Garland et al 2012_Behaviour

Animals can communicate using visual and acoustic displays to convey information to conspecifics. In some cases, such displays are produced in highly stereotyped and repetitive sequences. Here we use a quantitative analysis technique, the Levenshtein distance, to assess similarity in sequences of displays at both the population and individual levels. We review two existing variations of the method and present two new variations that complement and extend these existing techniques. Three of the methods include the use of a median string sequence and three use a normalisation of the original equation. Humpback whale song theme sequences from multiple populations, years and song types (different variations of the display) are used as examples to illustrate the application and success of each variation. A novel outcome of this technique is that it can produce a threshold measure of similarity to assess when behavioural sequences are so dissimilar that they must be considered different, with a measure of the probability of such clusters being distinct. The Levenshtein distance is applicable to all behavioural data produced in sequences and its use should not be limited to acoustical studies.