The Dualism of Physical Effect

Quantum mechanics has brought to the center of attention of natural science the fascinating yet irritating phenomenon of the dualistic nature of the atomic coherences with all its consequences.

Dualism is hereby treated in the sense of a double nature of the causal relationship – which means that both components of dualistic coexistence (such as of the wave and the particle in *"dualism of wave and particle"*) in the theories of quantum physics each has its own cause i.e. independent from one another yet linked in the sense of Bohr's complementarities.

Accordingly there is an independent *"wave cause"* for the *"wave phenomenon"* and there is an independent *"particle cause"* for the *"particle phenomenon"*.

Such a correlation seems here to be so self-evident that no one yet seems to have thought of the possibility that proven dualism need not at all be categorically and automatically primarily attributed to the causal component *"cause"*.

In fact with at least the same theoretical justification, the other component of causality, namely *"effect"* alone, can be responsible for the dualistic appearance of the atomic context manifestation.

If this were so, then this would indeed have consequences with incalculable far reaching amplifications. Then the dualism phenomenon would be, despite all specious appearance and contrary to present conceptions, retraceable to one **single** cause.

Herewith, in one fell swoop, all the paradox and confusion, which quantum mechanics has imposed onto science (for example: Theory of Parallel Universes, etc.), could be eliminated – quantum physics, classical physics and even rationalistic philosophy including the causality principle could suddenly be brought into agreement.

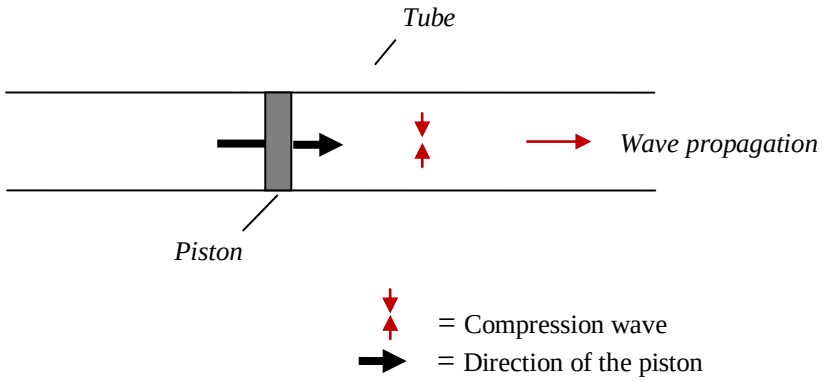
In the following, I will prove on the basis of two simple, fundamental examples, which are thereby applicable to everything else, that dualism applies specifically in the area of classical physics precisely in this sense, that thus the result there always has a double effect – that therefore in the apparently so unambiguous macro physics, every cause is automatically and by the laws of nature necessarily followed by a double effect1 as in dualism. A generalized application of this phenomenon, which we shall call ***"dualism of effect"***, on the context of atomic physics, should make all the processes there understandable in an extended, rational completely comprehensible manner.

1 This does not refer to the mundane insight that every cause is followed by a **chain** of results because every result is, in turn, a cause of a further result and so on.

Example 1

In the following example, I refer to a diagram in the *dtv-Lexikon der Physik (May 1970 Deutscher Taschenbuchverlag GmbH & Co. KG, Munich / © 1969 Franckh'sche Verlagshandlung, W. Keller & Co., Stuttgart)* and quote from book 2, page 181, keyword *compression wave* (***Druckwelle)***2:

> *"In Fig. 1, there is a long tube which is filled with a gas such as air which is stopped at one end by a piston."*
>
> *Fig. 1*



> *If you put the piston into motion, a wave emits during the acceleration phase starting at the base of the piston and continues in the direction of the arrow. When the compression wave accelerates into the tube, it is a compression wave (or blast wave in a more strict definition).* ***When it accelerates out of the tube, it is a decompression wave****".*(my own emphasis)

I now position the piston in the middle of the tube and display the above mentioned outwards acceleration in Fig. 2 in an analogical manner.

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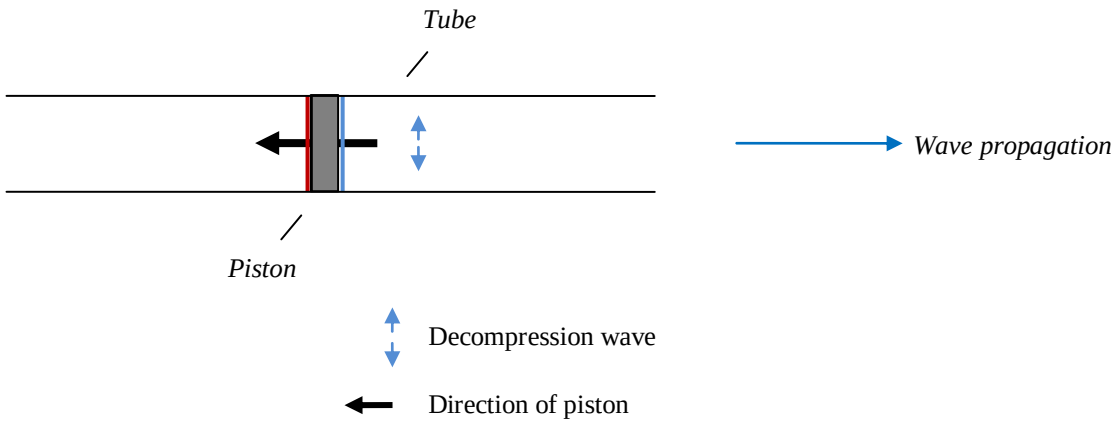
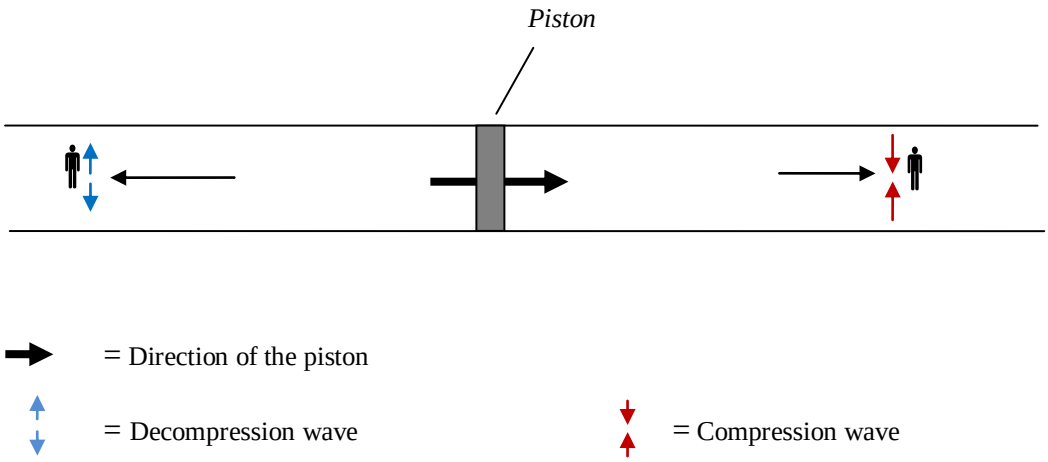
2 In *Fachlexikon der Physik / VEB F.A. Brockhaus Publishing House / Leipzig* under „compression wave" (Druckwelle) is stated, among other things that, *„If a piston is put into motion in a tube which is infinitely long on one side, a compression wave begins from the base of the piston. Depending on whether the piston moves into or out of the tube, either a compression wave or a decompression wave develops."* (A comment about the above: if one were to imagine the striking piston as being in a tube which was infinitely long in both directions – which in fact makes no difference – then it becomes immediately clear that it only depends on the position of the observer whether the movement of the piston creates a compression wave or a decompression wave.)

Fig. 2



In a further illustration (Fig. 3), I shall now have the acceleration of the piston in the tube measured by two independent observers (🧍) who are placed at exactly the same distance from the piston. One of the observers is in front of the piston and the other is behind it.

Fig. 3



Whether the now occurring movement from the piston is considered to be into the tube (i.e. an *"inwards acceleration"*) or out of the tube (i.e. an "outwards acceleration") appears here clearly to be only **relative** and dependent only on the position of the observer.

For the observer on the left side who is in the section of the tube *"**behind**"* the piston, the piston acceleration to the right is, as shown in Fig. 3, an outwards acceleration. For the observer (relative to the other) *"**in front of**"* the piston on the right side, the **same** original occurrence is an *"inwards acceleration"*.

Both observers will be able to prove their diametrically opposed versions at any time technically exact and clearly.

The sensor of the measuring device in front of the piston has measured a compression of the gas and thereby registered a blast wave. The measurement behind the piston on the other hand has registered a decompression of the gas i.e. a decompression wave.

Since both observations are absolutely equally justified as seen from the point of the cause and since both refer to the same action, this experiment proves quite clearly that from one cause (acceleration of the piston to the right in this case), a double effect must always follow and that this is necessary and inseparable i.e. causally mandatory.

In another physics lexicon, *Fachlexikon der Physik, VEB F.A. Brockhaus Publishers /Leipzig*, page 186 is noted further under the same keyword (compression wave):

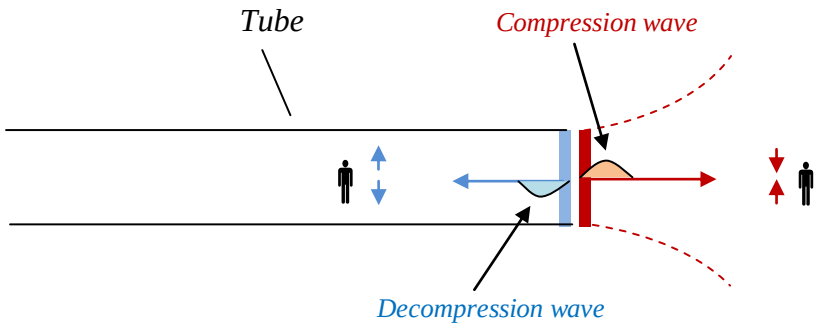
> „... Compression waves are reflected as compression waves on a fixed tube ending **but as decompression waves on an open tube**. For decompression waves corresponding laws apply. ...“ (My own emphasis)

A basic explanation which goes beyond the purely mechanical occurrence for this situation which is, at first unbelievable, that in an open tube, a compression wave is *“reflected”* as a decompression wave and a decompression wave as a compression wave is not offered by “stationary gas dynamics”.

This is understandable because a logically comprehensible explanation for this phenomenon is only possible, if the *“dualism of cause”* is considered. The explanation looks like this:

> Since from a compression shock in a certain medium (for example gas), at the same time a decompression shock follows and continues in the opposite direction, a compression wave in an open tube causes, when it suddenly exits the tube, a *“compression wave”* into the open space and due to the dualism of cause, also causes a *“decompression wave”* back into the tube. This phenomenon is measured by stationary gas dynamic and, in absence of other explanations, logically inconsequentially interpreted as “reflection”.

Fig. 4

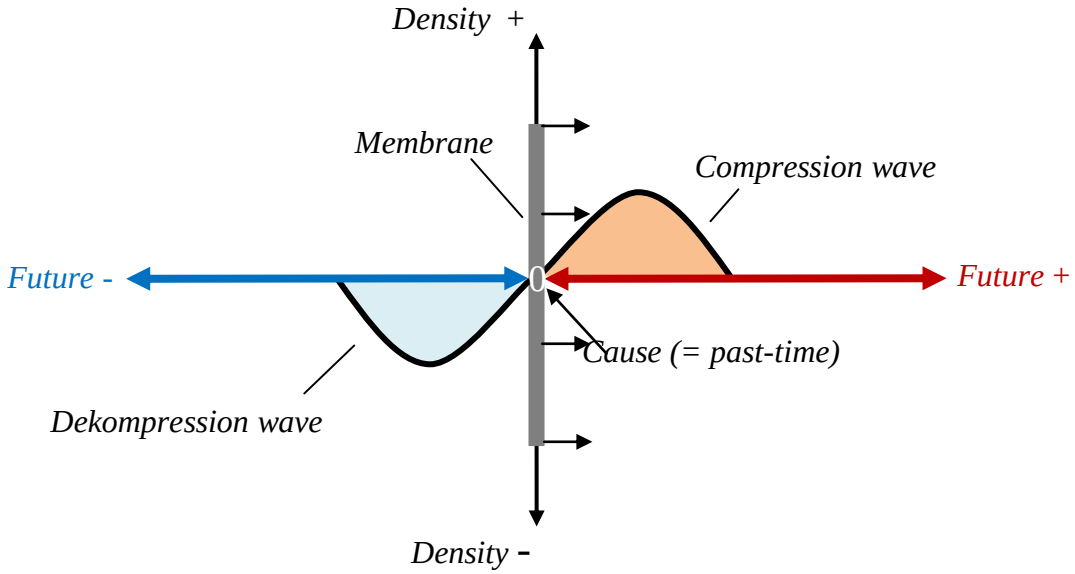


Example 2

Should an oscillating membrane (for example of a loud speaker) cause a compression wave into the air which touches it, this would include (corresponding to ex. 1) **at the same time**, a decompression wave into the air behind the membrane.

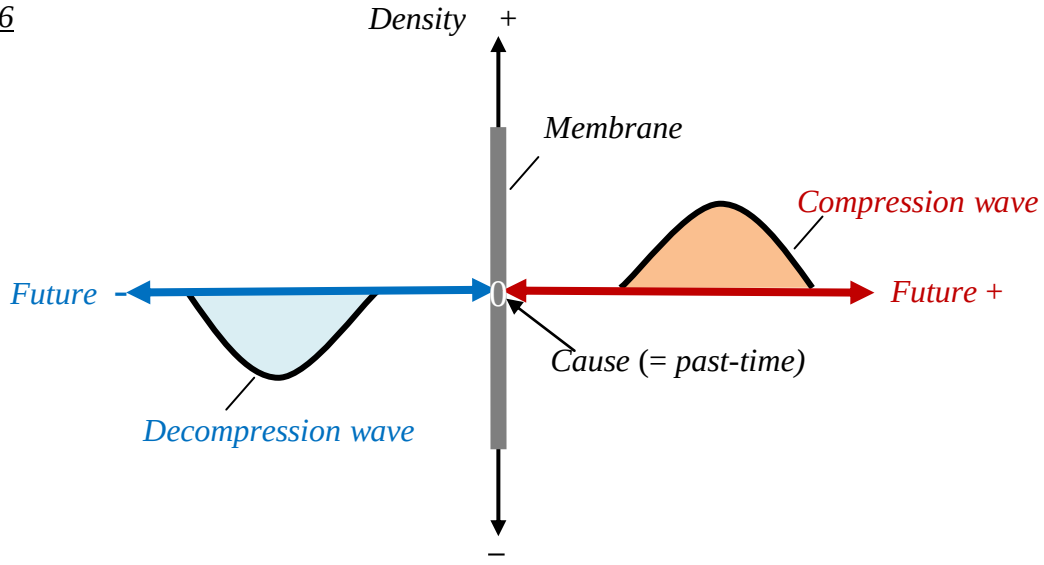
Fig. 5:

"Phase of the oscillating membrane"



Both opposing shocks spread out in opposite directions, i.e. move diametrically apart – and since forces which are moving away from each other naturally never meet, it is not possible (not as is assumed in loud speaker technique) for the compression wave in front of the membrane and the simultaneous decompression wave at the back of the membrane to ever meet directly. Both components of the phase effect i.e. compression wave and decompression wave move away from the membrane in opposite directions.

Fig. 6



Direction of decompression-effect ←
Direction of compression-effect →

This occurrence turns into its opposite in the paraphrase.

Fig. 7

"Paraphrase of the membrane oscillation"

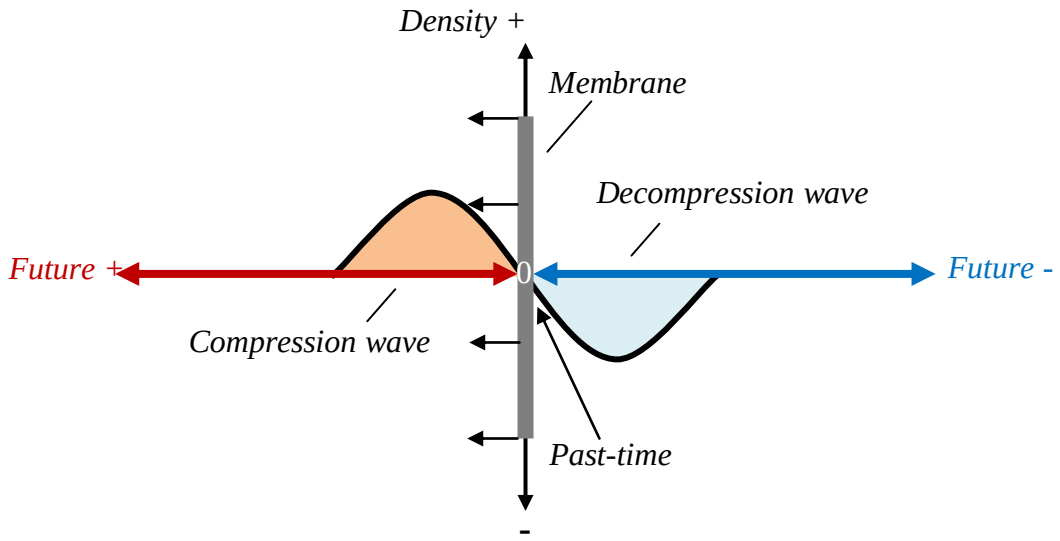
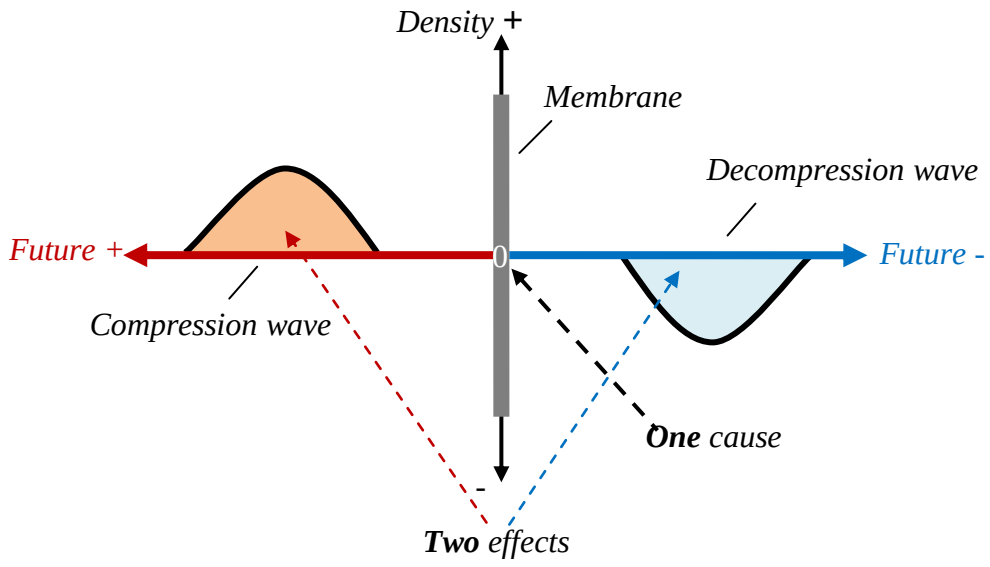


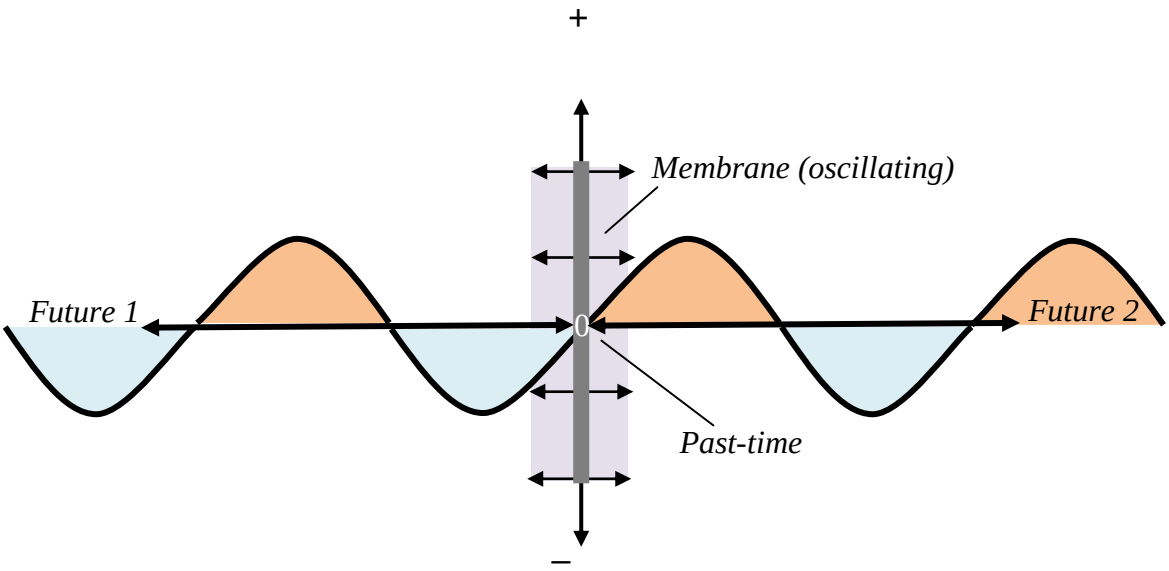
Fig. 8



As a membrane oscillates, two paraphrase waves are sent in opposite directions away from the membrane **at the same time** (and thereby causally connected to the same cause). This causes the occurrence of a "***polarized sound field***".

Fig. 9:

"Polarized sound field"



In acoustics, one describes such a *"polarizing"* of the sound field as a „***spherical radiation of the first order***".

The following illustration shows a cross section though the "*polarized sound field*":

Fig. 10