed will be extended (loss) or shortened (gain), depending on the change in wind direction and the position of the boat on the left or right side of the regatta field. The red boat must sail outside the regatta field - outside the circle - extended path (loss) to reach the lay line. The green boat remains within the regatta field (circle) and can reach the lay line on a shorter path (gain).



Wind shift to +15°, red boat loss -56/-70,

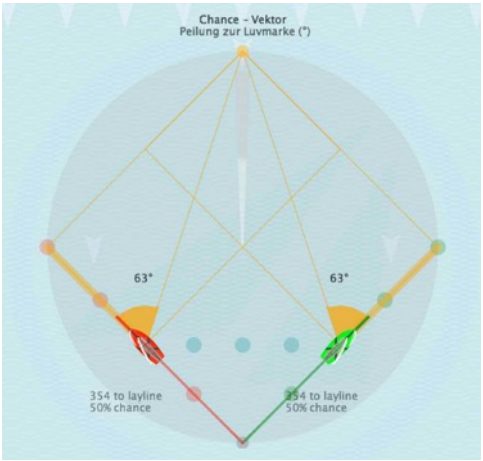


Green boat gains 128/114

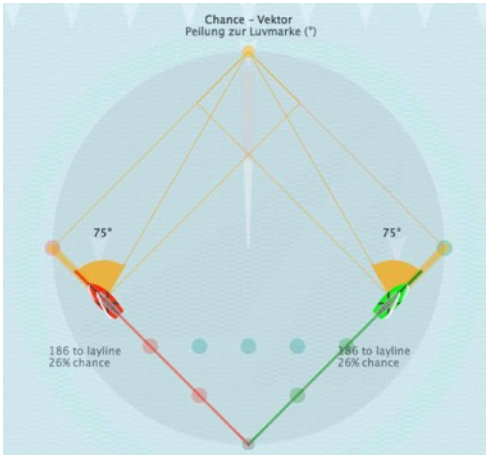
9.1.2 Distance boat to layline

The distance to the layline always presents "Risk". On nearing the layline the "Risk" is at the highest. It can even lengthen the course - (see red boat) - if the wind suddenly shifts and changes direction. There is much less "Risk" when a greater distance is between a boat and the layline. With a longer distance to the layline, it is easier for a sailor to adapt to any wind changes.

The distance to layline is also a measurement of “Reward”. But it happens in an opposite effect. At the downwind mark or in the middle of the race field is the gain highest. A wind shift to the “favourite” side can shortcut the path to sail. By reaching the lay line all chances of a reward is lost!



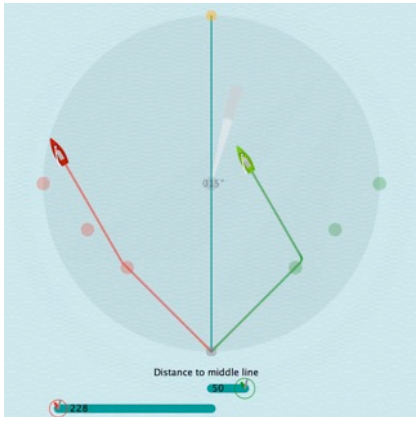
Half way to lay line, bearing ca. 63°



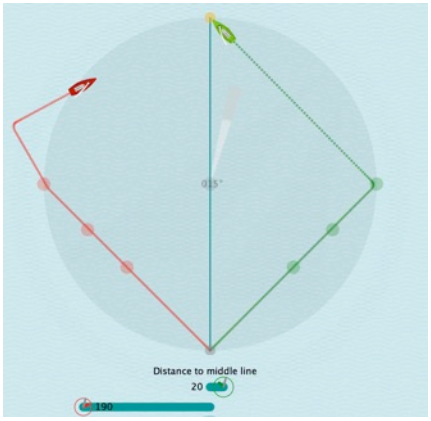
¾ near lay line, bearing of ca. 75°

9.1.3 Distance boat to centre line

The distance to lay line is a measurement for reward and risk.
The logical description for centre line is similar to lay line, see explanation in chapter above.
Examples: The distance from the centre line is the "risk-value". Close to the lay line is the highest "risk-value". A Low risk-value is in near the middle line (green boat), a high risk-value (red boat) at lay line. Distance is indicated on the bottom of the screen.



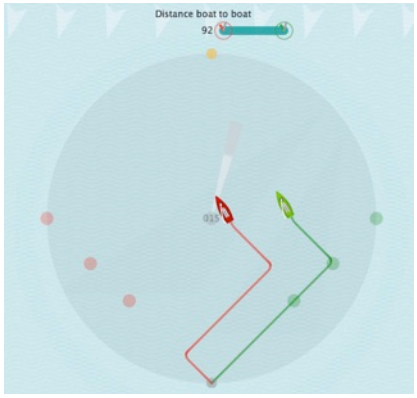
Low risk-value in the middle (green boat)



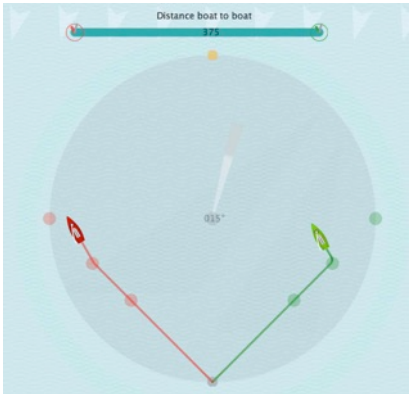
High risk-value (red boat) at lay line, way lengthening

9.1.4 Distance boat to boat

Your willingness to take risks can pay off, because the bigger the risk, the higher the potential gain but also the loss. The distance to your opponent “boat to boat” is the "risk-value". Low risk is, if the opponent remains nearby, high risk is, if sailing on opposite sides. For example, if you double the distance to your opponent, the potential gain is doubled too. (Note: Distance is indicated on the top of the screen.)



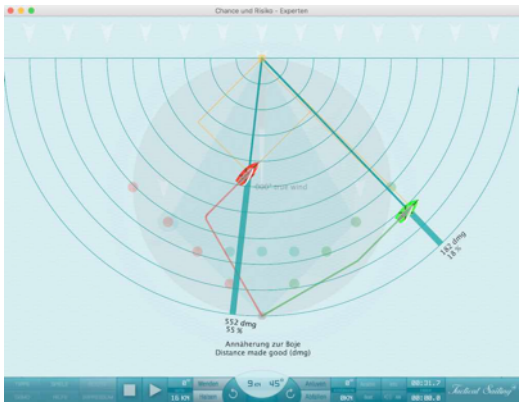
Low risk: the opponent remains nearby



High risk: sailing on opposite sides

9.1.5 DMG - Distance Made Good

The distance to the upwind mark shows the absolute, already achieved approach to a target mark (distance made good (DMG)). From the concentric rings and the numerical length specification (meter, DMG) approximation or distance can be observed. The DMG is a tool for evaluating the tactical position of two boats with a view to the upwind mark during wind shifts, see example of the 470s with 55% and 18% approach. The approach or distance depends on the tacking angle of the boat. In particular, in boats with a tacking angle > 90°, e.g. with a skiff (29er or 49er), very quickly the boat passes away from the center line and even from the upwind mark.



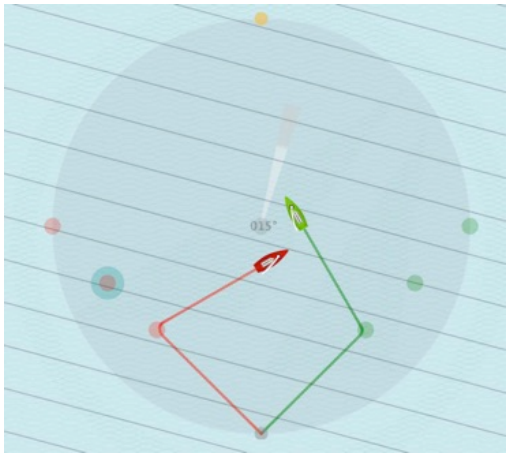
A short distance to the centre of the race area means a better chance of reacting to a wind shift. The concentric rings simply show the tactical advantage of positioning themselves in the race centre in order to reduce the risk of disadvantages in a wind shift.

See detailed explanations and tactical advice on "Distance Made Good" on:
Tilo Schnekenburger: Die Geometrie des Regattasegelns, Chapter. 5.2.

9.1.6 Leverage – "Money in the bank"

"One way to quantify risk is in terms of leverage, over the fleet, or over one boat in particular." ... "If I double the separation from a boat (or the fleet), I double the distance I stand to loose or gain from a wind shift. That's why we call it leverage. So if I want to make a big gain, I will split further from the fleet. I will only do this if I am willing to risk a big loss or am very sure of my strategy. If I'm not so confident, I'll edge towards my favourite side, but I reduce the leverage over my closest competitors."

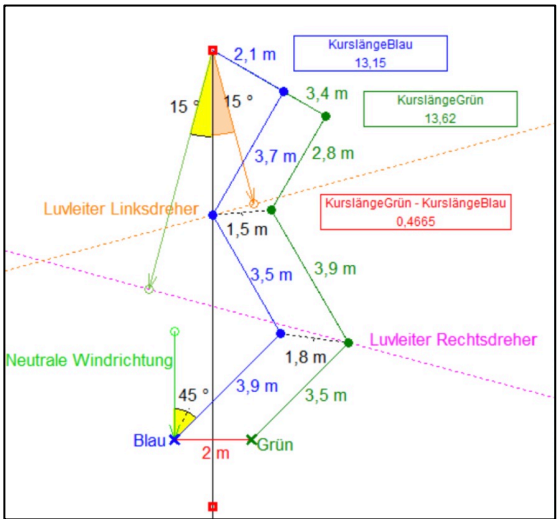
Caution: this gain due to a wind shift is a "paper gain" … it's like making money when share prices rise … and we know what can happen to them. It is only a real gain when the shares are sold, and the money is in the bank. The racing equivalent of selling out is to actually cross directly to windward of the boats concerned. If we are directly upwind of a competitor, there is no leverage, we can't lose or gain on a wind shift; the money is in the bank!"

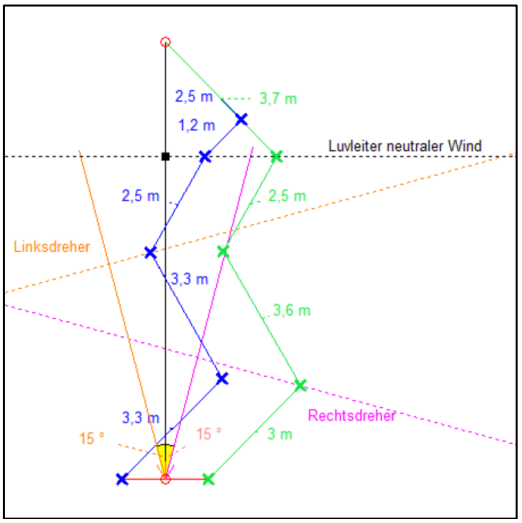


How to bank a wind shift: … in oscillating conditions, a wind shift gain isn't fully realised until we physically cross the competition…."
(Source by Mark Rushall, www.rushall.net; i-coach: The beat, July 2003, page 80).

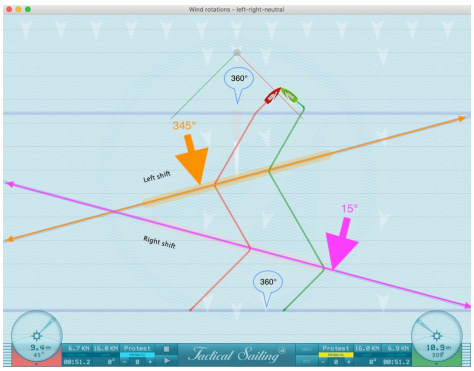
9.1.7 Wind fields - left-hand and right-hand shifts

"Do left-hand and right-hand shifts actually neutralize each other? One of the questions that is discussed again and again among regatta sailors is whether two wind shifts by the same amount to the left or right about the mean wind direction neutralize each other during an upwind course.

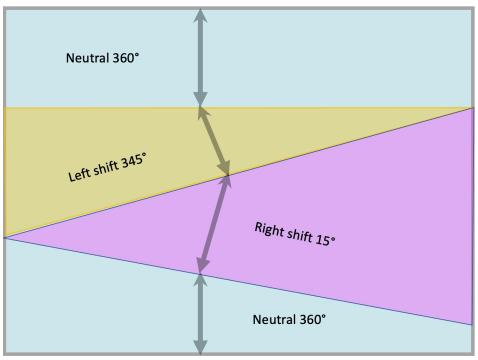




Course lengths: Blue 1315m Green 1362m Projection Blue 47m= approx. 3.45%.
A geometric observation is best suited to answer this question", see Tilo Schnekenburger at: http://www.schnekenburger.click (German).



For experts we simulate the situation in the Trainer Toolbox: "Experts / Wind Fields".
Example: Way points of the two boats with right-hand wind at 15° and left-hand wind at 345°.
The new wind pattern "Wind Field" in the Tactical Sailing program offers challenging tactical scenes for special areas for training. A striking practical example is "Lake Garda (ITA)", which is surrounded by mountains with steep rock faces on the west and east shores in the north. A special wind field is created there on the rock faces in the west, which are heated by the sun. The experienced regatta sailor consciously steers towards this "edge" - and into the field. There, the direction and force of the wind are more favorable, e.g. through a "left or right turn". By tacking and then "lift up", he can then reach the windward buoy by a shorter route.

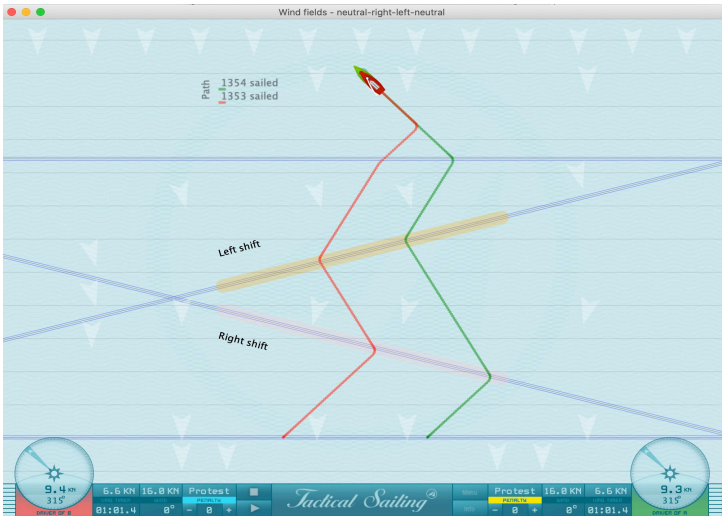


Wind fields: In the simulation, an extended "wind field" begins at a geometrically "sharp edge". In the drawing with four wind fields, the area of a "wind field" begins "at the bottom" at a line (edge at the bottom) that is "neutral" to the wind direction (360°) from left to right. The "field" then spreads "upwards" and is bounded by another "field". A new line (edge) with a 15° slope marks the subsequent new "wind field" as "clockwise". Several "wind fields" can overlap with different wind rotations, e.g. neutral

(360°), right (15°), left (345°) and neutral again (360°). Right or left turns in the "last wind field" are decisive for the distance the boats must sail.

A) Four wind fields: Neutral-Right-Left-Neutral

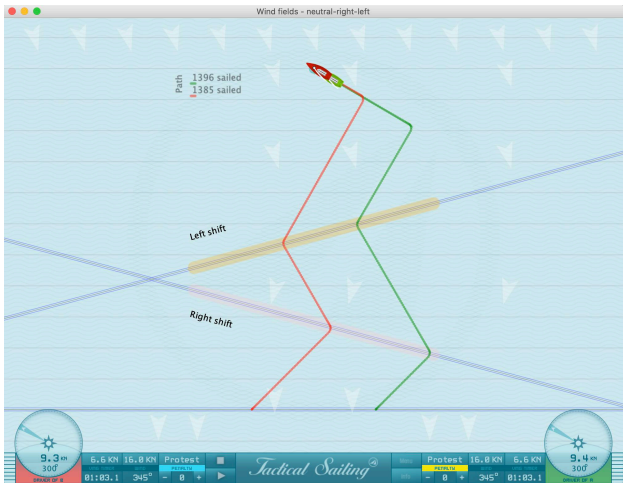
In the Tactical Sailing simulation, the two boats overlap at the windward buoy/finish on the screen, so that the actual difference "optical" and "measured" is hardly visible. For this reason, we have let the two boats sail separately.



Boats 1 and 2 show the turning point when reaching the "edge" of the wind field. Alternately, boat 1 or boat 2 is slightly ahead *.
At the windward buoy, the green boat reaches the finish first, as it was on the side of the right-turner(!) from 345° to 360° (lift). The measured distances at the windward buoy differ slightly*:
Red: 1377m
Green: 1354m
Difference: 23m
Lead Green: 23/1377=approx. 1.67%
approx. 4-5 boat lengths

Green lead: right turn(!) from 345° to 360° (lift)

B) Three wind fields: Neutral-Right-Left

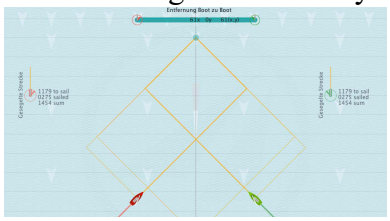


At the windward buoy, the red boat reaches the finish first, as it was on the left-turning(!) side of 15° to 345° (lift). The measured distances at the windward buoy differ slightly *:
Red: 1385m
Green: 1445m
Difference: 60m
Lead Red: 60/1445=approx. 4,15%
approx. 10-12 boat lengths

Lead Red: Left turn(!) from 15° to 345° (Lift)

*** Summary**: Left-hand and right-hand shifts do not neutralize each other! In the last upper wind field, the slight difference arises because the boats do not reach the wind shifts at the same time, but in practice these can account for a lead of up to 12 boat lengths (Laser, 470).
Tilo Schnekenburger explains the advantage on his website: "The advantage of the last wind shifter before the windward buoy makes a difference. This underpins an essential strategic principle in racing:
Sail the last beat to the windward mark in one "lift" if possible".

How can the geometric conditions of the "last beat" be clearly shown?
The following scenes clearly show the realization:

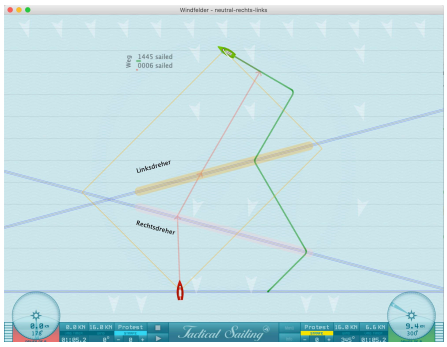

Initial situation Wind 360°


Left turn -345°: Red in front

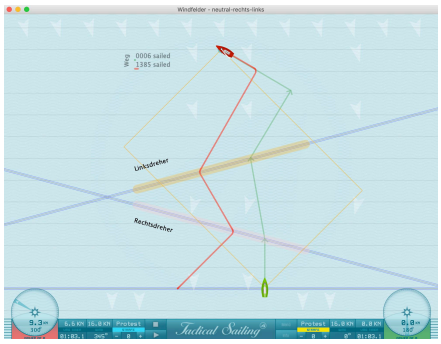

Right turn +15°: Green in front

Lessons learned on left and right turns:
Principle: Sail the last beat to the windward mark in a "lift" if possible.
o Left turn -345° "lift" on the red boat, red is at the windward mark in front.
o Right turn +15° "lift" on the green boat, green is in front at the windward mark.
The further the horizontal distance, the greater the distance between the boats.

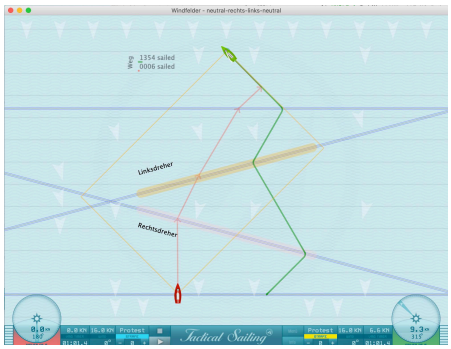
Remarks on the numerical values in the simulation:
The simulation of Tactical Sailing (TS) shows the sailed "ways" on the wind fields. The numerical values (points/pixels or meters) are explained in **chapter 9.2 Calculated facts**.
In the simulation, the two boats overlap at the windward buoy/finish on the screen, so that the actual difference "optical" and "measured" is hardly visible. For this reason, we let the two boats sail separately, the "turning points" and "waypoints" are fixed in the TS program and can be used without manual operation. The second boat then "stands still in the wind". The differences in the measured distances are then clearly visible.
See the following examples with three / four wind fields and their measured distances.



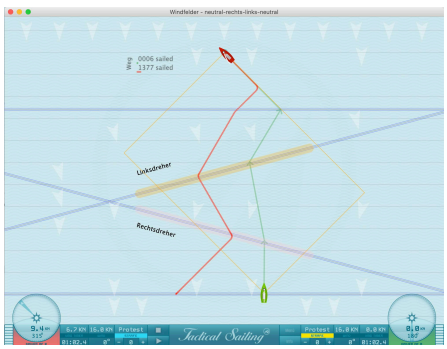
Three wind fields: Boat Green 1445m



Boat Red 1385m



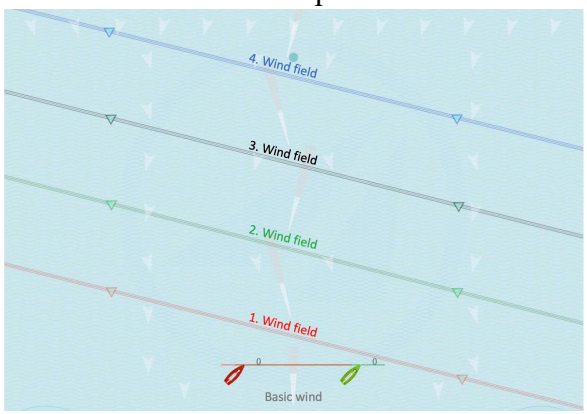
Four wind fields: Boat Green 1354m

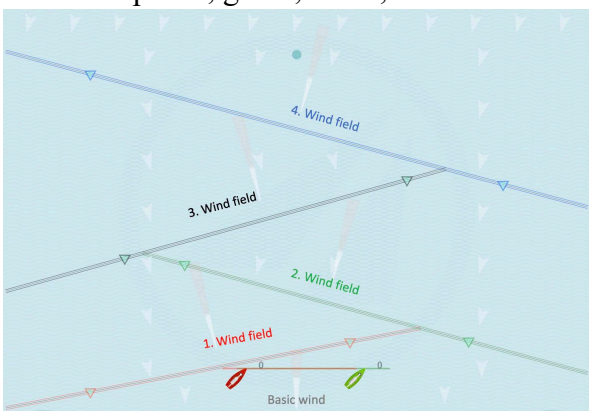


Boat Red 1377m

C) Change wind fields flexibly

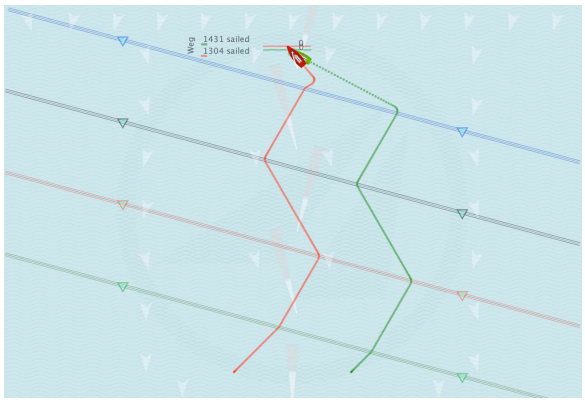
Menu: "Experts / Wind fields - flexible - left and right shifts".
Wind fields are bounded by wind edges, they can be moved as desired.
Each wind field is limited by a colored line, the 'edge'.
The 'position' and 'inclination' of the wind edges can be moved as desired.
Use the triangular symbols to ‘drag&drop’ the wind edges to the desired position.
At each wind edge a new wind field begins, it extends 'upwards' in the direction of the wind arrow. Each wind field ends at the next wind edge and a new wind field is created. The borders of the wind fields overlap in the order from bottom to top: red, green, black, blue.

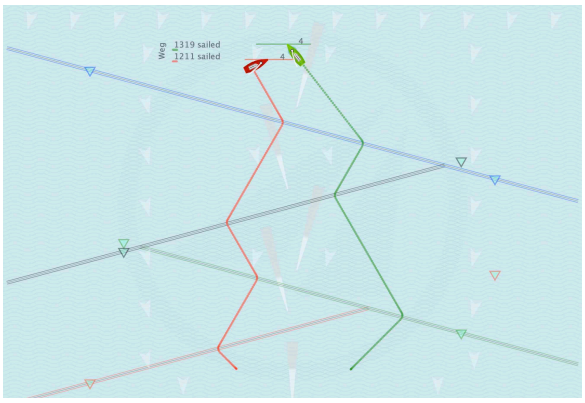




Clockwise shifts with 4 wind fields each with 15° inclination

Counterclockwise and clockwise shifts with 15° and 345° inclinations





Distance: Red: 1304, Green: 1431 = 127m Red: 1211, Green: 1319 = 108m

Wind direction and strength can be changed with 'drag&drop', they are indicated with a white arrow in a wind field - near the wind edge. In addition, so-called wind vanes - small white triangles - can be moved as desired within the wind fields with 'drag&drop'.

Start / Pause / Stop / Save

Changes to the settings can be made before the start 'Play' or in the state 'Pause'.
With 'Stop' or 'ESC' the changes are saved.
Switching between the initial and saved settings:
Click 'Stop' or 'ESC' (toggle) again to switch between the two settings.
Control 2 boats to ‘tack’ with the buttons:
Boat 1: 'G' for green
Boat 2: 'R' for red

9.2 Calculated Facts

The simulation calculates important facts for reacting to wind shifts. When a wind shifts, it can significantly shorten the way to the windward mark (gain) or unnecessarily prolonged it (loss). The Simulation instantly calculates both the already sailed and the theoretical still-to-be-sailed path in "real time".

Numerical values in the simulation: The internal basis of the calculated facts in the program is represented by 'dots' (dots, pixels) on the screen: total 1000x700. The distance between the leeward and windward mark - or the circle diameter - measures 500 dots and fits on screen.
Measurement Unit: For didactic reasons, when the calculated values are displayed, they are converted into the “decimal unit” of measurement: meters (m). The calculated values, calculated as 'dots' (dots, pixels), are multiplied by the factor 2, so that e.g. a circular diameter of 500 dots internally calculated will be displayed as a number of 1000(m). A regatta stretch is here about 1000m, so that a good comparison can be made to practice.
In order to simplify readability on small screens, the measurement unit "Meter (m)" is not displayed in the program at all, but only the numerical value, e.g.: 1000. Starting with the program and documentation version of October 2017, decimal measurement system is displayed. Some use of older copies of screen shots in this documentation are still based on 500 dots, the numbers must be multiplied by a factor of 2.
The models of the boats have no real units and are not drawn to scale. Boats can be seen for didactic reasons as a model with the typical contours and with a length of approx. 50-70 dots drawn, size of a dinghy is similar to a yacht. For comparative measurements and manoeuvres, the geometric centre of the model is used.
Tolerance range: Theoretically calculated and practically measured distances are within a tolerance range of +/- 10 points, e.g. from boat to boat or from boat to mark. The reasons are: tolerance of the measurement in the rhythm of the simulation or manual operation of keys and the reaction of the computer. The boats must be within the area of the lay lines. Calculated facts may be rounded up or rounded off and displayed without commas.

Reset the calculated values: The options for the calculation of the distances should only be activated in the "stop mode" (ESC key) in order to allow a correct calculation. The "Reset" of the calculated values is carried out automatically by pressing the "ESC" key. Most calculations are also updated in "Pause mode" or recalculated after the next "Play", e.g. the display of the bearing will only be updated with the next "Play" when the boat is re-oriented.

9.2.1 Distance to sail

In this documentation, an extreme **wind shift of 45°** is calculated for didactic reasons, although this is unrealistic in a real regatta. With a 45° wind shift (extreme value observation), known trigonometric calculations result in the right-angled triangle and the characteristics of the calculated values - whether linear or non-linear - become visible. For comparison with the practice, wind shifts are then calculated by 5°, 10° and 15°, which are quite common in a regatta.

The distance to be sailed is 1414m for a boat with a tacking angle of 90° (for example 470er) in the simulation "Chance and Risk". The two limbs are the "leeward line" and the "lay line", each with a length of 707m. The line of the route - and thus the shortest route between the downwind mark and the upwind mark - is 1000m long. Depending on the wind direction change (1 ° ... 45 °), the distance to be sailed is shortened or lengthened. A distance of 1414m (100%) is valid for the comparison of a route without any wind shifts.

Extreme value consideration for abbreviation and extension: the **wind shifts by +45°:**

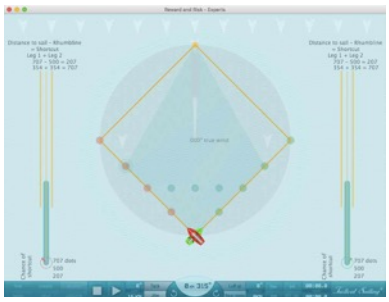
1) **An abbreviation (shortcut)** of -414m (approx. 29%) is theoretically possible,
   a) if the wind at the leeway mark is increased by max. 45°, then this route is obtained as an "abbreviation" and directs strait to the upwind mark, e.g. this route is the "optimization potential". At this point at the downwind mark, the "chance" is in theory greatest to a maximum shortcut. Each wind shift of 1°... 45 ° is "a part" of this **Abbreviation1** (0...- 414m).
   b) If the boat moves along the leeward line to the upwind lay line, then the potential of the abbreviation (shortcut) becomes smaller and smaller (-414m ... 0). If the wind would then shift at the current position, one could reach a part of the maximum possible abbreviation (-414m...0).
   c) The length of the already "sailed path" on the leeward line until the wind shift begins must therefore be taken into account when calculating the shortcut (see **Abbreviation2**).
2) **A prolongation (extension)** of + 293m (about 21%) is theoretically possible,
   a) if the wind is already at the leeward mark by max. + 45 °, then at first an "abbreviation" is created to the upwind mark. If one controls along the leeward line to the lay line, then it is noticeable that from the "abbreviation" only at a position with a bearing angle of approx. 68° then an "extension" occurs. One could therefore speak of the beginning of a "risk zone" from this "bearing angle 68°". Then the potential of the extension (risk) becomes ever greater (0...+ 293m). Once the lay line has arrived at the tacking point, the length of route is as follows: 1707 = (707 + 500 + 500). Compared to the distance without wind shift: 1707-1414 the difference of +293m (see **Extension1**) is created.
   b) The max. prolongation - in contrast to the abbreviation - does not take place on the leeward mark, but rather when the lay line is reached at the tacking point, when the wind shift increases by max. 45 °.
   c) The length of the already "sailed path" on the leeward line until the wind shift begins must therefore be taken into account when calculating the extension (see **Extension 2**).

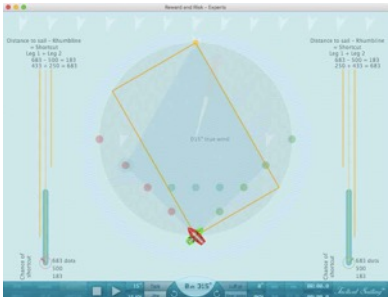
Abstract Special case: Change of wind direction of + 45° at downwind and tacking point

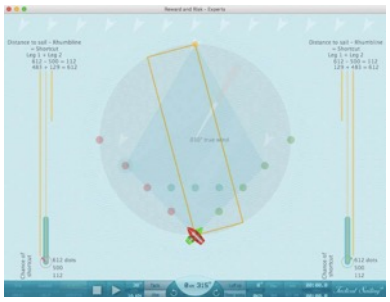
We know two extreme values for an assumed wind direction change of + 45° at two positions:

- At the downwind mark the max. shortcut -414 corresponding to 29%,
- At the tacking point the max. extension +293 according to 21%.

Shortcut the distance 11%
For the comparison of a distance to be sailed without wind shift, the normal path to sail 1414m (100%) applies.
Special case: Wind shift 45° - Shortcut -29%
The max. shortcut is already on the downwind mark. A theoretical wind shift of max. +45° at the downwind mark shortens the distance to be sailed on the course of 1000m. Compared to the distance without wind shift: 1414m to 1000m the difference of max. -414m and thus an **abbreviation of max. -29%.**
Note: The long leg and short leg as well as the tacking points on the lay line are always within the area of the regatta field - the circle!


Wind 0°: shortcut 0%


Wind 15°: shortcut 3%


Wind 30°: shortcut 13%

9.2.2 Shortcut – towards layline

The program and wind system-1 and wind system-2 can be used to simulate situations which do not occur at the downwind mark only, but also away from it towards lay line.

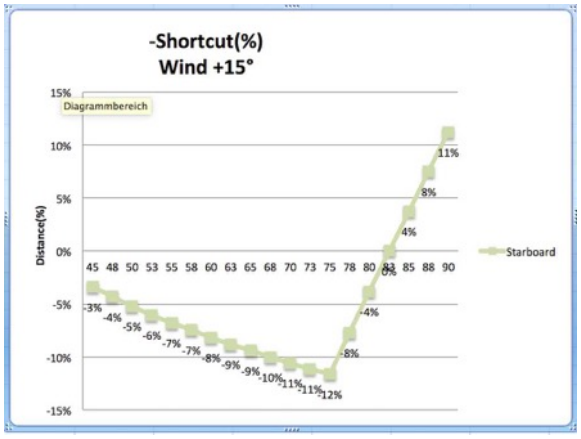
Normal: wind direction 15 ° - Shortcut -11%

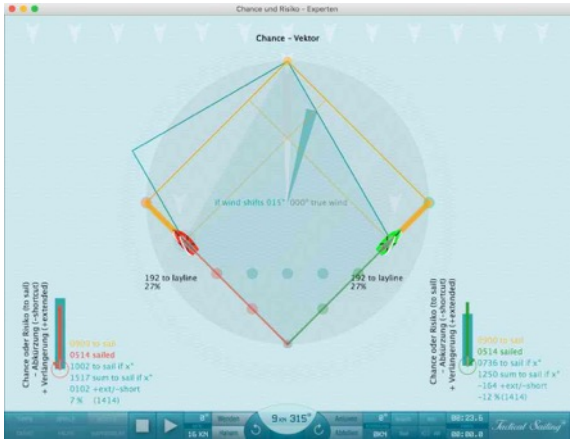
Two boats sail on starboard and port on the way to the lay line along the leeward line.

The two boats are to start on the downwind mark, there is no (!) long leg or short leg, the wind direction is 0°. The wind suddenly turns from 0° to + 15° with a bearing of 75 °.

Example:

The shortcut for the green boat on starboard tack is then 159 and is therefore -11% (-11.24%) compared to 1414, see screenshots and graphics.

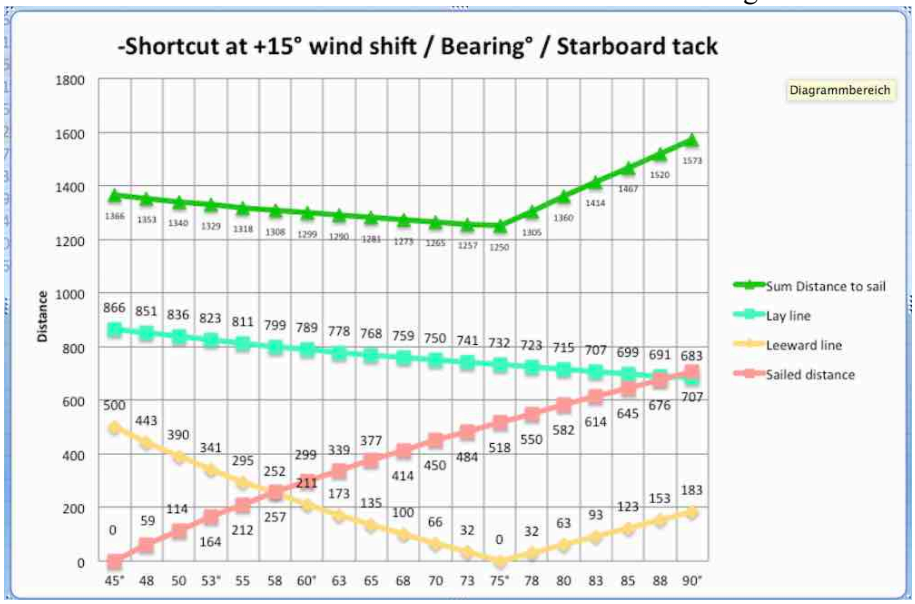




Example: Bearing angle 75°, wind direction to +15°,
Green boat right on starboard: Chance of max. shortcut (-11%),

The following diagram shows the entire course of the "Shortcuts" (length of the distances) with a wind rotation of +15°. At the downwind mark, the "sum of the route to be sailed" is 1366, with a bearing of 75 ° it is down to 1250. The difference between the normal route 1414-1250 = 164 corresponds to approx. -12% compared to 1414.

>>> The basis for the "Shortcut" lies in the reduction of the length of the "leeward line" and "layline".



Shortcut: Sum of the sailing distances from 1366 to 1250 at bearing angle 75°

Tip for the practice: You should think about your tactical options, if you have a bearing on the leeward line reached about 75°. Until there is your "chance" on a shortcut for the green boat on the right still about -12% (max).
Caution: Even closer to the lay line (75°...90°), the chance drops rapidly to 0%, and even increases by 80° to an extension (+11%) when you drive up to the lay line. On the other side of the regatta field, the red boat on the left increases the risk of an extension from 7% to 11%.

The values are calculated and displayed in the following options:
Choose Tactic / Chance and Risk:
• Direction to the windrow (°)
• Chance vector: to lay line (%),
• Windsystem-2: to sail, + extended and -shortcut.

See detailed explanations and tactical advice on the topic "Long leg-short leg, Chance and Risk, Distance Made Good (DMG), Switch Point, header, lift, etc." at:
© Tilo Schnekenburger: Die Geometrie des Regattasegelns, (in German language), chap. 3.5.2, 5.4.3 and 6.2.9.

Extension of the distance 11%

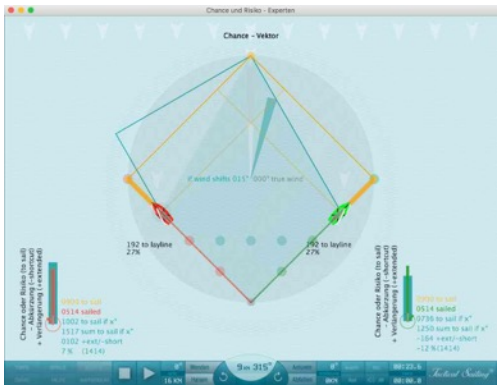
For the comparison of a sailed route without wind shift, the normal route length of 1414m (100%) applies.

Normal situation: Change of wind direction

Compared to the distance without wind shift: 1414 to 1573 the **extension of +159 arises about 11%** (+ 11,24%). With the help of the two wind systems-1 and -2 the calculation of the length of distances can be observed. The max. Extension, in contrast to the abbreviation, does not occur on the downwind mark, but rather only when the lay line is reached, if wind would shift to +15°. If one sails along the leeward line to the lay line (bearing angle 45°...90°), then the potential of the extension (risk) becomes ever greater, the sailed distance is 707 (sailed) when the lay line is reached.
There are also to be "two new legs" to sail, consisting of:

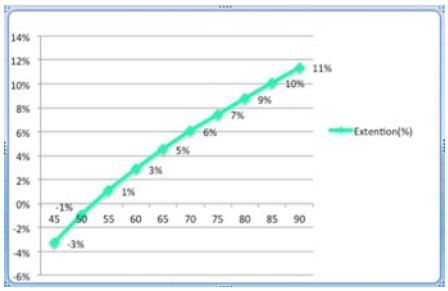
- the lengthening of the leeward line by 183 plus
- the shortening of the lay line by 24, i.e. the remaining length of the "shortened" attachment line of 683,

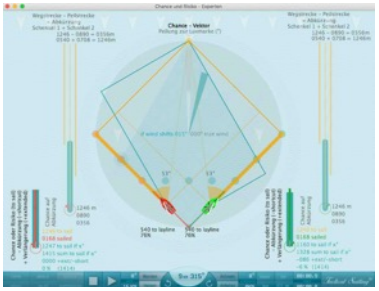
overall, therefore, a length of 866 (to sail) for both legs.

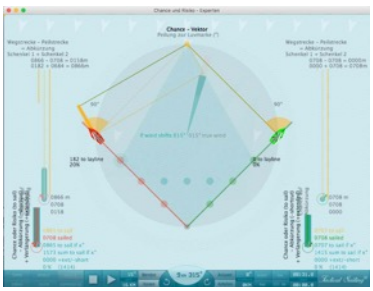


Note: There is currently a lack of sufficient vocabulary in the literature for the geometrical considerations to precisely formulate a description of the dynamic processes "sailing along the leeward line".
Alternatively, one could regard the "two new legs" as a "new virtual extension lay line". The length of the lay line from the original 500 on the downwind mark is extended to 683 at the "new tacking point", thus again by the length change of 183!

The total distance to sail is: 1573 = (707 + 183 + 683).
Compared to the distance without wind shift: 1414 to 1573 the **extension of +159 arises about 11%** (+ 11,24%). See the graph with the bearing angles from 45° to 90°. Seeing the program the values for: Bearing angle, sailed, Distance to the anchor line, to layline, to sail, sum, + extended / -shortcut.

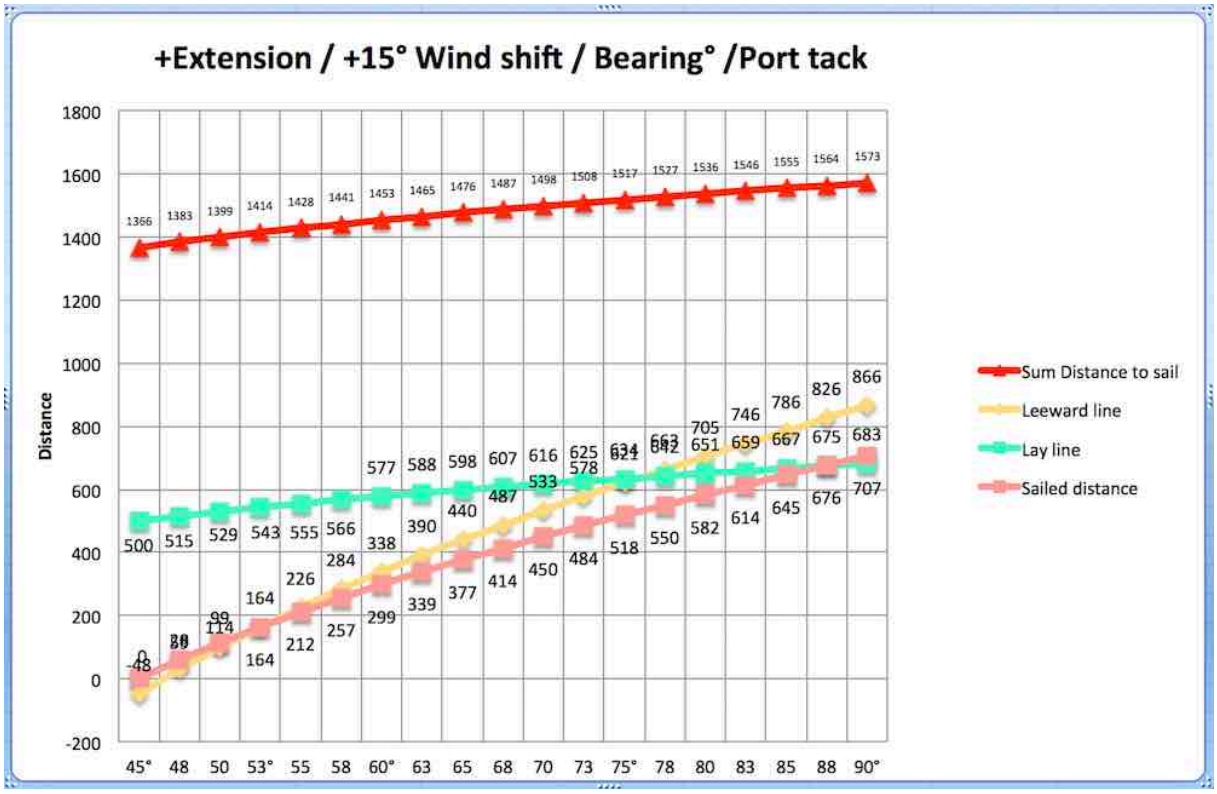






Extension (%) at bearing angles from 52.5°...90° and wind direction 15°; Extension max. 11%
The following diagram shows the entire course of the "extension" (length of the distances) with a wind shift of +15°. The "sum of the path to be sailed" is 1366 at the downwind mark, and 1573 at a bearing angle of 90°.

>>> The basis for the "extension" is the increase of the length of the "leeward line" by 183 plus the slight reduction of the lay line by 24 to the value 683!
The sum of these legs gives the extended path to sail.



Extension: Sum of the path to be sailed from 1366 to 1573 with a bearing of 90°

Special case: The "Offside"

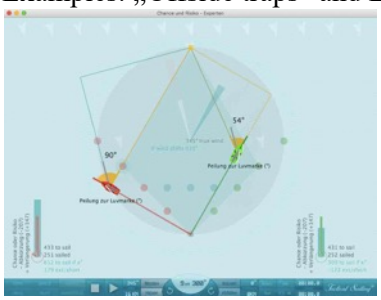
With the help of the program, other situations can be simulated in order to get an idea of the extension (risk) when you fall into a "offside trap". What is the extension if the boat starts on a "short leg" and then a "lift" occurs? See the following examples with the wind direction (°) and extension (+). These extensions are "extreme values" because they correspond to the max. Value of +293!

Note: The tacking point at the lay line is always outside the area of the regatta field - the circle - in the "offside"!

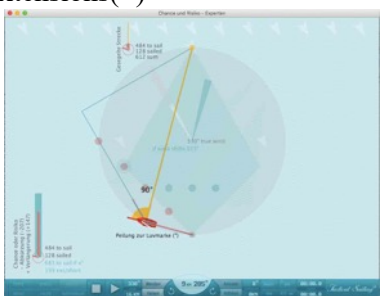
* Source: © Tilo Schnekenburger: Die Geometrie des Regattasegelns, (in German language) Chapter 6.2.6.

Lift or Header of 15°

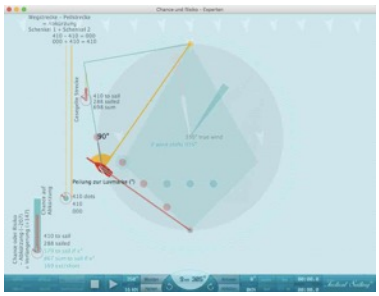
Examples: „Offside traps“ and Extensions(+)



Wind: 345°, Bearing 90°: +354



Wind: 330°, Bearing 90°: +398



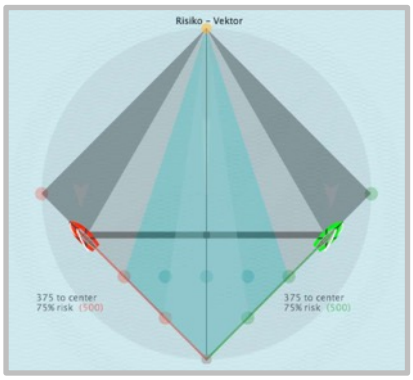
Wind 350°, Bearing 90°: +306

9.2.3 The Risk - Reward - Zones

The "Risk-Reward - Zones" marked in color in the picture represent tactical "decision areas", the border lines of which should not be exceeded or respected on the starboard tack and port tack. These zones are dependent on the tacking angle of a boat.
For practical reasons, a boat with 90° tacking angle (e.g., 470) and a wind direction of 360°, which can vary by +/- 15 °, are shown in the drawings.

The various segments and boundary lines are characterized by different colors:

- dark gray surfaces
  - They represent the **absolute loss zone** at a distance of 75% to 100% to the middle line. (see graphic)
- light gray surfaces
  - They indicate the maximum risk zone and the maximum chances zone at a distance of 50% to 75% of the middle line.
- Turquoise surfaces
  - They indicate the zone with medium risk and / or medium chance at a distance of 25% to 50% to the middle line.
- light turquoise surfaces
  - They indicate identify the zone with minimum risk and / or minimum chance at a distance of 0 to 25% from the middle line.



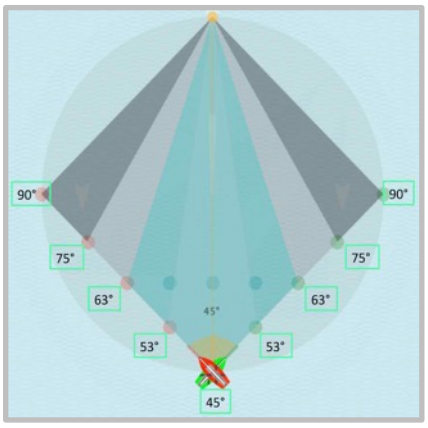
In practice it is helpful not to determine these "zones" by percentage points to middle line, but by roughly finding a bearing angle(°) in steps of 10° from the boat to upwind mark.

Percentage range (%):	0%	25%	50%	75%	100%
Bearing angle (°):	45°	55°	65°	75°	90°

Especially as a bearing on each boat by simple observations, e.g. bearing on prominent points behind the upwind mark, estimates through exercise, guidelines on deck or even with appropriate instruments. A rough geometric view of the racing field - here the playing field - provides the facts that can be displayed in the simulation in the "Options / Tactic" menu.

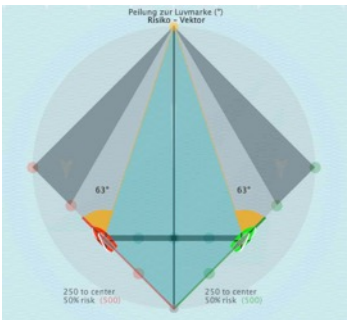
Bearing and boundary lines in the simulation

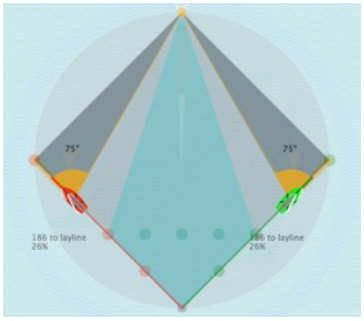
The playing area consists of a circle, the diameter is the distance from the downwind to upwind. The circle is subdivided into color different segments, which are delineated by bearing angle (bearing °). The lines of the segments from 45 ° to 90 ° from the boat to the upwind mark are the boundary lines of the segments.
The boundary lines of a segment are marked by tactical decision points to indicate the transitions between the zones which may be essential for a particular "assumption", e.g. with possible wind shifts. In the simulation, wind shifts can be set in 5° steps using the "N and M" keys. The decision points are on the leeward line at a distance of 25%, 50%, 75% and 100% of the middle line. This results in the following calculated bearing angles of 53°, 63°, 75°, 90°.

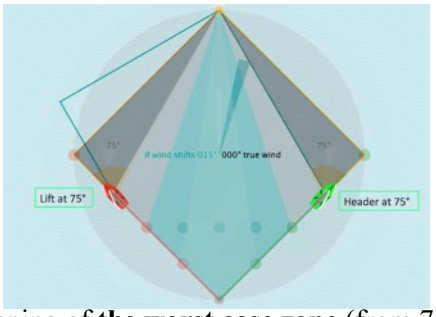


Risk of extension 11%

The zone with the absolute loss - "**Worst Case Zone**" - begins at approx. 75° bearing to the upwind mark (dark grey area), if the wind with a "lift" by +15° to the other, the “wrong side”. The risk of an increase of +7% increases to the highest risk of extending the path to +11% and lies on the lay line with a bearing of 90°, the “**Worst Case Point**”. The "Risk vector" option displays the distance from the boat to the middle line. The larger the distance from the boat to the middle line, the higher the risk of a stretch of the path (0% ...11%). The transitions of the zones vary because they are influenced by the wind direction (e.g., 15°). A boat with a 45° close hold angle is considered.



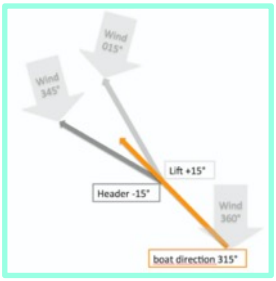




Mean risk: bearing 63° Maximum risk: bearing up to 75° Beginning of **the worst case zone** (from 75°)

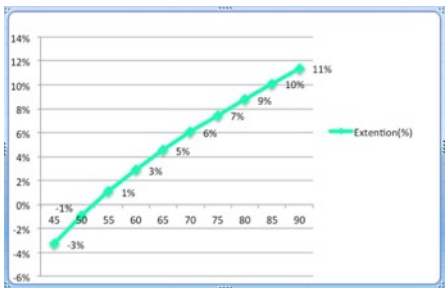
Example: The red boat is approaching on port tack with the direction of travel 315° of the lay line.

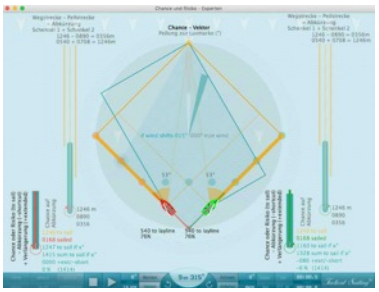
- ❖ The risk of an extension in the distance increases and is constantly increased, since the wind could shift at any time to the other, the "wrong" side with a "lift" (+ 15 °).
- ❖ If the boat were to sail to its tacking point, it would increase its risk continuously from 0% to 11%, thus reaching the point with the highest loss on the lay line.

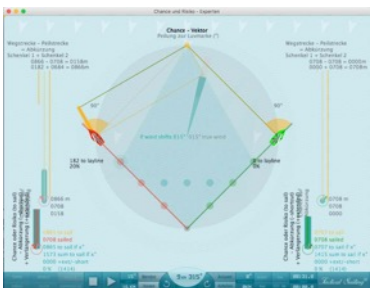


Lift or pull by + 15 °

Practical tip: "Avoid the lay line" is a familiar rule of thumb.
In practice, wind shift of +/-15° are realistic and can result in a 7% to 11% (11,56%) extension of the distance. For a total distance to sail of 1414m, the extension is about 100 to 150m, which could be about 20-30 boat lengths of a dinghy (e.g., 505, etc.).







Extension (%) at bearing angles from 52.5°...90° and wind direction 15°; Extension max. 11%

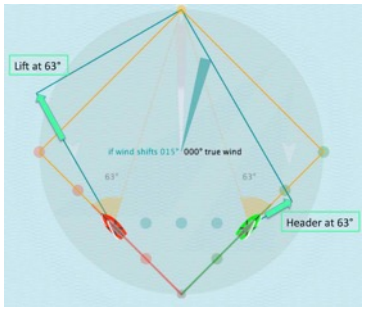
Risk of extension: The percentage stretch extension (+%) obtained with a wind shift of e.g. 15 °, is indicated by the following bearing to the upwind mark:

- ❖ High risk: extension 7% ... 11% bearing from 75° ... 90°
- ❖ Medium risk: extension 5% ... 7% bearing from 63° (62.5 °) ... 74°
- ❖ Low risk: extension 0% ... 4% bearing from 53° (52.5 °) ... 62°
- ❖ At downwind mark: shortcut -3% ... 0% bearing from 45°... 52°

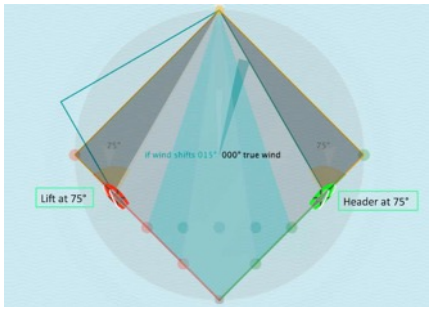
It is recommended to display additional options in the "Tactic" menu during the exercises, e.g.: Direction to the upwind mark, Wind system-2 and the sailed path.
(See the detailed calculations in the chapter "Calculated facts").

Reward of shurtcut 11%

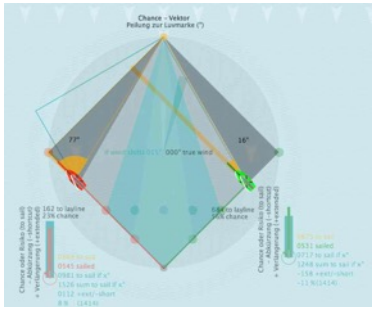
The zone with the highest chance for a shortcut the "**Best Case Zone**" begins halfway at a distance of 50% to the middle line (light grey area) with a bearing of 63°. This applies to the case where the wind shifts to the "right side" with a "header" of +15° and then ends abruptly at approx. 74°, the "**Best Case Point**"!
But beware! There are no chances without risk! Risk tolerance can pay off because the greater the risk, the higher the potential gain of -12%. Along the path, there is no difference between "risk and reward" - both run parallel, regardless of whether you are sailing on the starboard or port tack.
But beware! With a bearing of 74 ° the chance ends, because at 75° the absolute loss "Worst Case Zone" begins for the sailor.



Shortcut -10% at 63 °



Shortcut -11% at 74 °


Tack: Collect a reward -11%

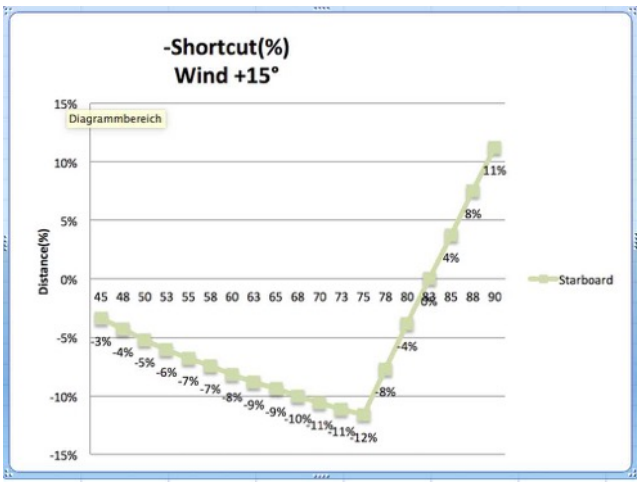
Example: The green boat approaches on starboard tack with 45 ° direction of the attachment line.

- ❖ The chance of shortcut of the path occurs when the wind shifts to the "right side" with a "header" (+15°). With a bearing of 63° one can already "cash out" the "gain" on the distance of -11% with a tack on the other side.

Practice: This light gray opportunity zone rewards the courage to take a risk and hope that the wind will turn to the side you have chosen - and it will actually turn in your favor! The profit is greatest at the end of this zone at 74 ° with 11% distance cut! The transitions of the zones vary because they are influenced by the wind direction (e.g., 15 °). A boat with a 45 ° wind angle is considered.

Reward of a shortcut: The percentage shortcut (-%) obtained with a wind shift of e.g. 15 °, is indicated by the following bearing to the upwind mark:

- ❖ Over stand lay line: extension -12% ... +11% bearing from 75° ... 90°
- ❖ High Reward: shortcut -10% ... -12% bearing from 63° (62.5 °) ... 74°
- ❖ Medium Reward: shortcut -7% ... -9% bearing from 53° (52.5 °) ... 62°
- ❖ Low Reward: shortcut 0% ... -6% bearing from 45°... 53°



It is recommended to display additional options in the "Tactic" menu during the exercises, e.g.: Direction to the upwind mark, Wind system-2 and the sailed path.
(See the detailed calculations in the chapter "Calculated facts").
Maximum shortcut: -11%.

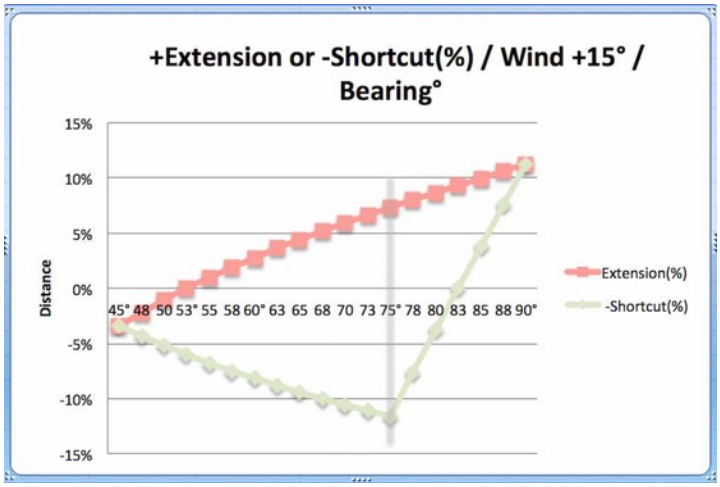
9.2.4 Summary: Distance calculation +/- 11%

Practice: wind shifts of +/-15°
In practice, wind shifts of +/-15° are realistic and effect a change in the distance of approximately:

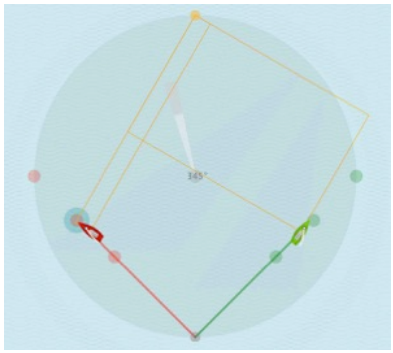
- **-11% shortcut** at a bearing angle of 75° or
- +**11% extension** at a bearing angle of 90°.

Theory: Wind shift +/-45°
There is theoretically a "chance" of max. shortcut of -29% of the distance.
There is theoretically a "risk" of max. extension of + 21% of the distance.
The greater the change in the wind direction (0°...45°), the larger

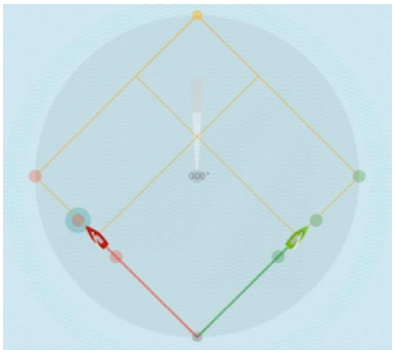
- the shortcut (0...-29%), if you are on the "right side",
- the extension (0...+21%), if you are on the "wrong side".



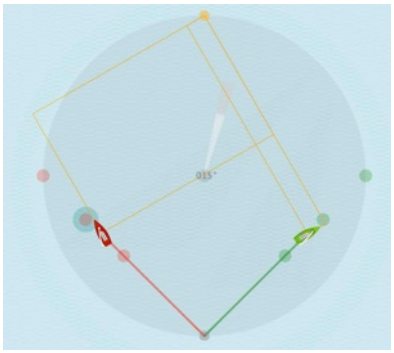
Example: Wind +15°, Shortcut -12%, Extension + 11%



Wind direction 345 °
Red on the "right side"
Green on the "wrong side"



Wind direction 360 °
Same chance, same risk
Same chance, the same risk



Wind direction 15 °
Red on the "wrong side"
Green on the "right side"

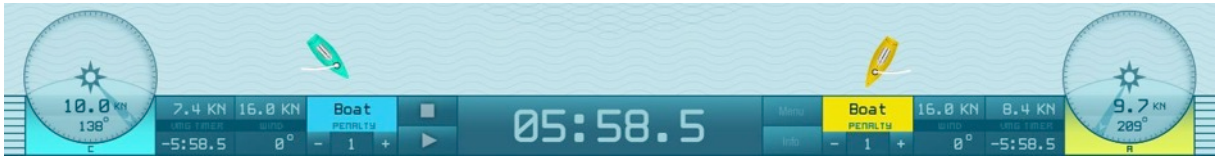
See detailed explanations and tactical advice on the subject "Risk, Lift and Header, Offside, etc." at:
© Tilo Schnekenburger: Die Geometrie des Regattasegelns, (in German language), chap. 3.5.2, 5.4.3 and 6.2.9.

10 Tips – Right of Way Rules

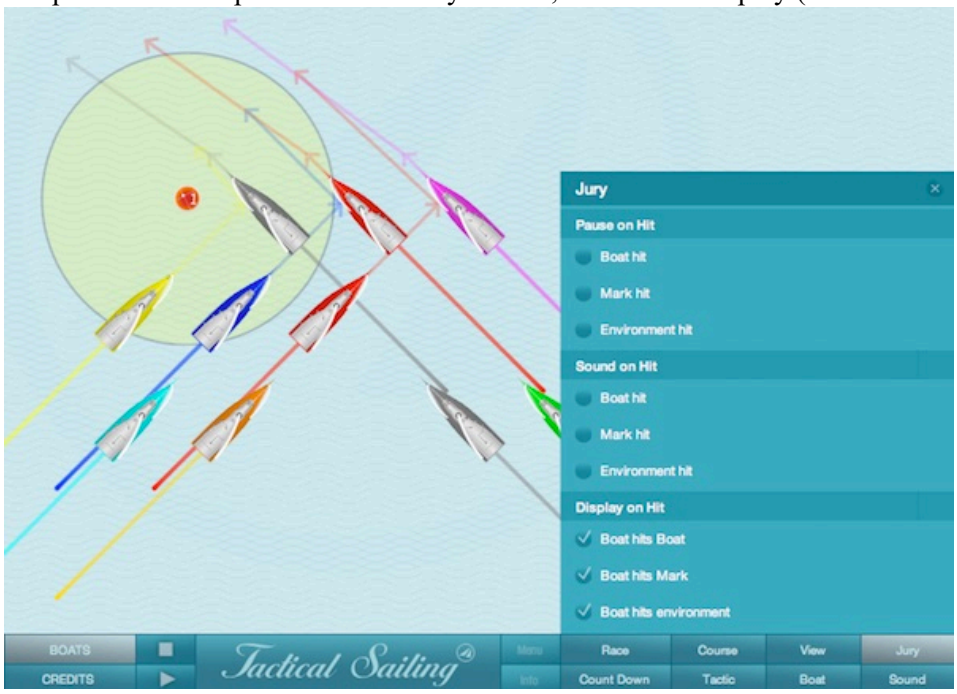
Tips are exercising or racing situations shown as **video clips**. Like usual the video clips they are easy to use. Coaches can show them without prior preparation.
A selection of the Tips Right of Way Rules, which are fully included in the "Boat Against Boat" program package, is also shown in Tips Tactics.

10.1 Umpire

The umpire has the task of rigorously observing the course of the game. He or she can even stop the game, resolve a situation, apply rules, penalize or request for redress. Each player can also lodge a protest by using the “Protest” key thus pausing the game. Infringements can be interpreted and immediately decided mutually by the players or by (fictional) water umpires. A so-called “Penalty Account” provides current information about the number of demerits for each sailor. The account is automatically updated and can be adjusted manually.



In the Coach’s Toolbox, infringements due to contact with an opposing boat are recognized “automatically” by the program. Many other infringements are also registered: contact with buoys, crossing the start line (OCS) and misconduct during the starting phase. The infringements are indicated by acoustic and optical signals. Other right of way situations are distinctly illustrated in order to make the corresponding rules “visible,” e.g. zone, inside position, overlapping, leeward before windward. With these functions, it is easier to show and discuss many tactical scenes that are usually difficult to explain.
An umpire can automatically pause the program when an infraction occurs to make it visible to the competitors. See: Options: “Menu/Jury” Pause, Sound and Display (bubbles on the water).



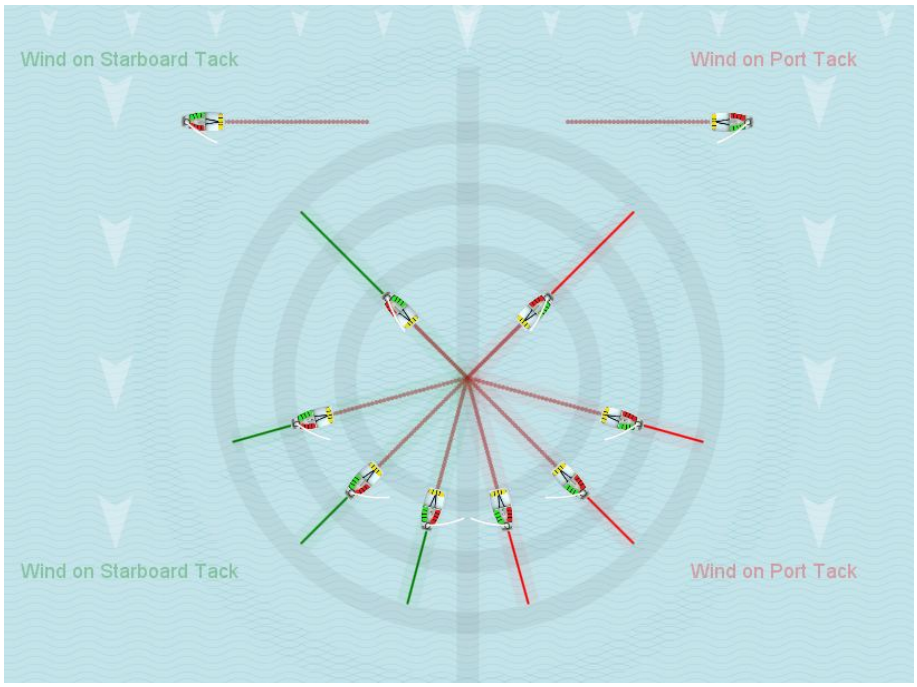
10.2 Basic Racing Rules

The basic rules of right of way are defined by the wind! In “Racing Rules of Sailing” the definition of right of way states: “A boat has right of way over another boat when the other boat is required to keep clear of her.” E.g. Rules 10, 11,12 and 13:

- Boat on opposite tack - Wind on Starboard or Port (10)
- Boat on same tack with overlap - Leeward before Windward (11)
- Boat on same tack - without overlap (12)
- While Tacking - Keep clear (13)
- Avoiding contact - do not cause damage or injury (14)

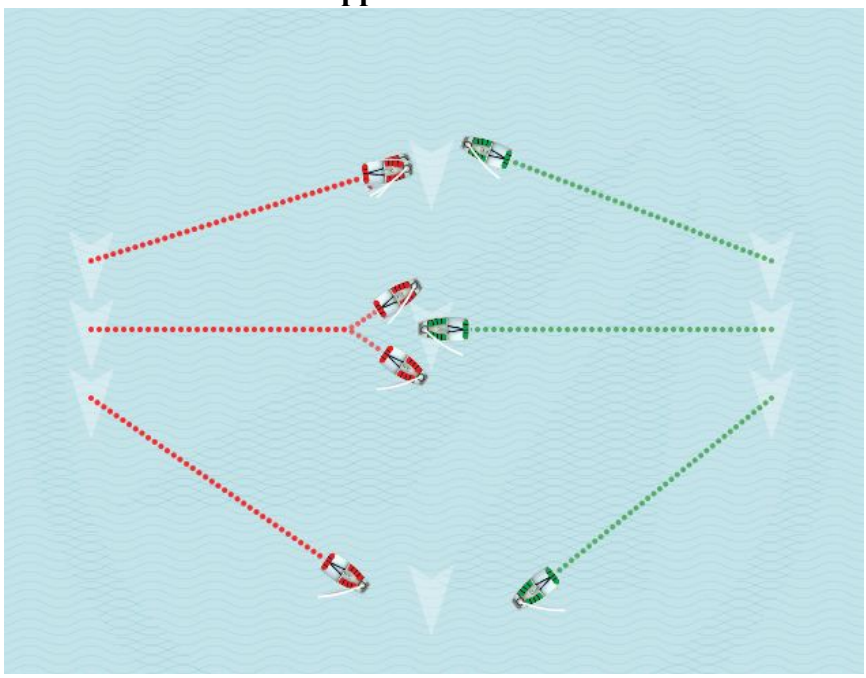
Note: All the simulations shown in the tips correspond to the ‘Racing Rules of Sailing 2021-2024'.

The following scene shows multiple boats with “wind from starboard and port” with the direction of the wind from above 360°



These basic rules are available in the **Main Menu**, “**Tips Tactic**” Like the video clips they are easy to use. Coaches can show them without prior preparation. “Game scenarios” are shown when sailing upwind - and with the following applicable rules of the “World Sailing” (WS). Rules 10-14 and 18 are simulated for players to inform themselves thoroughly about the right of way.
Uli Finckh released a comprehensive “rule set” question and answer quiz on his website: finckh.org. (English)
Examples of these tips for Rules 10-14 and 18 are shown as a simulation as video clips.

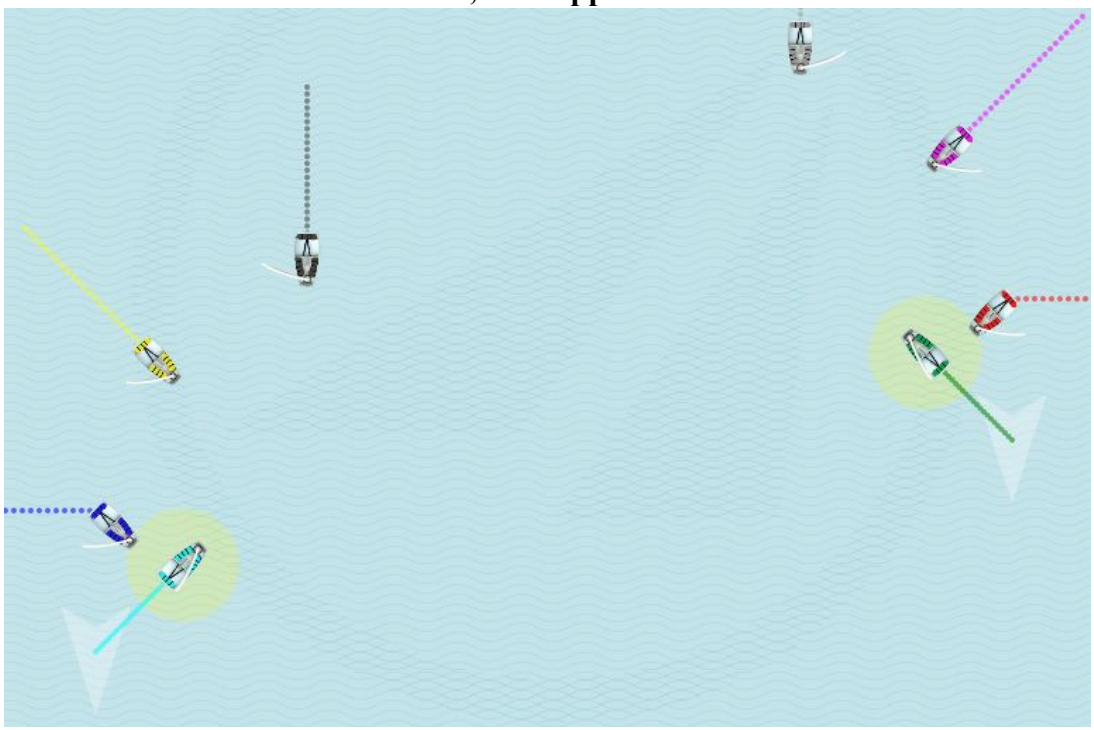
10.3 Rule #10 Boats on opposite tack



When boats are on opposite tacks, a port-tack boat shall keep clear of a starboard-tack boat (Rule 10).

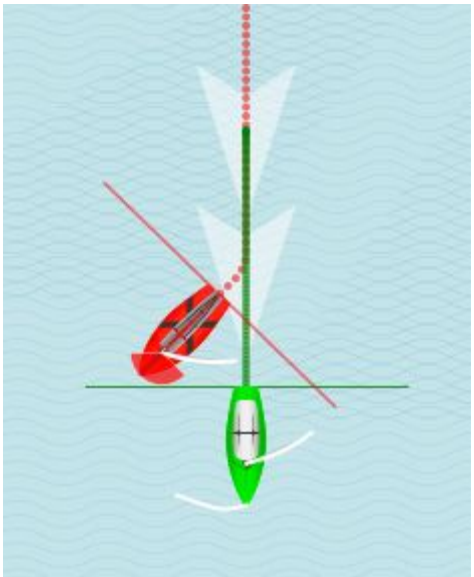
Example: Both boats above with wind from starboard have Right of Way.
The "turquoise" boat shall keep clear of grey and pink.
Caution: This situation does not refer to Rule 11: "Windward shall keep clear of Leeward"!

10.4 Rule #11 Boats on same tack, overlapped



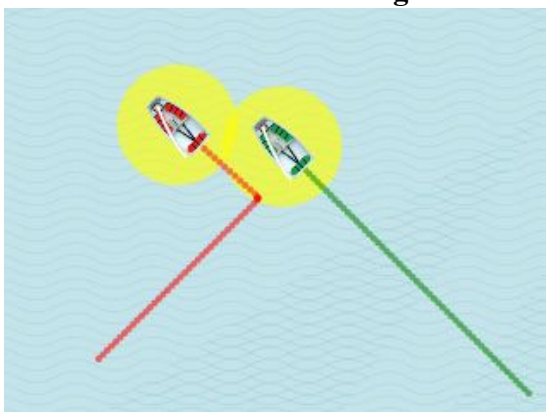
When boats are on the same tack and overlapped*, a windward boat shall keep clear of a leeward boat. (Rule 11). E.g.: The boats turquoise and green have Right of Way.
*Remark: Boats overlap, if they are not clear astern.

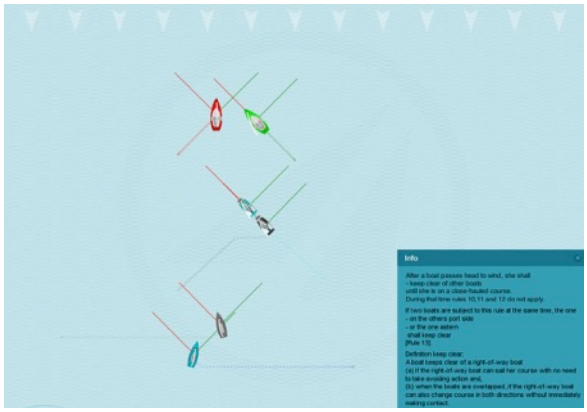
10.5 Rule #12 Boats on same tack, not overlapped



When boats are on the same tack and NOT overlapped, a boat clear astern shall avoid a boat clear ahead (Rule 12). E.g.: both green boats have Right of Way.

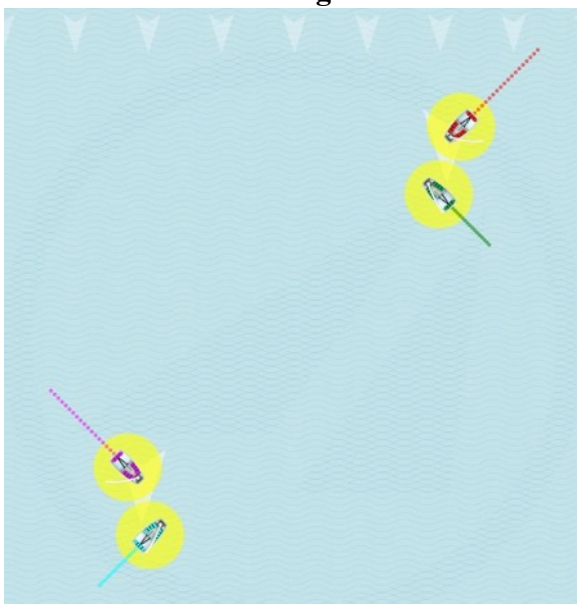
10.6 Rule #13 While Tacking





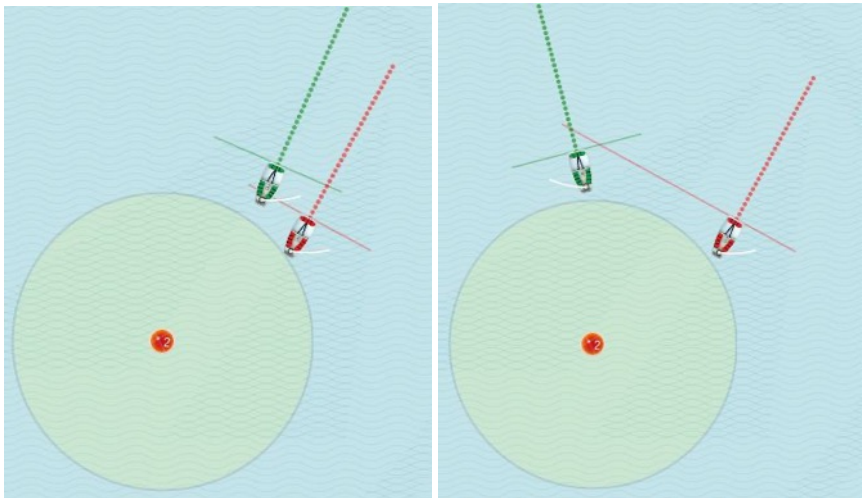
After a boat passes head to wind, she shall keep clear of other boats until she is on a close-hauled course (Rule 13). During that time rules 10, 11 and 12 do not apply. If two boats are subject to this rule at the same time, the one on the other's port side or the one astern shall *keep clear*.

10.7 Rule #14 Avoiding Contact

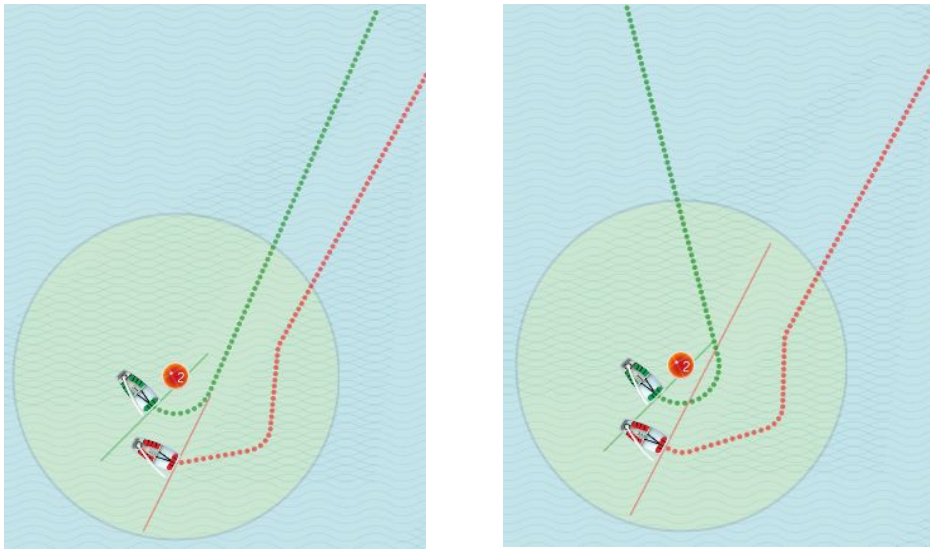


A boat shall avoid contact with another boat when possible.
However, a right-of-way boat or one sailing within the room or mark-room to which she is entitled, need not to act to avoid contact until it is clear that the other boat is not keeping clear or giving room or mark-room.

10.8 Rule #18 Mark Room

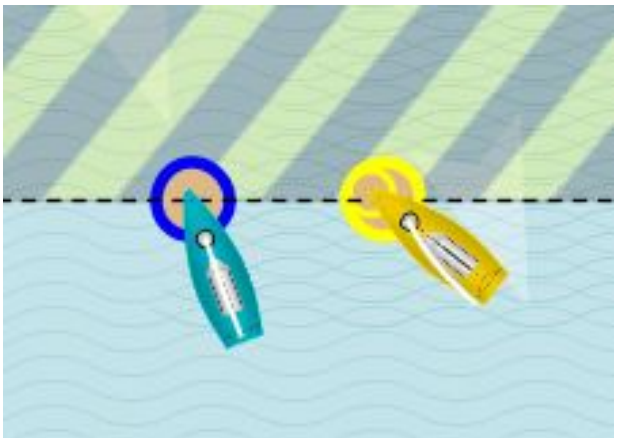


The explanation of Rule 18 (including 1-5; a-d) is extensively differentially discussed with experienced coaches. The criteria "Wind from opposite or same tack" are the same in many cases. Another main criteria are the definition of overlapping in front of the zone and the right of way inside the zone. The simulation displays this very clearly. See also “Tactical Manoeuvres”.



10.9 On Course Side (OCS)

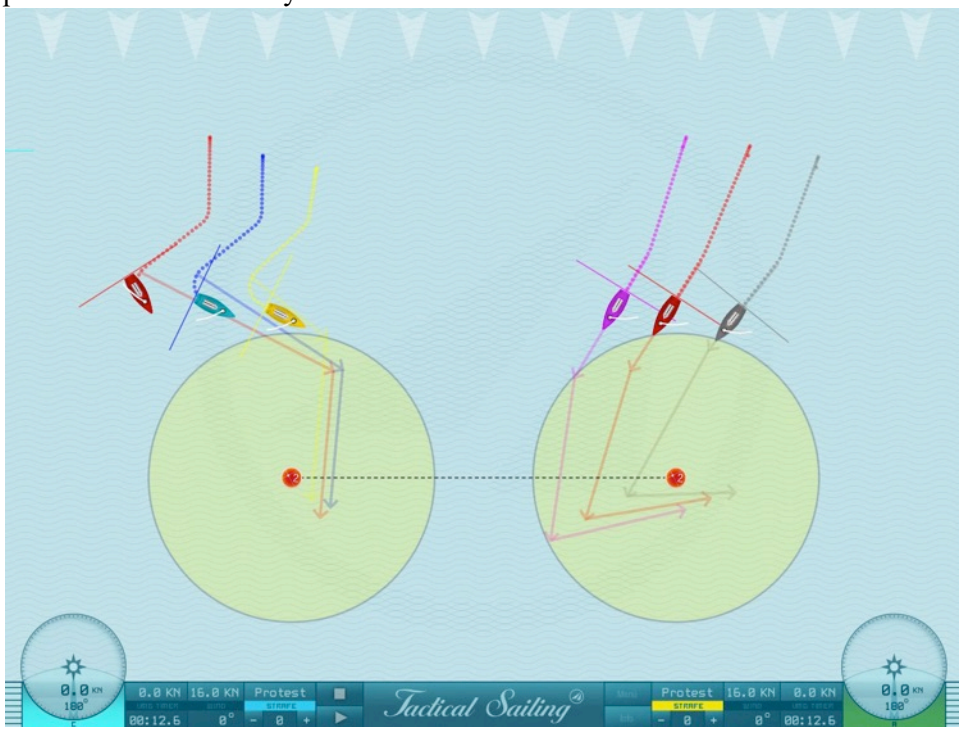
Crossing the start line (OCS) and timing misconduct during the starting phase can be controlled in the "Menu/Race". These infractions are automatically signalized by acoustic and optical signals. The penalty points in the protest account are automatically updated.



False Start - Starting line crossed (OCS)

10.10 Control Zone and Overlap

By switching On/Off the Menu Options: “View/Zone” and “Boat/Overlap Lines”, lines can be made visible to evaluate possible infractions. The umpire pauses the program (Pause/Play) and can adjust the protest account manually.



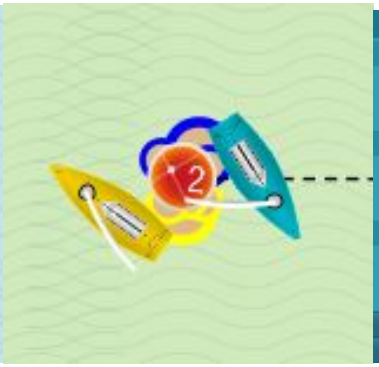
10.11 Control Contact with Boats and Buoys

In the Options “Menu/Jury” (on hit) can be switched On/Off, so that it is displayed visually, acoustically and paused.

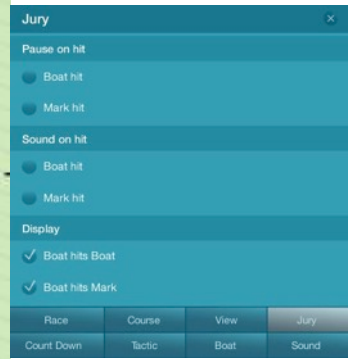
The boat’s protest account is automatically updated upon contact with a buoy.

Both protest accounts are automatically updated upon boat contact until the “question of fault” is cleared; the accounts are then manually adjusted.

Contact with Boat



Contact with the 2nd Buoy



“Jury” Options

11 Tips – Tactic

In the "Tips Tactics" rubric, tactical decisions can be found, which should be learnt to become successful in sailing. Professional sailors have revealed their tricks to us on how to stay a "nose length" ahead of other competitors, which is especially important in a regatta.
These important "Tips tactic" can also be called up as **video clips** without additional operation on the PC - only with the "1-click operation": Play-Pause-Stop"!
Choose Menu: **Tips Tactic**.
The tips tactics are a "summary" of the most important topics and scenes from the rubrics

- Beginners
- Regatta sailors and
- Experts.

11.1 Complexity of tactical decisions - boats, wind and current

Each sailor has to cope with complex, dynamic, tactical decisions at the same time, which can be divided into 3 "dimensions":

1. Boat against wind - direction and strength, oscillating, oscillating, gust, field
2. Boat against Boat - direction and speed, close range, at obstacles
3. Boat against Current - direction and strength, calm water, waves, swirl

At any time, new situations will arise for the sailor, which are determined by the prevailing wind, the bearing of the opponents boat and flow of the water.

Jochen Schuemann, Germany's most successful and prominent sailor, says:
"Sailing is like a **three-dimensional chess** game. The physics of sailing constantly forces a clear decision. The goal in the race is clear: in the wind direction lies the first turning buoy, which you want to reach first. Basically, you have to decide in which direction you cross first. This is a very strategic issue. However, one moves in constantly changing conditions such as wind direction, strength and current. Then we have to decide from moment to moment: Do I stay on the course or do I tack and drive in the other direction?" (Capital, Nov 26, 2014).

11.2 List of Tactical Topics

The selection of these scenes is made at the request of the trainers according to the following criteria:

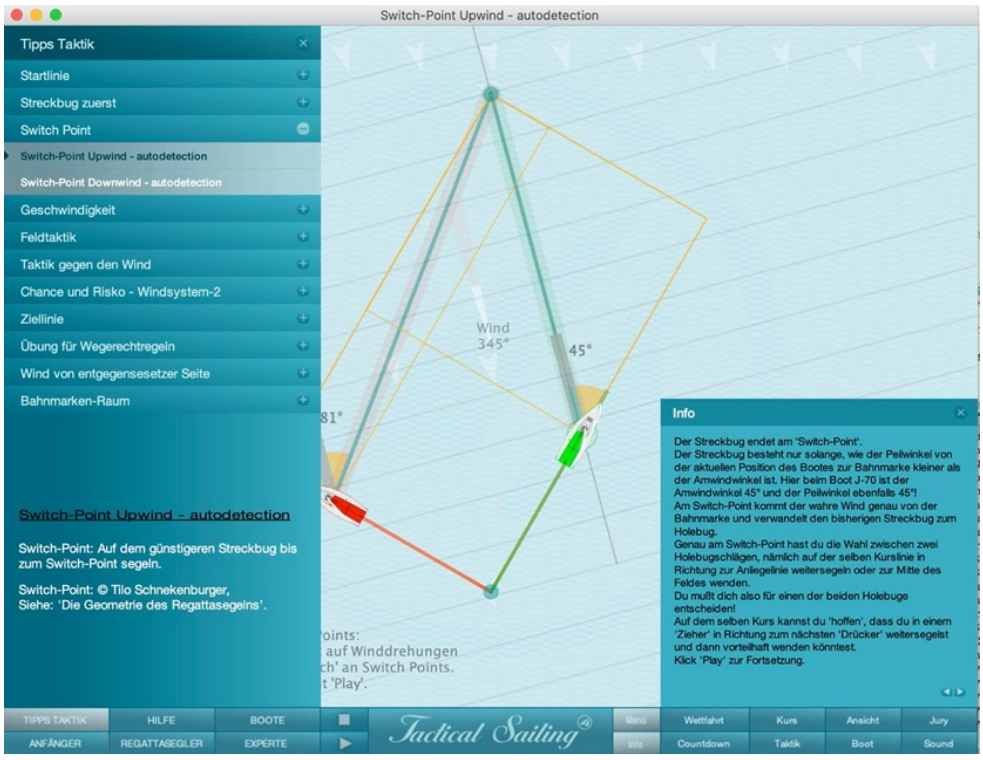
- ❖ an important tactical topic "quickly to find" and show.
- ❖ "easiest operation" so as not to spend time with "operation".

We have selected "important tactical topics" according to the following principle:

- ❖ You have to make a clear decision
- ❖ The decision must logically be made clearly on the basis of the principle of 'either/or'.

Examples of this are:

- ❖ Left or right race area side decide,
- ❖ Start line - pin-end or committee boat,
- ❖ Switch point - tack or do not tack,
- ❖ Etc.



Menu: Tips Tactic - Example Switch Point

The most important tactical topics are

- "tips" from David Dellenbaugh,
- "tools" from Tilo Schnekenburger,
- "strategic tools" from Mark Rushall,

which show advantages in long leg, short leg, tactical maneuvers in lee and luv, among others. Tactics in regatta sailing also mean using the special features of the lay lines, circles around marks, overlap and the internal position on the mark. Using the tacking angle and jibing angle, we control an optimal course and show tips for clever manoeuvres with a "header or lift" or "to cash in".

The tactical topics are realized in scenes as video clips and can be used in a workshop as a basis for discussions:

Start
- Wind conditions – constant, shifting, oscillating
- Left or right race area side upwind
- Start line bias - pin-end or Committee boat,
- Countdown to start - on time or not on time

Windward strategy – the Beat - Against the Wind
- Long or short leg
- Switch point* - tack or do not tack
- Lift or Header - tack or do not tack
- Risk zones - diamond - tack or do not tack
- Leverage** - Close or distant
- “Cash in” ** - tack or do not tack

Field tactics - boat against boat
- Boat speed or sailing close-hauled course - shorten the course
- Rewards or risk
- Cover the opponent – „Curry Tack“***
- Right of Way**** - Tack or Duck

Downwind strategy - the Run - Wind from behind
- Left or right race area side downwind
- Switch point* - t jibe or not jibe
- Lift or header – jibe or not jibe
- Risk zones - jibe or not jibe

Finish
- Cover the opponent – „Curry Tack“***
- Finish line - pin-end or Committee boat,
- Finish line - shoot up *****

* Tilo Schnekenburger: Detailed explanations and tactical advice on "Tactical Tools – Switch-Point" can be found in his book: The Geometry of Regatta Sailing (2nd Edition 2018, German language).
** Mark Rushall: "Leverage - Cash in": This gain from the wind shift is a "gain on paper" ... it's like making a profit when your stock market shares go up in value ... and we know what that profit can become. It's a real gain when the shares are sold, and the money is in your bank account. See his famous book: Tactics (3rd Edition 2019, English language)
*** Manfred Curry invented a “tactical tacking” (Curry Tack) and published it in his book: “Regatta Taktik” (German, Espanol, 1932).
**** A selection from the Tips: Right of Way Rules (10, 11, 12, 13, 14 and 18) from “Word Sailing” will also be shown in Tips Tactics.
***** David Dellenbaugh Top 100 Tips in Speed&Smarts Newsletter.

11.3 Tool Bag - the 11 tactical positions on the regatta field

The following figures show 11 positions for tactical decision-making situations on the regatta field applying to the courses Upwind and Downwind.

In the "Top Tactics" section, these tactical decision situations are simulated, which should be learned and applied to sail successfully. We recommend that these positions 1-11 should be discussed with a Coach/sparring partner to evaluate the theoretical decision making clearly, according to the principle "either/or", together with practical compromises.

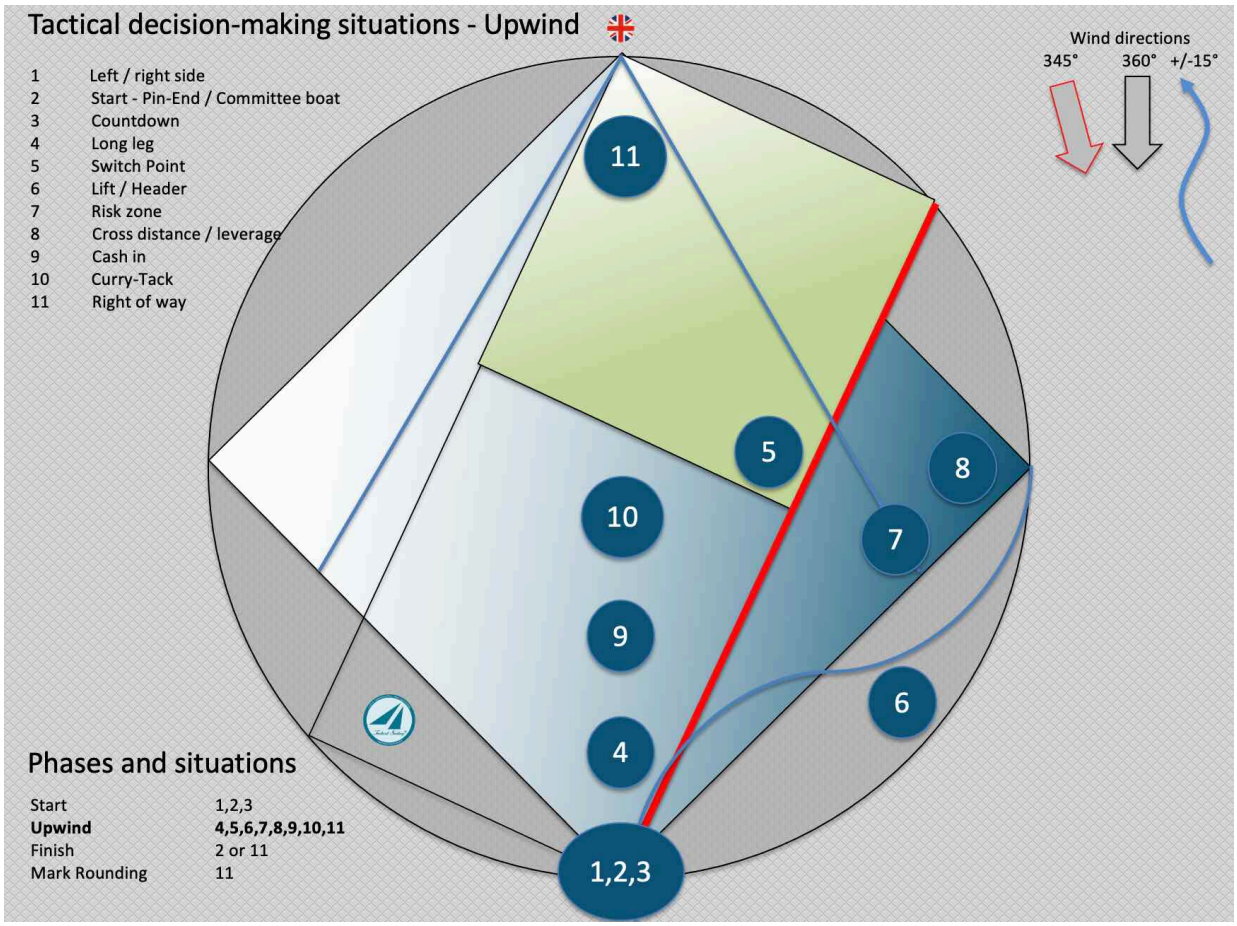


Figure Upwind

11.3.1 Upwind Course

Tilo Schnekenburger has described on his website http://www.schnekenburger.click interesting explanations using the example of the illustration "Upwind", which are quoted here.

"Area of strategic-tactical decisions in the regatta field – playing field

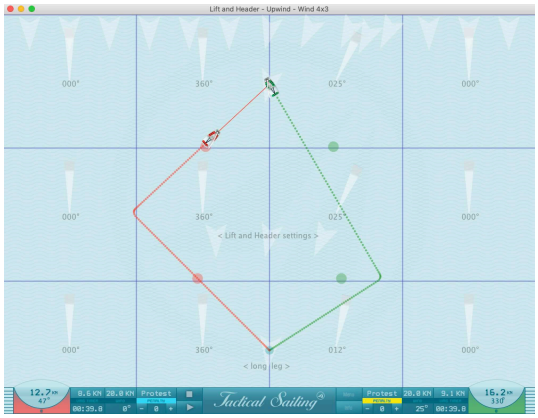
The diagram shows a regatta track with 2 different wind directions (wind 360° or wind 345° from the left) with their respective regatta fields. The regatta fields are limited by their Lee or Luv lay lines. The "long leg" of the skewed course is highlighted in red.

Eleven points within the playing fields are given, which are explained in more detail below.

Run the Tactical Sailing(TS) Program Coach's Toolbox and select your boat type at the beginning, e.g. OPTIMIST, and then the desired scenes. You see exercises either in standard settings for wind, boats and racing area, or you adjust all settings as you desire. We give instructions to start the scene in the programme menu.

Run scenes in Menue TIPS TACTIC, RACING SAILOR or EXPERTS

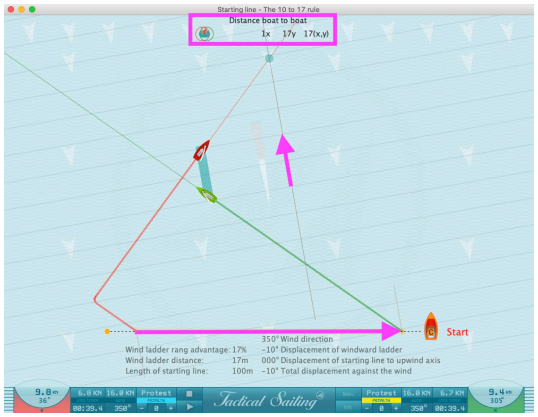
Position 1: Pre-start and start



Strategically, the better regatta area side must be determined in terms of wind strength, wind direction, waves, current and obstacles. This results in the choice of the basic strategic concept (center, left or right side, Z-course, lay line). In addition, the long leg must be determined in case of a skewed course.
In order to take a leading position tactically in the field at an early stage, the 1st tack should be planned after the start.

1 Run scene in Menue: RACING SAILOR/Lift and Header/Upwind 4x3

Position 2: Pin-End and Committee Boat



Strategically, the preferred side of the starting line (line bias) is determined here. From a tactical point of view, it is important to keep an eye on certain opponents from the start and to start near them. (Example 10:17 Rule).
The wind displacement of 10° causes a height loss (y) of 17 m (17%) for a lateral distance (x) of 100 m.

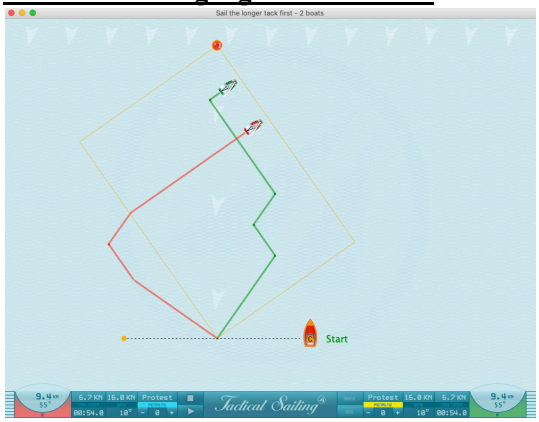
2 Run scene in Menue: EXPERTS/Gain or loss/Use the ‘10 to 17’ rule

Position 3: Countdown

Strategically, they will try to achieve a “head start”. For this purpose, the time must be taken exactly and by means of a bearing over the starting mast and pin-end to a landmark, the distance to the line must be precisely determined.
Tactically, the main focus is on creating a gap to Lee at the start in order to be able to accelerate quickly and unhindered.

3 Run scene in Menue: TIPS TACTIC/Start line/Count Down 1 minute - 10 boats

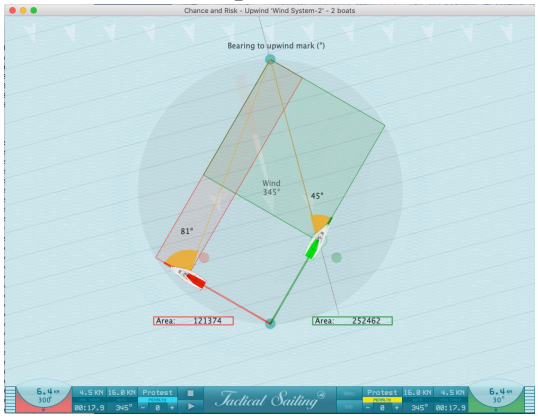
Position 4: Long leg and wind axle



Strategically, it is now important to sail the long leg with precisely bearing to the wind axis. In this first third of the upwind course, it is a matter of implementing the planned strategy in order to be able to take advantage of all the benefits that are available.

4 Run scene in Menue: RACING SAILORS/Long tack first/Longer tack first

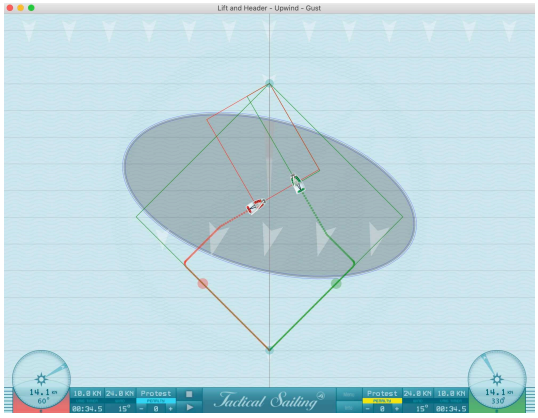
Position 5: Switch point and Risk Zones



From a strategic point of view, the location of the switch point is of particular importance, behind which the zones start with increased risk. Almost every header beyond the switchpoint should be answered for strategic reasons with a tack to the new long leg. Lifts beyond the switchpoint may lead to the “long leg trap” or “outer banana”.
Tactically, one should closely observe and react to the risk behavior of the important competitors in this – strategical - area around the Switch point.

5 Run scene in Menue: RACING SAILORS/Switch Point/Upwind

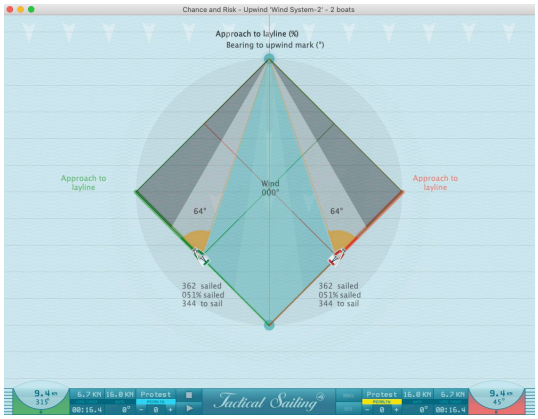
Position 6: Lift and header



Strategically, the lift and header offer the best chances to shorten the course to sail. The dangers of the long leg trap or the offside trap must be taken into account.
From a tactical point of view, a wedged in position is the greatest danger when you can no longer react to nearby opponents, lifts or headers.

6 Run scene in Menue: RACING SAILORS/Lift and Header/Upwind - Gust

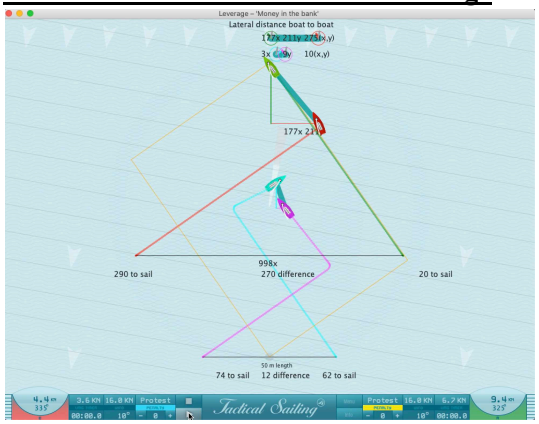
Position 7: Playing field (risk zone)



Observing the development of the shape of one's own playing field is particularly important from a strategic point of view, as a narrow, elongated playing field offers hardly any possibilities for reaction to react profitably to wind rotations.

7 Run scene in Menue: EXPERTS/Reward and Risk/Chance and Risk - Upwind

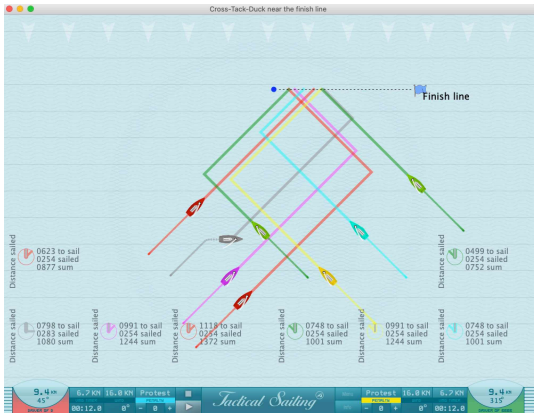
Position 8: Cross distance and leverage



Cross distance and leverage are the typical tactical weapons of attack as used by pursuers. The leader, on the other hand, should keep the cross distances and gains from a wind shift of his pursuers as small as possible in order to defend his position.

8 Run scene in Menue: EXPERTS/Gain or loss/Leverage – 'Money in the bank'

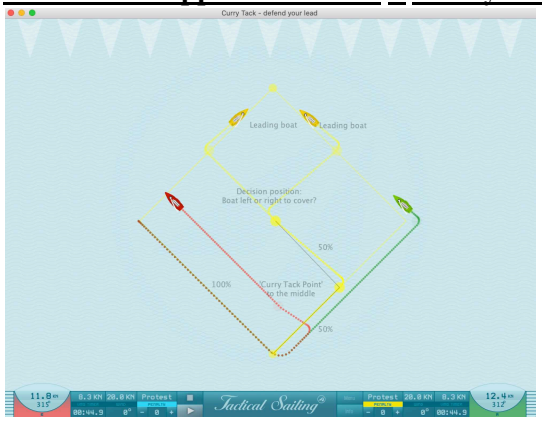
Position 9: Cross, Tack or Duck and Cash in



Again and again on the cross "Cross, Tack or Duck" decisions come to the sailor. Strategically, it is important not to give up one's own strategy recklessly because of such a situation.
Tactically, after a successful leverage situation, it can make sense to realize the profit by means of a cross maneuver and to "achieve" this advantage.
Example:
Red crosses all,
Pink tacks in front of yellow,
Grey ducks away from the green.

9 Run scene in Menue: RACING SAILORS/Cross – Tack – Duck/ Near the finish

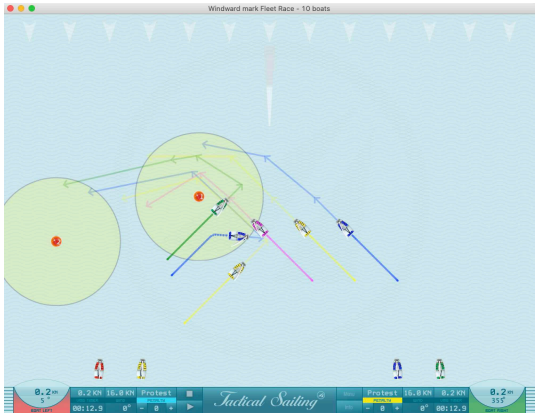
Position 10: Opponent control - Curry tack



A typical tactical means of a leading boat is, after the rounding of the Lee mark, to make an early tack between the later rounding opponents and the next mark, thus to make a so-called “Curry tack”.

10 Run scene in Menue: RACING SAILORS/Curry Tack/Defend your lead

Position 11: Right-of-way and cover



In the last third of a cross, the approach to the Luv mark must be planned primarily tactically. As the boats get closer again, covered race areas must be avoided, and the lay line must not be sailed too early, for both strategic and tactical reasons. The last wind shift in front of the Luvmark must be sailed like a permanent shift."

11 Run scene in Menue: EXPERTS/Start to finish – 10 boats/Windward mark Fleet Race

11.3.2 Downwind course

Tilo Schnekenburger has described on his website http://www.schnekenburger.click interesting "considerations on the strategy for the downwind course at the Upwind mark", which are also quoted here for the figure "Downwind" with the corresponding positions.
"The downwind course has become increasingly important for successful regatta participation in recent years for a number of reasons. The proportion of downwind courses is much larger than in the past and modern boat classes sail much faster speeds and speed differences on the course than was previously the case. Thus, of course, the right choice of strategy for this course has become more important.
The illustration is based on a sailing boat that achieves the best V-Luv with a wind angle of 45° and the best V-Lee with a reaching angle of 135°.
Key arguments at the downwind course positions can be explained in the figure at the following positions 1 to 11:

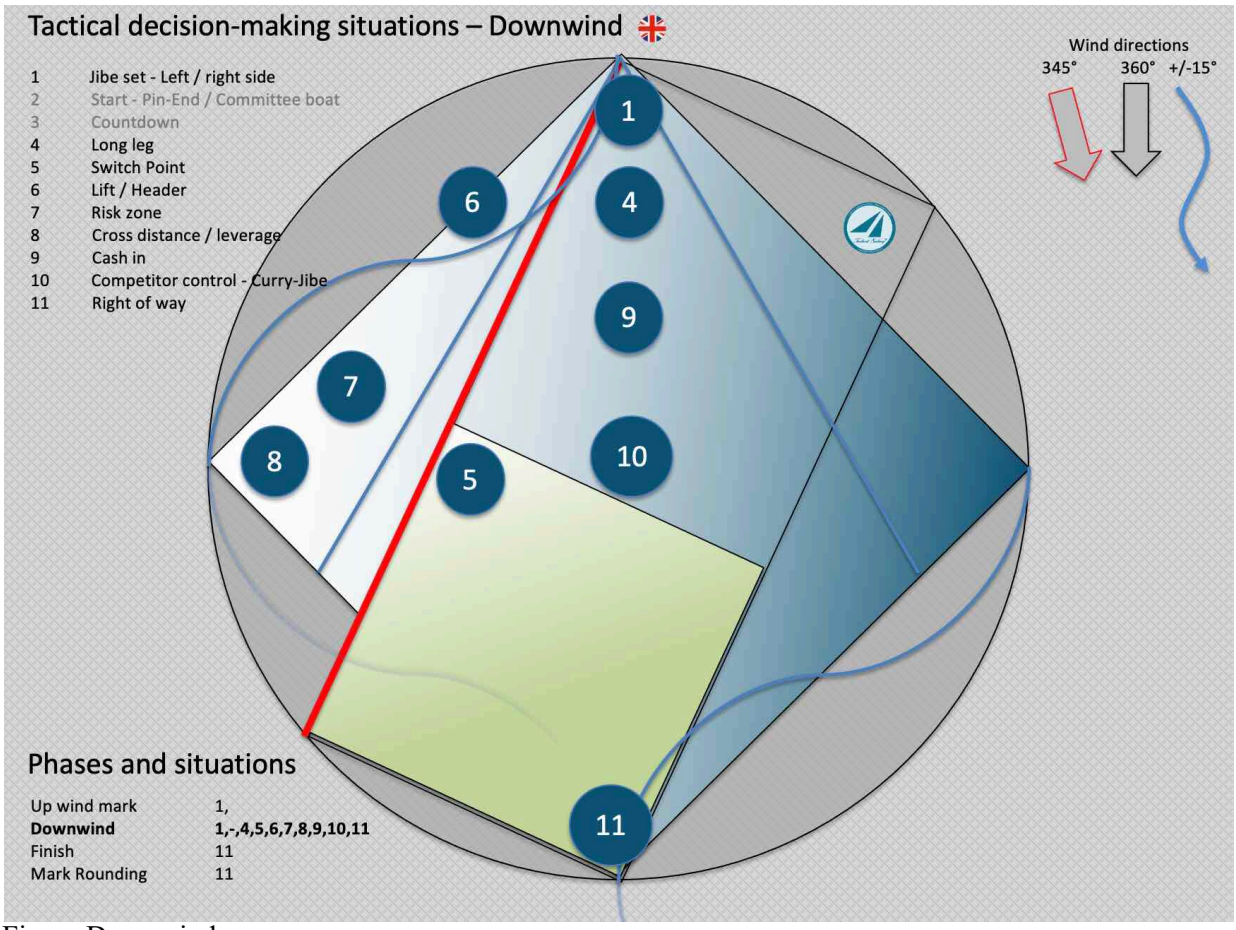


Figure Downwind

Position 1: Jibeset when rounding the Luvmarke?
Over and over again, when approaching the upwind mark, the question arises as to whether one should simply bear away around the upwind mark or choose the other course with one jibe.
This results in the relatively simple rule of thumb for the above question:
If you approach the upwind mark in a lift, you should plan the rounding with a jibeset, but you approach with a header of the upwind mark, strategically, a drop to the fastest course without jibing is ideal.

Position 4: Race area downwind – Long leg
The shape and size of the regatta field also plays a significant role on the downwind course. The individual playing field is limited on the downwind course from the two reaching directions with the highest speed according to leeward and the two lay lines to the downwind mark.
Also on the downwind: The larger the individual playing field, the greater the chances of finding favorable sailing conditions such as gusts, waves, thrust current or wind shifts. Therefore, it is important to choose the long leg on the downwind as much as possible.

Position 5: Switch point and Risk Zones
From a strategic point of view, the location of the switch point is of particular importance, behind which the zones start with increased risk. Almost every lift on the downwind course beyond the Switch point should be answered with a jibe on the new long leg for strategic reasons. A header must be responded to by changing the course in favour of the shorter path to the leeward mark while maintaining the optimum speed. Tactically, one should closely observe and react to the risk behavior of the important competitors in this area around the Switch point.

Position 6: Lift and header
Strategically, the lift and header offer the best chances to shorten the route while maintaining the optimum speed. From a tactical point of view, a clamped in position is the greatest danger when you can no longer react to nearby opponents, lifts or headers.

Position 7: Playing field (risk zone)
Observing the development of the shape of one's own playing field is particularly important from a strategic point of view, as a narrow, elongated playing field offers hardly any possibilities for reaction to react profitably to wind shifts.

Position 8: Crossing and gains from wind shift
Crossing and gains from wind shift are the typical tactical weapons used as attack from pursuers. The leader, on the other hand, must keep the gaining distance of his pursuers as small as possible to defend his position.

Position 9: Cross, Jibe or Duck and “Cash in”
Time and again, decisions come to the sailor on the downwind track "Cross, Jibe or Duck".
Strategically, it is important not to give up one's own strategy recklessly because of such a situation. Tactically, after a successful wind shift, it can make sense, by means of a cross manoeuvre to achieve this advantage.
The effects of the wind shadows, such as the own wind shadow according to leeward, must be observed in advance. In particular, the change of direction of the wind shadow after a jibe (due to the change of the driving wind) is often not considered.

Position 10: Competitor control - a quasi "curry jibe"
A typical tactical means of a leading boat, after the rounding of the upwind mark, is to **jibe** between the following rounding competitors and the next mark, the so-called "Curry Tack" – namely to make here a quasi "curry jibe".

Position 11: Right-of-way, overlap and cover at the leeward mark
Even with the downwind, the layline should be sailed late. Tactical, however, right-of-way, overlaps and coverage in the final phase of the downwind are of paramount importance. In the last third of a downwind course, however, the approach to the leeward mark must above all be planned tactically. It is to be decided whether the leeward mark can be controlled with wind by starboard or port side. Special rules of overlap apply. As the boats get closer together again, bad air must be avoided.
"The strategic and tactical rounding” of the leeward mark: Basically, one can state that too much speed is lost during tightly driven maneuvers and on widely driven maneuvers you sail additional distance.

The geometrically ideal compromise must be learnt but can hardly be implemented perfectly in tight races. Sailing tactically, it is a matter of being able to sail freely after the rounding, in order to be able to realize your own strategy on the subsequent beat or to be free of tactical constraints by competitor influence."

11.4 Tactical Sailing - Coach‘s Highlights

The “Coach’s Toolbox” has developed over the years into a popular “teaching and learning program” for sailing beginners, regatta sailors and experts in strategy and tactics. We have succeeded in developing more than 100 different learning modules and in the “Coach’s Toolbox” to summarize.

Coach’s Highlights

The ever-growing scope of the program makes it impossible to add further learning modules for technical reasons.
We have now bundled the most important tactical exercises - the “highlights” - for coach’s and regatta sailors in a new program version.

New Program version: Highlights

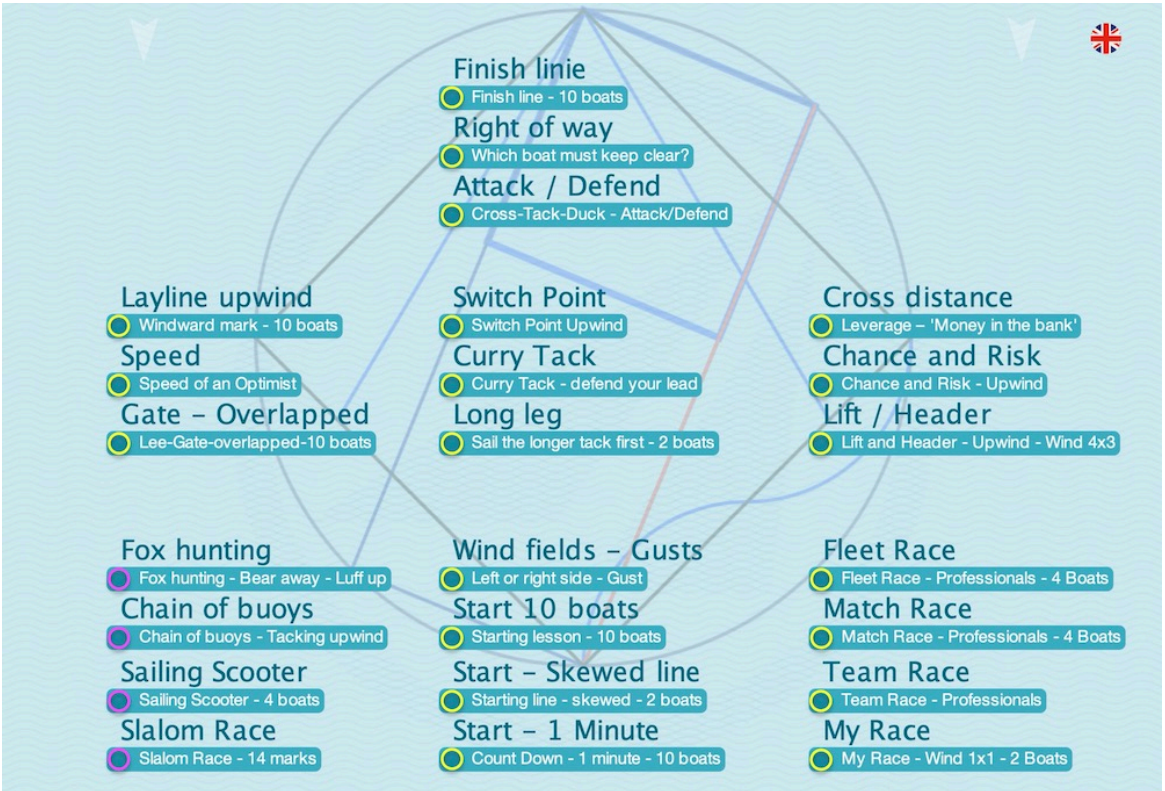
The “Coach’s Highlights” for PCs (Windows, Linux and macOS) are **a new independent program version with 20 exercises** and are now available as a useful **supplementary program (add-on)** based on the “Coach’s Toolbox” (Status October 2023).

11.4.1 Coach's Highlights - Introduction to the topic of 'tactics'

The "Coach's Highlights" show tactical exercises in various positions on a symbolic "regatta field" clearly arranged. A comment from sailing expert and author Tilo Schnekenburger: "Super-fast introduction to the most important tactical topics - ideal for training work!"

These are the 20 most important tactical exercises that every trainer and experienced regatta sailor should know as an **introduction to the topic of "tactics"**.
In the overall overview of the "regatta field" on the screen, you can select a '**keyword**' in the graphic and start the exercise with a 'click'.

O Yellow marking:
Trainer highlights - tactical exercises. These include topics such as
Start line, stretch bow, switch point, curry turn, finish line, field tactics with 8 exercises.
As a supplement to the individual exercises, in the "Regatta Tactics" section (Fleet, Match, Team, My Race) you can train a complete process from start to finish with two or four people.
O Pink marking:
Sailing Games - "Fun Sailing",
For everyone who would like to relax a little after the practice session: 4 playful variants (fox hunt, chain of buoys, scooter, slalom)!



"Keywords" - Overview of the regatta field from start to finish line

11.4.2 Operating - Overview of services

The “Trainer Highlights” with 20 tactical exercises, specifically selected from the “Coach’s Toolbox”.

Highlights

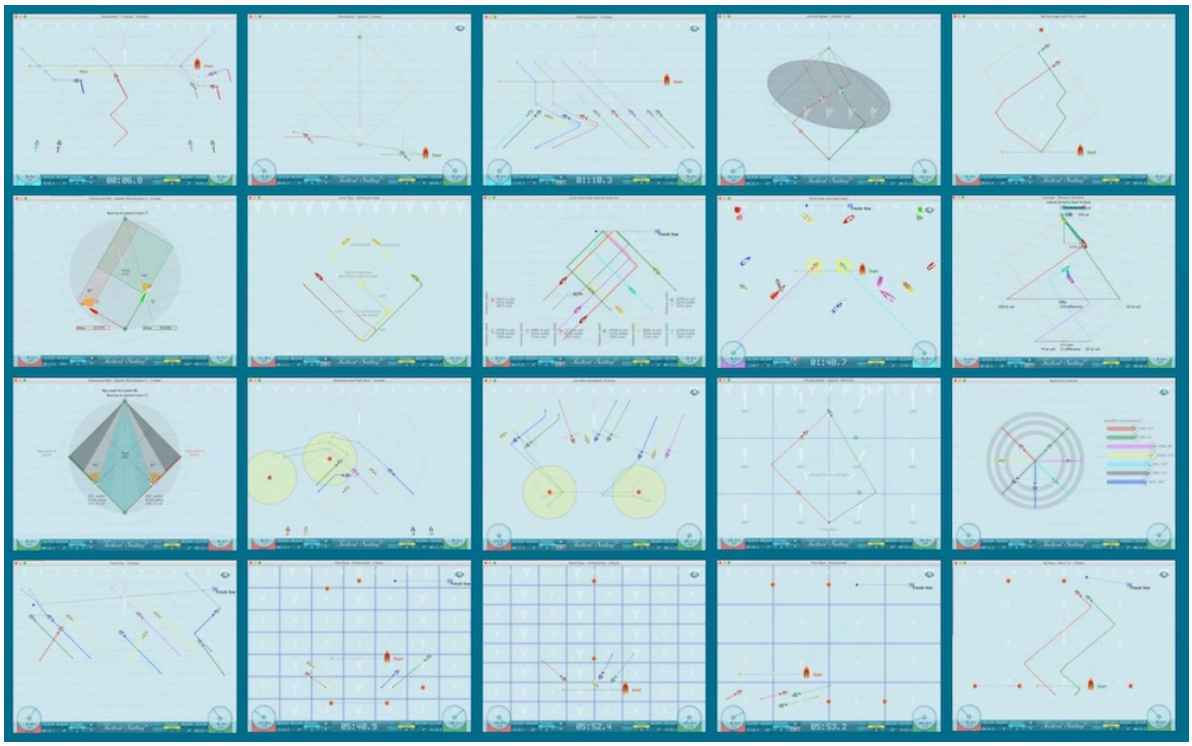
No.	Name of exercise	Menue Tips Tactic	Exercise in Menue Tips Tactic
1	Start 1 Minute	Start line	Count down 1 minute - 10 boats
2	Start-Skewed line	Start line	Starting line skewed - 2 boats
3	Start 10 boats	Start line	Start 10 boats
4	Wind fields - Gusts	Start line	Left or right side - Gust
5	Long leg	Long tack first	Sail the longer tack first - 2 boats
6	Switch Point	Switch Point	Switch Point Upwind
7	Curry Tack	Curry Tack	Curry Tack - defend your lead
8	Attack / Defend	Fleet tactic	Cross-Tack-Duck - Attack/Defend
9	Right of way	Fleet tactic	Which boat must keep clear?
10	Cross distance	Fleet tactic	Leverage - 'Money in the bank'
11	Chance and Risk	Fleet tactic	Chance and Risk - Upwind
12	Layline upwind Luv	Fleet tactic	Windward mark 10 boats
13	Gate - Overlapped Lee	Fleet tactic	Lee-Gate-overlapped - 10 boats
14	Lift / Header	Fleet tactic	Lift and Header - Upwind - Wind 3x3
15	Speed	Fleet tactic	Speed of an Optimist
16	Finish line	Finish line	Finish line - 10 boats
17	Fleet Race	Racing Tactic	Fleet Race - Professionals - 4 boats
18	Match Race	Racing Tactic	Match Race - Professionals - 4 boats
19	Team Race	Racing Tactic	Team Race Professionals
20	My Race	Racing Tactic	My Race - Wind 1x1 - 2 boats
21	Fox hunting	Sailing Games	Fox hunting - Bear away - Luff up
22	Chain of buoys	Sailing Games	Chain of buoys - Tacking upwind
23	Sailing Scooter	Sailing Games	Sailing Scooter - 4 boats
24	Slalom Race	Sailing Games	Slalom Race - 14 buoys

11.4.3 Coach's Highlights - 20 exercises

With one click, the trainer can repeatedly call up the simulation of a regatta scene and discuss it with the sailors. The aim is to develop special skills, namely to make quick and optimal tactical decisions during a regatta:

- Take-off phase, wind conditions, strategic-tactical maneuvers, risk assessment, attack defense, right of way and performance analysis.

Strategic and tactical decisions in regatta sailing are made in a similar way to classic "risk management". This starts right at the starting line. The sailor must choose the right or left side of the regatta field. Jochen Schuemann, one of the world's best sailors, also sees it this way: "The physics of sailing constantly force you to make a clear decision."



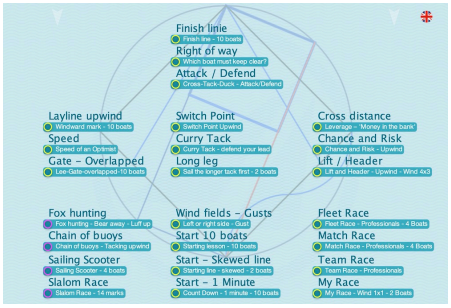
Screenshots of the 20 highlights
A detailed explanation with tactical tips for each exercise can be found in the program's "**Info**" window.

11.4.4 Fun Sailing - 4 games

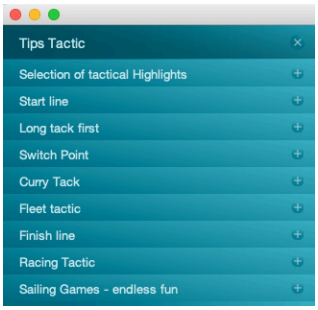
Learn to sail while playing - these 4 games are specially designed for young sailors. With the fox hunt, the buoy chain, the slalom and scooter race, a lot of fun is guaranteed for two or four people! **A detailed explanation** for each game can be found in the program's "**Info**" window.

11.4.5 Program start - Operating instructions

Start menu program



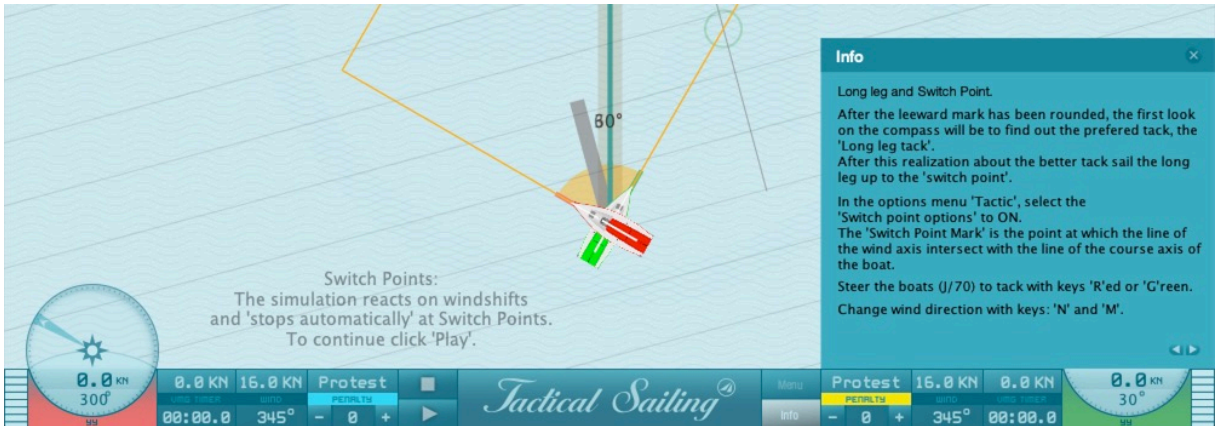
Regatta field



Tips Tactics

The program starts automatically with a complete overview of a “regatta field”. You select a “keyword” and start the exercise with a “click”. At the end, the menu item “Tactics Tips” opens automatically, where you can start further exercises.

A detailed explanation with tips for each exercise can be found in the **"Info" window**.
Example: **Exercise "Switch Point"**



11.4.6 License key - ‘Coach’s Highlights

Coach’s Highlights requires a **new, special license key**, which you can order from the Tactical Sailing Shop. If you have already purchased a **Coach’s Toolbox'** with a license key version 2, then we offer you ‘Coach’s Highlights', the additional program as an "**Upgrade/Add On**".

11.4.7 Documentation

The documentation of the ‘Coach’s Highlights' is in Chap. 11.3 'Tool Bag' of the previous ‘**Coach’s Toolbox**’ (here!) has already been described in detail, there you can read the functional description, screenshots, and operating instructions. Download this documentation free of charge from our website: https://www.tacticalsailing.com/en/downloads/documentation/coachs-toolbox.

Download the current description of the Coach’s Highlights program here:
https://www.tacticalsailing.com/en/downloads/documentation/coachs-highlights.

12 General

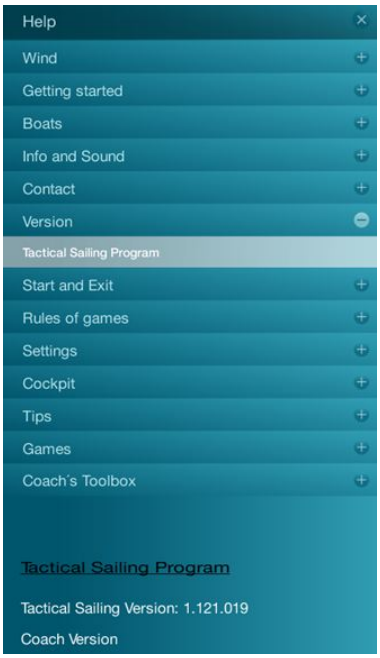
12.1 License

The Coach's Toolbox and Highlights are a special expansion of "Tactical Sailing" Software, made available to coaches for educational purposes and every sailor for private use. This Coach's Toolbox requires a license key for setting up the software functions. If you are interested or have questions, please contact Paul Gerbecks at Paul.Gerbecks@TacticalSailing.com. The Coach's Toolbox is made available as a download to coaches and sailors. Updates are published in the Tactical Sailors Lounge on the website www.TacticalSailing.com. Therefore, please register yourself there (optional)!

License for commercial purposes

Any commercial use (e.g. links in: print media, books, Internet-based media, website, etc.) or public showing (exhibition, commercial event, etc.) may be authorized by the license holder: "Media Digital Page", send e-mail to:
office@MediaDigitalPage.com . See license agreements:
https://www.tacticalsailing.com/en/legal

Program Version: The version number of the "Tactical Sailing" Program is displayed in menu:
<Help> <version> <program> Tactical Sailing Program.
with the designation "Coach-Version".

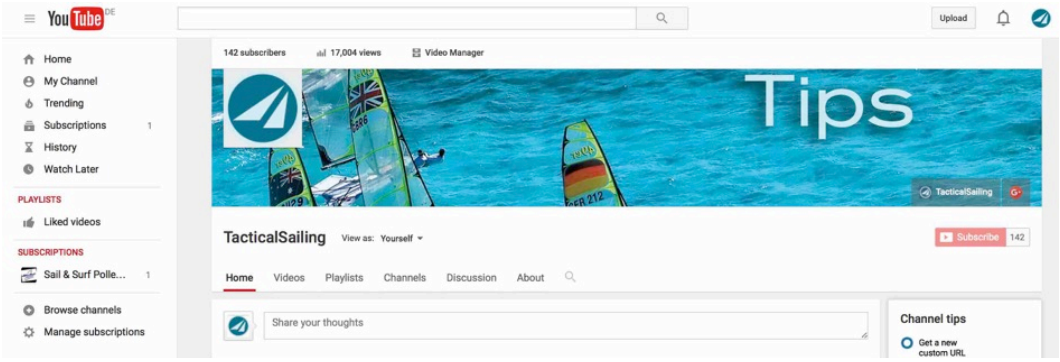


Updates:

The current version and the history of the updates with a brief description will always be posted on the website:
https://www.tacticalsailing.com/en/downloads/updates
As a licensed user you can get a free update. Send us your license key and call your operating system (Windows, Mac OS X or Linux) via e-mail at mailto:office@TacticalSailing.com.
Your installed version number you see in the game in the main menu: <Help> <version> <program>.
Compare your version number with the current version number.

12.2 Video clips on You Tube

Some “Tactical Sailing” tactical exercises are available on the channel "TacticalSailing" at You Tube. The list of exercises are based on screenshot of TS-version 1 and can be seen here:
https://www.youtube.com/tacticalsailing



https://www.youtube.com/watch?v=FDdJ_RS-duM

https://www.youtube.com/watch?v=ax3GcIy5pYY

https://www.youtube.com/watch?v=hFOgIE07zXc

12.3 Video clips for teaching and training purposes

Each coach can create an individual video clip for teaching and training purposes for his or her personal needs. License regulations must be observed.
https://www.tacticalsailing.com/en/legal
This can be carried out with: e.g. the program „QuickTime Player“.

12.4 Video clips for commercial purposes

Any commercial use (Links in: print media, books, Internet-based media, website, etc.) or public showing (exhibition, commercial event, etc.) may be authorized by the license holder: "Media Digital Page", send e-mail to:
office@MediaDigitalPage.com . See license agreements:
https://www.tacticalsailing.com/en/legal

12.5 Bug reports

Tactical Sailing software is tested when computer manufacturers change their operating systems (Mac, Windows, Linux). In some cases it may be subject to adjustments, which we publish in order to maintain the compatibility.

Following bugs are fixed, the issues are listed here:

- Mac: The menu display and structure's animations are very slow.
  - Selection of Main Menu and sub menu open and close slowly.
- Windows and Mac: Coach Toolbox – 4 players, all scenes with 4 boats.
  - if 4 players hit the keys, boats do not respond to the keystroke.

Current error reports: If your program is affected by this, then look at the solution to the problem, which is always updated on our website “Tactical Sailing - Downloads - Notes”.
https://www.tacticalsailing.com/en/downloads/hints/bug-reports.
In all cases, the error was rectified quickly and resolved by a **software update**, see
https://www.tacticalsailing.com/en/downloads/updates