By replotting the mean data of the ratings of perceived exertion (RPE) against total exercise duration during a constant-load cycling task at 70% of maximal oxygen uptake (VO2max) from the study of Baldwin et al. (2003), Noakes (2004) demonstrated a scalar linear relationship between the RPE and the duration of exercise in both carbohydrate-depleted and carbohydrate-replete conditions. Noakes (2004) proposed that by anticipating the maximal RPE that the individual will tolerate, the brain increases the RPE as a proportion of the total exercise time that has been completed (or the percentage (%) of time that remains), indicating that the brain uses scalar rather than absolute time to set perceived exertion at any time point during an exercise bout.

The purpose of this study was to assess whether antecedent fatiguing activity affected the scalar time property of perceived exertion. Fifteen minutes after completing a graded exercise test (GXT) to assess VO2max, 10 physically-active participants (25.1 ± 7.8 years) performed a constant-load cycle test to volitional exhaustion at 75% VO2max (fatigued condition-FC). Participants performed two further tests at the same exercise intensity in a fresh state condition (FSC1; FSC2) within the following 7 days. The RPE was regressed against time and % time to volitional exhaustion in both conditions. Time to exhaustion was faster in the FC (21.06 ± 13.17 min) than either FSC1 (35.02 ± 21.00 min) or FSC2 (32.43 ± 17.55 min, P < .001). Despite the respiratory exchange ratio being significantly lower at the start of the exercise bout in the FC (P = .001), most likely due to the lower levels of carbohydrate available following the GXT to assess VO2max, there were no differences in the RPE (P > .05) at the onset (13.1 ± 1.4, 12.4 ± 1.3, 12.5 ± 1.6, respectively) or completion of exercise between conditions (19.1 ± 0.8, 19.3 ± 0.8, 19.3 ± 0.7, respectively). Consequently, perceived exertion was not directly set in accordance with any physical parameter, but may have been set in relation to what scalar time controlling mechanism in the brain was perceived to be correct at the start of the exercise for the distance to be covered. As expected, the rate of increase in RPE was greater in the FC (P = .002). However, when the RPE was plotted as a % time to volitional exhaustion the rate of increase in perceived exertion was similar between conditions (P > .05). In conclusion, the study provides further evidence that perceived exertion has scalar time based mechanisms.

References