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HISTORICAL PERSPECTIVES
A Personal Insight into the Origin of the "Talk Test"

Robert C. Goode

ABSTRACT

Background Qualified exercise professionals incorporate various strategies to establish effective exercise prescriptions. However, many are unaware of the ease of use and utility of the "Talk Test" and the "Breath Sound Check." Moreover, many do not understand how we came to develop these tests.

Purposes The purpose of this paper was to demonstrate the ability of the "Talk Test" and the "Breath Sound Check" to provide effective exercise prescriptions. A secondary purpose was to provide a background for the development of both tests.

Methods A narrative review of the literature was conducted.

Results Often, exercising individuals are not aware of when they have reached and/or exceeded the intensity required to improve maximal aerobic power (VO_2max). We developed the "Talk Test" hypothesizing that if exercisers are "just capable of talking" they are close to their anaerobic threshold. By using the "Talk Test" you can establish an appropriate training intensity. We also developed the "Breath Sound Check" - the point at which you begin to hear your breathing while exercising. This point corresponds to the Ventilatory Threshold, and provides a good gauge of the minimum intensity for training.

Conclusions The "Talk Test" has been used for years as an effective exercise prescription. The recommendation for persons in the general public who wish to improve VO_2max is that they should be able to "hear their breathing" but still "be able to talk." **Health & Fitness Journal of Canada 2008;1(1):5-8.**

Keywords: Aerobic exercise, anaerobic threshold, ventilatory threshold

Dr. Goode is a Professor Emeritus from the University of Toronto.

INTRODUCTION

Fifty years ago, John Faulkner, a Canadian who taught at Queen's University and the University of Michigan, introduced the idea of Karvonen and colleagues regarding training heart rates to the coaching of university swimmers (Karvonen et al. 1957). Faulkner used heart rate to establish an appropriate swimming speed (intensity) to improve maximal aerobic power (VO_2max). Swimmers were told to swim four lengths of the pool at a heart rate of approximately 170 bpm. After completing four lengths, they could rest until their heart rate decreased to150 bpm (which was thought to be the minimum heart rate for an improvement in VO_2max for a 20 yr old) and then repeat this procedure approximately ten times.

At that time, I was a swim coach at the University Settlement Aquatic Club in Toronto and introduced Faulkner's heart rate training program. One of my swimmers was Jim Shaw, who went on to be a Canadian age-group champion. Jim was winning races easily in his age group and when I took his heart rate at the end of a race it was only 150 bpm. I then asked Jim to go faster. He did and his success at winning improved. At the same time I was coaching another excellent swimmer, Joy Stratten who was unable to raise her heart rate to 170 bpm during the repeats. The minimum training stimulus heart rate of 150 bpm was based on the premise that the maximum heart rate is 220 – age. This estimation is not valid for all persons -some swimmers had a maximum recorded heart rate of 234 bpm, while Joy's was below 170 bpm. I began to have doubts

about the use of heart rate to gauge training intensity for all persons. In addition, at 80 years of age, my father could not readily find his pulse while training on an exercise bicycle. It was obvious to me that another tool was needed to determine exercise intensity.

Years later, I was involved with fitness programming at the Geneva Park YMCA camp. I observed members of the sailing school jogging in order to improve their VO_2max. The first group of adolescent sailors were jogging easily, but 25 metres behind were two older males trying to keep up with the younger group. Their wheezing and panting was audible from 50 metres away. From this observation I realized that a "cap" was needed for training aerobically. During this time we had demonstrated to the Ontario Government that Health Care Costs were lower in populations that had higher VO_2max scores and the government asked for the preparation of a pamphlet on physical fitness for adults - "A Guide to Personal Fitness" (Goode 1978).

While writing the pamphlet and considering heart rate as the basis of intensity and the panting joggers, a colleague, John Grayson who was ~60yrs old, came in to my laboratory and asked if he could train on an exercise ergometer in order to assist in lowering his blood pressure. When he was pedalling the bike to warm up, I mentioned to him that I was writing a fitness pamphlet and had a problem putting a "cap" on aerobic exercise so that the general population would not exercise too strenuously and become "turned off" or even harmed by exercise beyond their ability. Grayson replied that in 1937, when he was a younger man climbing in the Scottish Highlands, the climbers had a spoken rule to climb no faster than a speed at which they were able to talk. Being a respiratory/exercise physiologist trained in the control of breathing and carrying out experiments on hypoxic exercise, I recognized that the climbers were climbing at a pace that reduced the effects of altitude hypoxia. These effects include increased anaerobic metabolism and light-headedness. Anaerobic metabolism quickly results in muscular fatigue. The development of fatigue and light-headedness are two undesirable conditions while climbing a mountain. High intensity exercise at sea level can result in some of the same problems. At that moment I realized that the older panting sailors must have been experiencing anaerobic metabolism and likely they could not talk to each other. I also knew how closely ventilation was tied to hydrogen ion concentration. If they could talk they were unlikely to be anaerobic. The "**Talk Test**" was born.

With anaerobic exercise, the hydrogen ion, epinephrine and norepinephrine levels rise quickly and consequently the drive to breathing also rises very quickly. These stimuli increase the rate and depth of inspiration but do not have an effect on expiration. This is why the "Talk Test" worked. If you are jogging below the point at which anaerobic metabolism begins in earnest, you have sufficient oxygen from breathing (aerobic metabolism) and there is no sudden large increase in hydrogen ion, hormones or the drive to increase the rate and depth of inspiration. You make speech when you expire, and as there is no need to suddenly cut off expiration to switch to inspiration, speech is normal (or nearly so). However, when you become anaerobic, these stimuli suddenly rise and increase your drive to inspire, which cuts off expiration so that speech is interrupted. The ability to talk while climbing allowed the participants to avoid anaerobic metabolism and I reasoned that the same tool might work during exercise at sea level.

We then designed an experiment to test this hypothesis. Did the point of being "just capable of talking" coincide with the onset of anaerobic metabolism? Thirty male subjects age 20 to 30 yr cycled for two minutes at 50 watts. The load was increased by 25 watts each minute to a power output greater than that required to reach the "threshold of anaerobic metabolism" (The Respiratory Compensation Threshold) (Wasserman and McIlroy 1964). The participants were asked to read three sentences from a pre-rehearsed cue card at three steady-state stages; rest,

half the distance to the anaerobic threshold and at the anaerobic threshold. The voice was recorded and later played back in a random order. Eight listeners were asked to identify when the subject was "just capable of talking." The correlation between the phrase "just capable of talking" and the anaerobic threshold was 0.91. We had our "cap." This was presented to the winter meeting of the Canadian Physiological Society and the gathered physiologists voted and approved the publication of our results (Goode et al. 1993). We published an important paper on this in 1998 (Goode et al. 1998).

We now had a tool for the general public to separate aerobic from anaerobic exercise. This is the optimal level of intensity to avoid exercising too strenuously, but we also needed another tool for gauging the minimal training intensity. As mentioned earlier, my father had difficulty finding his pulse during an exercise session. He had asked me how hard he should work and because he was not able to determine his heart rate I told him to pedal quickly enough that he could "hear his breathing". However, since he was 80 years old I also admonished him to "make sure you can talk." I did not know if the exercise was intense enough to improve/maintain his VO_2 max.

Robert Mertens, who was then an Exercise Science graduate student at the University of Toronto, considered this idea and saw that it might be related to the Ventilatory Threshold which is close to the Anaerobic Threshold. Ventilatory Threshold had been reported (Fabre et al. 1997) as the minimum intensity to improve VO_2max in adults. Robert conducted a series of experiments to show that when you "begin to hear your breathing", (the "Breath Sound Check") and maintain the same breathing sound while exercising, you are exercising at the Ventilatory Threshold (Mertens et al. 2001).

Hence, the "Breath Sound Check" provides a tool to know when an exerciser is at or close to his/her Ventilaory Threshold – the minimum intensity for improving VO_2max and the "Talk Test" is used as an upper limit or "cap" to ensure that an exerciser is aerobic and not exercising so strenuously that the exercise is beyond his/her capacity. "Hear your breathing" became the tool to ensure that the exercise is at a minimum intensity to increase VO_2max and "be able to talk" ensured that the exercise was aerobic and well within the subjects comfort zone. Moreover, these two tools enable individualized exercise prescription because each of us has our own personal Breath Sound Check level and Talk Test point.

Carl Foster, a past president of the American College of Sports Medicine recognized our contribution and the laboratory at the University of Toronto as the "creator" of the "Talk Test" (Foster et al. 2008). He subsequently confirmed our work on the "Talk Test" and performed elegant experiments to show that the "Talk Test" tracks with improving and declining VO_2max values (Foster et al. 2008). The "just capable of talking" point will occur earlier in exercise as your VO_2max decreases and you will be doing more work before the point is reached as your VO_2 increases.

CONCLUSIONS

Time has proven the utility of the "Talk Test" for effective exercise prescription. In future, it will be interesting to see the expansion of the use of both the "Talk Test" and the "Breath Sound Check" with healthy and clinical populations.

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