1.6.2. The Cyclic Circle Clock

If a rotating ***entity*** for each period delivers an identical information particle, that can be counted, we have a clock that makes 'time' pass. It is the frequency $f_c = \omega_c/2\pi$, that determines the clock speed. In this manner, we get the circular movement timing parameter t synchronised against the counting periods in the rotating motion using the mapping

(1.37) $\quad TIMING\colon\ t \to t_n := \lfloor f_c{\cdot}t \rfloor,$ that synchronises the parameter $t \in \vec{\mathbb{R}}_+$ with $t_n \in \vec{\mathbb{N}}$.

As expressed above in paragraph 1.4.1.1 the periodic cycle can be described as

(1.38) $\quad \odot^{f\cdot t} \sim e^{i2\pi f\cdot t}$.

1.6.2.2. The Cyclic Rotation Oscillation

The rotation oscillation can be described by the complex exponential function $e^{i\omega t} \in \mathbb{C}$ of the oscillator ***quantity*** $\omega \in \mathbb{R}$. We call such a cyclic rotation an oscillator.
When oscillation occurs in a plane and follows the function $e^{i\omega t} \in \mathbb{C}$ for $\forall t \in \mathbb{R}$ as a *subject* in the complex plane, I call it a *circle oscillator*. I claim the *fundamental synthetic judgement*:
The idea a cyclic oscillator in a plane is the ***primary quality*** as a circular motion with the controlling ***quantity*** $\omega = 2\pi f$, that causes the possibility of a sequential counting process *FORWARD*, with the counting rate f, which re-turns the development parameter $t = \theta/\omega = \frac{\theta}{2\pi f}$.

1.6.2.3. The Time Concept as a Running Wheel

The developing time concept rotating through the Euler circle $e^{i\theta} = e^{i\omega t} = e^{i2\pi f\cdot t}$, can be synchronised with a time-axis, by scaling the circle to $\frac{1}{2\pi}e^{i\theta}$, so that its perimeter is 1,

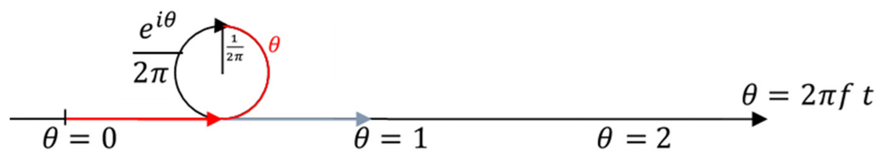

Figure 1.1 Oscillator wheel rolling along the parameter axis θ, also called the phase. Radius $\frac{1}{2\pi}$

and letting it roll like a wheel along a straight line marked by the phase $\theta = 2\pi f t$, see Figure 1.1. Similarly, the time-axis (phase-axis) is rolled up along the circle so that it becomes cyclic. Hereby illustrating that linear time is an illusion. The pure idea that remains for the concept of time is the ***primary quality*** as the ***causal action***, counting *FORWARD*.

The timing ***quantity*** is the number of individual identical but distinguishable events.

The former event is lost in the past but known in memory. The next is a priori unknown future.

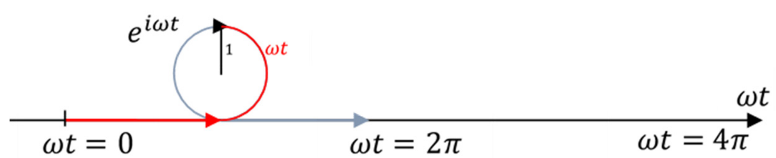

Figure 1.2 The parameter-axis $\omega t \in \mathbb{R}$ rolled over by the unit circle oscillator $e^{i\omega t}$. Radius 1, one unit.
(Such unitary oscillator we will later call an autonomous clock for the quantum mechanics phase development $\theta = \omega t$.)

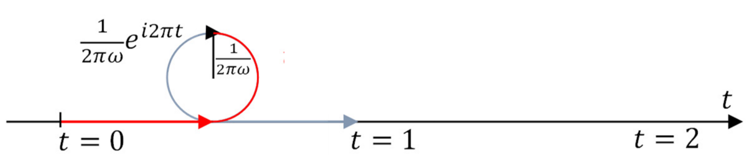

Figure 1.3 The development parameter-axis $t \in \mathbb{R}$ wound on a frequency scaled circle oscillator (classical clock).
The higher the angular roll frequency ω, the smaller the circle wheel $e^{i2\pi t}/2\pi\omega$, aperture radius $1/2\pi\omega$.

1.6.2.4. Euler Circle as the A Priori Clock

The oscillatory cycle of rotation has a ***primary quality*** given by the Euler unit circle $e^{i\omega t}$.
The interior given ***quantity*** of the rotation is the oscillation frequency $f \in \mathbb{R}$ or

(1.39) $\quad \omega = 2\pi f \in \mathbb{R}$.

When we select the real ***quantity*** $f \in \mathbb{R}$, the oscillating Euler circle is given by $e^{i2\pi f t} \in \mathbb{C}$, wherein the sequential periodic counting time is given by

(1.40) $\quad t_m = mT = \frac{1}{f}m,\quad$ where $\quad m \in \vec{\mathbb{N}},\quad$ and $\quad t_m \in \vec{\mathbb{R}}$

Do we choose an **a priori clock** $e^{i2\pi f_c t}$, as a development timing measure, its frequency is $f_c := 1$, thus $e^{i2\pi t}$ gives a sequential periodic time measure $t \in \mathbb{R}$.
The unit of measure is here one period of the clock $T = 1$,

(1.41) $\quad TIMING\colon\ t \to t_n := \lfloor t \rfloor = n,\quad$ see (1.12)

which synchronises the timing parameter $t \in \vec{\mathbb{R}}_+$ with $t_n = n \in \vec{\mathbb{N}}$
As we will see in the rest of this book, we prefer to use the form $e^{i\omega t}$ of the circular oscillator shown in Figure 1.2, the inner controlling ***quantity*** is the angular frequency $\omega = 2\pi f \in \mathbb{R}$, thus we avoid the factor 2π, just except when the timing measure is ***quantised*** with sequential periodic circumference.

(1.42) $\quad t \to t_m = \frac{2\pi}{\omega}m \in \vec{\mathbb{R}},\quad \frac{\omega}{2\pi}t_m = m \in \vec{\mathbb{N}},\quad$ from oscillator circle $e^{i\omega t} \in \mathbb{C}$, see Figure 1.1.

It is the sequential timing measure scale step $T = \frac{2\pi}{\omega} = f^{-1}$ to be scaled down with the angular frequency, as demonstrated in Figure 1.3 where I have just scaled the magnitude radius $\frac{1}{2\pi\omega}$ as well, when we measure the circumference of the circle oscillation with its period T.

Instead of a picture of linear time, which is pulling a fishing line from a rolling fishing-reel, I prefer to use the image where the line is drawn over the edge of a fixed roll as a helix spiral, which can then be stretched to a linear line. (There is no inertia from the roll.) This picture we will use later is the substance for the light photons which radiate linearly drawing a ghost helix into the past. We will then at last call it a *null helix*. (See Figure 7.1 p.334) -

1.6.3. The Continuous Measure for the Concept of Time

The parameter $t \in \vec{\mathbb{R}}_{s+}$ in $e^{i\omega t}$ is the *external continuous* ***quantity*** for the cyclic timing of the oscillator. The term 'para' is exactly synonymous with the 'external' for the ***quantity*** we invented to keep track of the connection in all relationships we owe the ***quality*** concept of development.
Overall, this can be the true continuous development parameter $t \in \vec{\mathbb{R}}_{s+}$ based on information timing used as a ***quantity*** for all types of processes in physics.
This external common parameter simply ***never*** has ***causal quality***. (An anti-paraphysical stand.)
The development parameter $t \in \mathbb{R}$ can never be the reason for things to happen (action).[31]
The fact that something happens is the reason why we experience time.
Since time is a *secondary quality*, the term "time parameter" will not be used.
Instead, often simply the term '*parameter*' will be used in many texts.
Terms such as 'time-parameter' had often been used, but 'time' is a false adjective because it often has a religious meaning of a paraphysical force that governs our universal Nature. Instead, it is the timing count, the action, or the change we perceive as a development cause.
We will recommend the use of the term 'action parameter' or the concept ***category*** I have invented for this book: *the development parameter* for information exchange.

[31] Time does not have any extension in the actual physical (natural) 3D space.