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# Assessing Dental Symmetry: Introduction of the Symmetry Measure Score (SMS) in Periodontal Disease Analysis

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## Abstract

Assuming symmetry in the human mouth in terms of shape and clinical signs, quantifying the symmetry of periodontal disease is relevant in two distinct contexts: epidemiological and clinical. From the epidemiological standpoint, symmetry quantification can enhance the estimation of population disease parameters, particularly in studies employing half-mouth evaluations. The clinical significance of symmetry is highlighted by the idea that asymmetrical values of periodontal disease indicators might be affected by asymmetrical factors influencing both the disease's onset and progression. Building on Zadeh [1] concept of fuzzy symmetry, we introduced a Symmetry Measure Score (SMS) to categorize the symmetry grade of two contralateral observations on periodontal disease indicators. This categorization considers both the differential and their mean value. The SMS function embodies the characteristics of a membership function within the fuzzy symmetry framework and offers insights into symmetry, relevant to both epidemiology and clinical periodontology. We tested the function using data from NHANES 2011-2012. The SMS values fluctuated based on the type of tooth, with values ranging from 0.8 to 1, indicating a high symmetry grade. We evaluated the results' validity in two ways: using GAMLSS models and graphically. The GAMLSS

models helped determine the magnitude and statistical significance of the side location effect size. Graphically, we compared the empirical probability density function of contralateral variables. Both sets of results aligned with the SMS findings. The SMS function proved to be a dependable measure of symmetry, consistent with the methods we employed for its testing.

### **Keywords**

Symmetry, Fuzzy Symmetry, Symmetry Measure Score, Periodontal Disease.

### **References**

Zadeh, L. A. (1965). Fuzzy sets. *Information and control*. 8(3), 338-353.