Shift

Instrumentation

- 2 Flutes (2nd doubling Piccolo), 2 Oboes, 2 Clarinets in Bb, 2 Bassoons (2nd doubling Contrabasson)
- 4 Horns in F, 2 Trumpets in C
- Timpani; Perc. 1: Güiro, Triangle, Crash Cymbals, Woodblocks (5), Glockenspiel, Vibraphone, Tam-tam, Whip; Perc. 2: Snare Drum, Suspended Cymbal, Vibraphone, Crash Cymbals, Bass Drum, Whip, Mini Cabasa, Tam-tam, Vibraslap
- Harp
- Solo Trombone
- Strings

Shift, concerto for trombone and orchestra
Duration: 25 minutes

Primarily associated with grand orchestral climaxes and epic themes, the trombone's soloistic abilities remain yet to be fully explored. *Shift* is a step in this direction, placing the focus on the kaleidoscopic range of expressive properties that this remarkable instrument is capable of. Written in four movements, it is a musical exploration of the behavior of waves as observed through the Doppler effect (or Doppler shift—hence the title) in three different mediums: sound, water, and light, each giving its name to the first three movements, with a fourth and final movement bringing all these elements together within the frame of a phenomenon called sonoluminescence. But let me backtrack for a moment.

The physical nature of sound itself has always been a source of fascination to me. How sound propagates through different mediums, the timbral qualities of each instrument, and the nature of resonance have all intrigued me since I began my music studies. Some aspects, like understanding how to exactly achieve the best possible acoustics in a concert hall, remain somewhat elusive even to the most celebrated architects and acousticians. Therefore, whenever creating a new concerto, I am always drawn into the characteristics of that specific instrument. The trombone's unique design, extensive range, wide dynamic and expressive possibilities, and its ability to bend sound through the use of glissandi, are unparalleled among wind instruments, making it the ideal instrument to evoke what is known as the Doppler effect.

First described by Christian Doppler in 1842, the Doppler effect is the apparent shift in frequency of a wave between a fixed observer and a moving wave source. When the source approaches, the pitch goes up, and when it recedes, the pitch lowers. We experience this phenomenon on a daily basis, but rarely do we actually stop to listen to it. This is what Dutch Meteorologist Buys Ballot did in Utrecht, The Netherlands, in 1845, when he set himself to refute the Doppler effect. Instead, he proved it right, and he did so in musical fashion. He placed a group of musicians on a moving wagon while a group of spectators stood along the tracks. Everyone heard higher tones as the wagon carrying the musicians neared, and lower tones as they moved past them. We have come a long way since, and the Doppler effect is nowadays used in a wide array of real-world applications in the fields of medicine, astronomy, and meteorology, among others.

Perhaps the most common example of the Doppler effect that we are exposed to in our daily lives is the wail of an ambulance or police siren darting past us with its characteristic downward pitch bend. Although interesting and ear-catching, imitating this effect repeatedly

could get a little tiring and uninteresting after just a few minutes. Besides, there is much more to the Doppler effect than meets the ear. In my trombone concerto I decided to start by creating musical motifs featuring ascending and descending pitches, coupling them with fluctuations in dynamics that represent variations in volume due to the proximity or distance from the sound source. More metaphorically, I also use tempo changes (increments and decrements in speed) to represent wave compression and decompression, plus I sometimes spread the same chord or musical gesture spatially among different sections of the orchestra to give the impression that the sound source is in motion. All of this, naturally, with the trombone soloist as our centerpiece and source of inspiration.

The first three movements explore all these different attributes of the Doppler effect in three main mediums. ***Sound***, the first movement, is quick, reactive, and agile as it pictures sound waves propagating through air, the medium with which we are most familiar. ***Water***, the second movement, is slower and denser, making extensive use of glissandi on both trombone and orchestra to represent the much greater resistance that waves face when traveling through this thicker, liquid element. ***Light***, the third movement, is lively, effervescent, and ethereal, as it deals with a most immaterial medium. The Doppler effect in light is mostly used in astronomy to measure, among other things, our distance from stars. When an object approaches, the wavelength is shorter and is known as "blueshift", whereas when an object recedes, the waves appear longer leading to what is termed "redshift".

The final movement stands apart because it is not directly related to the Doppler effect, but it does require all previous elements to come together. ***Sonoluminescence*** occurs when a sound wave impacts a gaseous bubble enclosed within a liquid, making the bubble collapse quickly, and emit a flash of light when it bursts. In the natural world it is observed when the pistol shrimp or the mantis shrimp hunt, snapping their claws with such force that in the process, they generate an air bubble that can reach a speed of almost 100km/h (62mph) releasing a sound upwards of 210 decibels (strong enough to kill a small fish). When bursting, the bubble emits light. Although discovered in a lab in 1932, sonoluminescence had not been observed in the natural world until 2001, and it is a truly fascinating confluence of three distinct elements at play. Musically speaking, the eponymous last movement of the concerto starts with a snapping gesture in the orchestra and a bouncing theme in the trombone that is later passed on to the orchestra. Motifs from the third movement make their appearance, alternating relentlessly with those of the fourth movement until a grand orchestral tutti reveals a theme from the second movement, but augmented and transformed. A section reminiscent of the first movement then makes its entrance, leading to a fiery cadenza, thus generating enough excitement and momentum to bring us to the finish line.

As of this publication, *Shift* is scheduled to be performed by the Rotterdam Philharmonic and the San Francisco Symphony, the two co-commissioning orchestras. The world premiere performance in Rotterdam will be led by Mtro. Tarmo Peltokosi, with internationally acclaimed trombonist Jörgen van Rijen (the concerto's dedicatee) as soloist. The San Francisco performances will be led by Mtro. Gustavo Gimeno and San Francisco Symphony's Principal Trombone Timothy Higgins.