

Nitrogen narcosis : tested and proved

(july 2012)

More than 15 SCUBA divers on a few square meters at a depth of just over 33 meters and above the jacuzzi of air bubbles hovers a second group. While everyone's occupied, I'm keeping a close eye on the whole exercise. Despite the preparations and the laborious planning I realize that I can do little if something should go wrong. It's a one shot only activity. Welcome to our wet experiment for nitrogen narcosis in the world's deepest pool!

Why would someone want to conduct a test of a to divers well-known phenomenon as nitrogen narcosis? Indeed, every diving course worthy the name mentions the narcotic effect of nitrogen under pressure. And yet, many divers claim they barely experienced this effect and thus wrongly assume that it doesn't affect them unless they dive really deep. Why?

The effect is difficult to detect by oneself during an actual dive. As with drinking alcohol only a few will tell you that they are under influence after one pint. And yet everybody is, because you don't possess your full intellectual capacity anymore. Asking it to your drinking buddies makes little sense because their reference is affected too. Only a comparative before and after test will uncover your reduced capacities. The same counts for the influence on high partial nitrogen pressure. No wonder this is also known as depth intoxication.

Diver-biologist Kiki Vleeschouwers, and diver-psychologist Leentje Vervoort and I designed a test set-up whereby 2 groups of divers filled out equivalent intelligence tests at 2 m and 33 m. With Nemo 33, the world's deepest pool, in our country (i.e. Belgium) we had the luck to

have easy access to deep, warm and relatively safe water because in open water other uncontrollable factors such as darkness, dust, cold, ... would have an effect on the results. Not withstanding complicating the whole test and rendering it more dangerous.

For testing the intelligence of our divers we could count on the collaboration

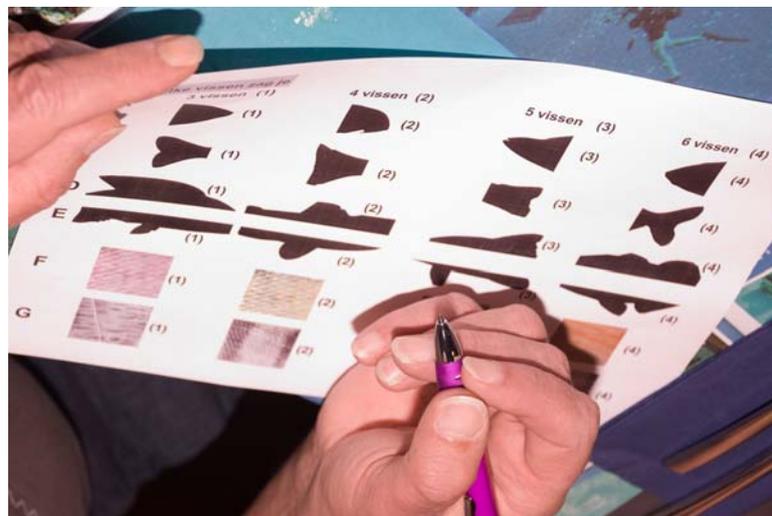


of Mensa, the Association for people with high IQ. The necessary test equipment was sponsored by ScubaService, a local dive shop, and the Flemish diving federation (Nelos). We also added a specially designed memory test in the form of imaginary fishes.

At the beginning of the test the complete diving team was briefed on every detail and practiced a few dry-runs. The dry-runs were no unnecessary luxury because under water it would be virtually impossible to positively influence the process. Not only is communication under water about unforeseen circumstances at minimum difficult, as the test-leader I, diving at 33 m, also would be under the influence of nitrogen.



After the smooth and not trouble-free one hour dive, the team debriefed while enjoying spaghetti. After the divers had done their work, we had to process their test results. This showed that there was a statistically 'significant' difference between the performance at 2 and at 33 meters. Significant means that the differences have not 'coincidentally' occurred in our experiment, but that it was very likely that they would also present in 'a real world' dive.



Because the dive team was made up by both men and women and both experienced (instructors) as novice divers, we could also consider the factors that were influencing or had an influence on the results. The number of completed questions was significantly smaller at 33 m (average of 12 questions) than at 2 m (17 questions). These results confirmed that at greater depth nitrogen narcosis

reduces our speed of thinking. The difference in number of completed questions between 33 m and 2 m was equally great for men and women, and for novice divers and instructors. At 2 m an average of 10 questions was correctly answered against an average of only 6 at 35 m. At depth a human diver thinks less 'precise'. Again the difference in correct answers was equally great for men and women. Furthermore, it was found that experience did not protect divers against the effects of the nitrogen.

After the dive (but before the spaghetti) the memory of the divers was put to the test. On a reply form they had to identify what they still remembered of the fishes that they had seen for approximately 1 minute at 2 m and 33 m. The results revealed that memorizing the characteristics of a previously unknown fish was a lot harder than expected. On average the divers remembered only 2 characteristics of the '2 m fish', and only 3 of the '33 m fish'. In other words, the divers remembered of each fish not even half of it. Sex, nor experience made any difference.

What can we conclude?

1. Depth makes us think slower and make us more prone to mistakes;
2. Experience, nor gender protects us from these effects. Depth has the same negative consequences for novice divers and instructors, for women and men!
3. Never trust the fish memory of your buddy.

We are planning a follow-up experiment whereby we want to demonstrate the (positive) effect of Nitrox on depth intoxication.

Members of the experimental dive team (alphabetical order)

Benoy Carry - Bultynck Nanou - Cockx Ann - De Loose Nick - De Wit Joeri - Devos Tom - Engels Hans - Hans Theo - Janssen Rudi - Lambrechts Tom - Limpens Jacques - Michiels Harry - Simons Olivier - Smets Peter - Steeno Patrick - Steeno Kristof - van Bragt Peter - Van den Berghe Jozef - Van den Bleeken Jose - Van Dessel Tine - Van Deuren Walter - van Doorn Roy - Van Hoenserlande Patrick - Van Hooghten Niki - Van Poucke Frederik - Vanderaspolden Tine - Verhoeven Dora - Vervoort Leentje - Vleeschouwers Kiki

Useful websites:

Nemo 33 www.nemo33.com

Flemish diving federation www.nelos.be

Dive shop Scuba Service www.scubaservice.be