



What happened before:

By chance, in the autumn of 2003, I saw a TV programme about the work of marine biologist Michel Andre, who anchors buoys equipped with underwater loudspeakers in the strait between Gran Canaria and Tenerife in order to warn and protect the cetaceans (whale-like mammals) from large ships with ultrasonic sounds. In recent years, some whales have been hit and killed by ferries during their resting period. After a meeting with Michel Andre, it became clear to me that without the scientific work of Dr. C. Kamminga (Technical University Delft - Netherlands, Research on dolphin sounds) such a work could not be realised.

In general, the studies of the echo signals of the Cetacea undertaken at TU Delft are unique worldwide. Prof. J.A.M. van der Weiden (TU Delft), for example, analysed the echo signals of dolphins (rhythmic clicks) for their regularity and systematics, and the scientific cooperation with the Sabar drummer Doudou N'Diaye Rose in Senegal, tribe members identify themselves with rhythms similar to those of dolphins, revealed surprising parallels between these rhythm patrons and the language of the Cetacea. The sudden death of Dr. C. Kamminga in November 2002 brought a sudden end to all research.

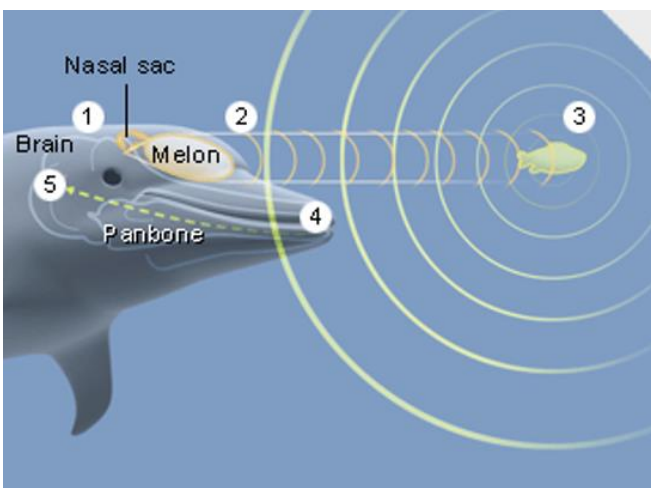
To create an audible connection between the rhythmic languages of humans and dolphins, to investigate the parallels and differences of the rhythms with a composition project and to present all this in a concert, these arguments have been the driving force for me to write "Cetacea". Music is communication and this in the truest sense of the word.

Theory of "Cetacea":

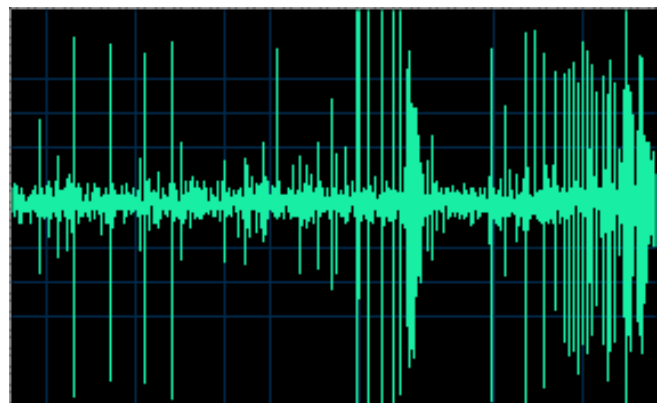
Dolphins produce and perceive sounds in order to communicate and navigate. In addition to the whistling sounds (audible frequency range), which are relatively well known, the dolphin also has a system called echolocation.

What does echolocation mean? (Graphic a):

1. dolphins produce single, short clicking sounds (sonar) in the soft tissue of the nasal cavities (nasal sac). These sounds have a frequency of 40,000 to 150,000 vibrations per second (inaudible frequency range).
2. a round organ called a melon concentrates the sound beam.
3. the sound hits an object and then returns to the dolphin (echo).
4. the pan-like bone in the dolphin's jaw (panbone) receives the echo. Behind this is a fatty body that acts as an eardrum, passing the sound on to the three middle ear bones and the brain.
5. since the dolphin continuously sends and receives clicking sounds, it can determine the distance and location of an object by reacting to the time delay and volume of the signal (see diagram b).



Graphik a



Graphik b

A dolphin thus uses its sonar not only to navigate, but also to locate certain objects. The echo (the returning sound) provides an exact location. Through this almost constant sonar, the dolphin lives in a complete sound world.

Course of the project:

- Historical sound recordings

The analogue underwater sound recordings of Dr. C. Kamminga, which are stored at the TU Delft and in Amersfoort, are a sound source for the composition "Cetacea". The sound recordings are recorded on a special tape recorder (Racal store 4d) at the speed of 60 ips. With this technique, sonar can even be registered up to 300,000 Hz. It would be conceivable to archive Dr. Kamminga's most important recordings on CD during the work and also make them available to the dolphinarium in Duisburg, Germany.

- New sound recordings and the processing

Together with the scientist Avi Cohen Stuart (assistant of Dr. C. Kamminga) and the sound technician Bert van der Wolf I made new digital sound recordings of dolphins in the dolphinarium of Duisburg on 15.4.2004. The director of the dolphinarium is Manuel Hartmann, a student of C. Kamminga. With the new digital technology (sample rate 384 KHz) very good quality sound recordings could be realised, which also allow a more versatile digital processing method. The sound of the dolphins is ultrasound (~150,000 Hz), which is then transposed downwards into the audible frequency range (~20,000 Hz) and serves as sound material for the composition "Cetacea". Of course, the transposition also changes the time constant. This is desirable, however, because the dolphins' clicks are normally emitted in very short time intervals (clicktrains) and are not perceived by the human ear as rhythm patrons.

- Senegal

A collaboration with Doudou N'Diaye Rose (1928¹), he is a very well-known Sabar drummer from the Senegambia region in Senegal, is a very important source of information for the composition "Cetacea". The sabar is a single-headed, conical wooden drum covered with a goatskin and stretched with wooden stakes. "Sabar" refers not only to the drum, but also to the dances and festivals accompanied by these instruments. The sabar is played on religious and social occasions such as baptisms, weddings and other celebrations. Doudou N'Diaye Rose is in a caste of musicians called griot (Portuguese from criado = servant). He knows about the secret power of rhythms and their tonal languages (talking drums) and the history of his own tribe, preserved in epics, is transmitted from father to son. The drum language is the direct natural reproduction of the language in Senegal. It is like a script that everyone knows, only it is not read with the eye but heard. This language, the rhythms of Doudou N'Diaye Rose, are integrated live and/or as sound material into the composition "Cetacea". In July 2005, I rehearsed parts of "Cetacea" with Doudou and his group in Dakar and received new musical inspiration for the composition.

About the electronic composition part of "Cetacea"

Because of the above-mentioned sound recordings and the processing technique, the basic material of "Cetacea" consists of rhythmic clicks in different pitches. In addition to this rhythm/sound carpet, noises such as moans, trills, squeaks, creaks and the familiar whistling of dolphins occur in "Cetacea" and are embedded in the composition in a signal-like manner. In addition, there is a low organ point (25 Hz - 150 Hz), which produces a bass register.

However, since the most important sound material for "Cetacea" consists of "sonar", which travels 4.5 times faster in water than in air, but is relatively quiet and has shorter wavelengths, these premises also apply to "Cetacea". The composition "Cetacea" therefore is relatively quiet, but very direct in terms of spatial acoustics. Since sonar is related to radar, "Cetacea" has a pulse-like "rhythm language".

About "Cetacea"

There is thus a musical contrast between the fragile, quiet, electronic compositional part and the physically expressive, signal-like beats of the 6 percussionists. The percussionists play their own rhythms from Senegal and new composed rhythm patrons derived from the clicking structures of the dolphins. The electronic composition is 5-channel. Both the 5 loudspeakers and the 6 percussionists are distributed around the concert space. The loudspeakers can be installed between or opposite the percussionists. This spatial concept ensures that contrasts between the different rhythms of the dolphins and the percussionists are made clear, or that straight connections are created that can be perceived acoustically and musically.

¹ He died in 2015

About the performance of "Cetacea

In cooperation with the "Westdeutscher Rundfunk" in Cologne (Markus Heuger) and the world music festival "Traumzeit" (Wilfried Schaus-Sahm) "Cetacea" premiered on 21 May 2006 in the Landschaftspark Duisburg-Nord in the foyer of the Gebläsehalle. On 15 July 2006 "Cetacea" was broadcast on the German Radio WDR 3 "Studio Akustische Kunst" (23.05-00.00 h.).

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