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Abstract

Behavioural Instability; What Is Next. A Holistic Approach to Behavioural Studies †

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Phenotypic variability and fluctuating asymmetry are the most often used indices for the estimation of developmental instability of an individual. These indices are often measured on morphological traits, which supposedly are affected during their development by intrinsic (genetic) and extrinsic (environmental) factors. Developmental instability is therefore suggested as a useful tool in environmental monitoring. However, the relatively large time windows during which a trait develops increases the possible confounding effect of environmental variability on such development. The expected relationship between the intensity of an environmental insult and the developmental instability of a trait can be confused by the random noise added by the environmental variability. The need for a "more immediate and reliable" signal of environmental disturbance could therefore be addressed by investigating the alteration of the behaviour of an individual. The behaviour is an immediate reaction to a given stressor and therefore it should reveal any association between the stressor and a behavioural alteration more directly. Several toxicological and behavioural ecology studies are now accurately quantifying the behaviour by measuring, for example, the speed and the acceleration of an individual. Subsequently, these parameters and their changes can be related to changes of the environmental conditions. We propose in this investigation to add additional parameters for the quantification of behavioural traits using modified indices which are traditionally used to investigate developmental instability. We focus on indices in which the scaling effect of the variance with the mean and deviation from the normal distribution (skewness and kurtosis) of the behavioural trait are taken into account. Additionally, sequence analysis and autocorrelation of the behavioural traits will also be considered as potential indicators of environmental disturbance. An experimental approach in which changes in behavioural traits are associated with environmental changes will be presented as an example of the application of these modified indices. The concept of behavioural instability will be discussed as an alternative and/or complementary tool for the analysis of behavioural data.

Conflicts of Interest: The authors declare no conflict of interest.

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