Solar Compass

Representation of the connection between the position of the sun and the time of day
Shadow cast by a fixed object moves during the times of day
Length of the shadow depends on the height of the position of the sun
Recognition of the cardinal direction by means of shadows and clock
Detection of the time by means of shadows and cardinal points
Polish-German project of the municipality of Słonsk and AstroWis e.V. from Müllrose

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Solar Compass

The sun as a means of temporal and local navigation

Many thousands of years ago, the sun was used for orientation and to tell the time. Both functions are closely linked to the position of the sun. Albert Einstein was not the first to recognize the relationship between place and time.
Everyone knows the year, which is defined by the Earth's orbit around the sun. The different position/inclination of the earth in relation to the sun creates the seasons. Knowing this was crucial for optimal sowing, working the fields and harvesting dates. The day is defined by the rotation of the earth on its axis. The sun determines day (sun shines) and night (sun does not shine).

In addition to being used to determine the seasons, the sun also played an important role in determining the time of day. In order to meet without electronic or mechanical clocks, determining and defining the time of day was of crucial importance. Fortunately, the sun is always in the same place in the sky at roughly the same time. At school, we sometimes learned and still learn the saying:

- The sun rises in the east
- in the south it keeps its course,
- in the west it will set,
- in the north it is never seen.

But how do you know where south is in order to know that it is midday? In the northern latitudes (i.e. in our area), the sun is highest above the horizon in the south. The height of the sun's position is indirectly proportional to the length of the shadow cast by each object. The higher the sun is, the shorter the shadow. If the sun is directly vertical above me, then I have no shadow cast. This shadowless event can only be experienced once a year between the Tropic of Cancer and the Tropic of Capricorn. At the equator, however, this peculiarity appears twice a year, each time at the solstice.

Here, the sun can be a maximum of 60° above the horizon (summer solstice). The shadow of an object is then around 0.6 times as long as the height of the object. Determining the south is therefore relatively easy. You measure the shadow and when it is at its smallest, the sun is in the south. Note, however, that the shadow points north when the sun is in the south. Therefore, you have already defined south and north. East and west are then at right angles to the line south-north. If you look to the north, the east is on the right and the west on the left. The sun needs six hours between each cardinal point. This gives you a first rough orientation. Incidentally, things look different in the southern hemisphere. There the sun is at its highest, i.e. at midday, in the north. The Vikings already used the length of the shadow to find their bearings. They built a “pocket sun compass” with which they could determine the south or north direction on their sea voyages based on the length of the shadow. Until the introduction of GPS, seafarers also used the position of the sun to determine their location. The sextant was used to determine the current latitude

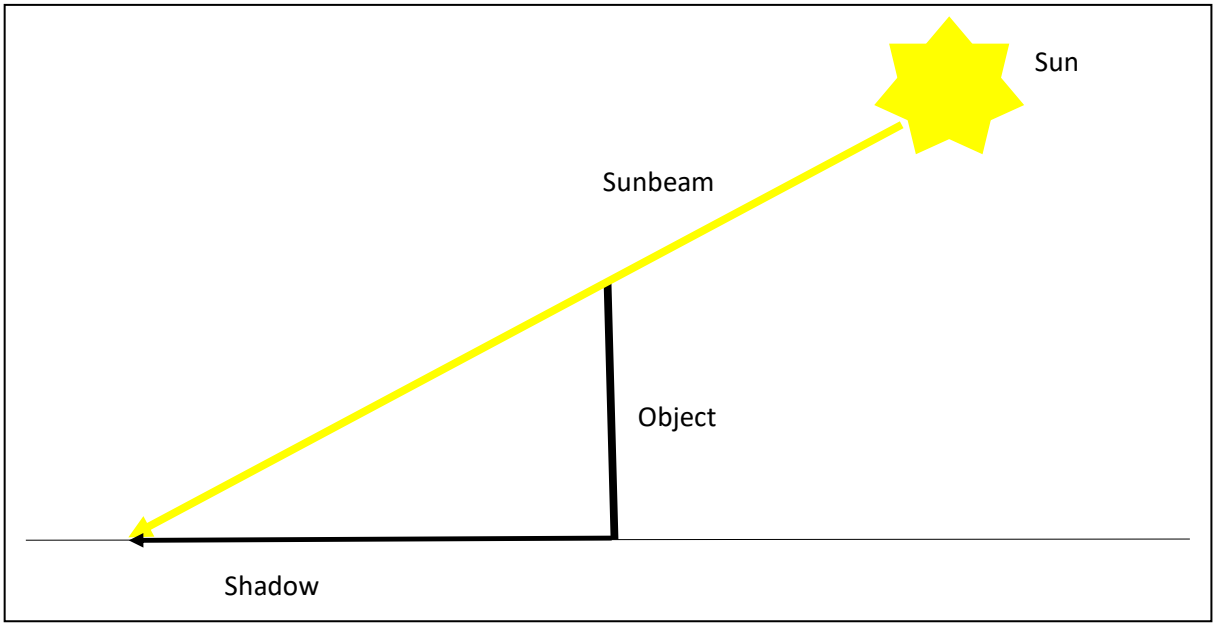

Figure: Position of the sun and shadow

The table below helps with the assignment of time of day and cardinal point.

Shadow direction	Position of the sun	summertime	wintertimer
East (E)	West (W)	19.00 Uhr	18.00 Uhr
East-southeast (ESE)	West-northwest (WNW)	20.30 Uhr	19.30 Uhr
Southeast (SE)	Northwest (NW)	22.00 Uhr	21.00 Uhr
South-southeast (SSE)	North-northwest (NNW)	23.30 Uhr	22.30 Uhr
South (S)	North (N)	01.00 Uhr	24.00 Uhr
South-southwest (SSW)	North-northeast (NNE)	02.30 Uhr	01.30 Uhr
Southwest (SW)	Northeast (NE)	04.00 Uhr	03.00 Uhr
West-southwest (WSW)	East-northeast (ENE)	05.30 Uhr	04.30 Uhr
West (W)	East (E)	07.00 Uhr	06.00 Uhr
West-northwest (WNW)	East-southeast (ESE)	08.30 Uhr	07.30 Uhr
Northwest (NW)	Southeast (SE)	10.00 Uhr	09.00 Uhr
North-northwest (NNW)	South-southeast (SSE)	11.30 Uhr	10.30 Uhr
North (N)	South (S)	13.00 Uhr	12.00 Uhr
North-Northeast (NNE)	South-southwest (SSW)	14.30 Uhr	13.30 Uhr
Northeast (NE)	Southwest (SW)	16.00 Uhr	15.00 Uhr
East-nordeast (ENE)	West-südwest (WSW)	17.30 Uhr	16.30 Uhr

However, it also works the other way round. If you have predefined the cardinal points, you can estimate the time using the shadow effect. If you get lost but have the time, you can use the position of the sun to determine the cardinal points.
You can carry out your own experiments with the solar compass. Observe the strut with the sphere in the center of the solar compass and look at its shadow. If you extend the shadow, you will find the corresponding pole with the cardinal point. If you look at your watch, you can check whether the sun is also in its assigned position in the sky. In the table above, you can see the relationship between the cardinal point and the time for summertime and wintertime.

Link: https://en.wikipedia.org/wiki/Burt%27s_solar_compass
Link: https://en.wikipedia.org/wiki/Sextant