

# MATHEMATIK-ARBEITSPAPIERE

A: MATHEMATISCHE FORSCHUNGSPAPIERE

SEPARATING AGREEMENT FROM ASSOCIATION IN  
LOG-LINEAR MODELS FOR SQUARE CONTINGENCY  
TABLES WITH APPLICATIONS

GERHARD OSIUS

PREPRINT NR. 43

NOVEMBER 1993

FACHBEREICH MATHEMATIK/INFORMATIK  
UNIVERSITÄT BREMEN

Bibliothekstraße  
D-28359 Bremen  
Germany

# Separating Agreement from Association in Log-linear Models for Square Contingency Tables With Applications

Gerhard Osius

## Contents

1. Introduction
2. The Symmetrical and Asymmetrical Components of Association
3. Sampling Models
4. Log-Linear Models for Agreement
5. Data Analysis
6. Model Extensions

## Summary

In square contingency tables the agreement between row and column classification is often of primary interest. Our aim is to *model* rather than *measure* agreement and to separate agreement from the remaining association. We decompose the total association – which is summarized in the family of cross product or odds ratios – into a symmetrical component representing agreement and a remaining asymmetrical part. Modeling both components of association separately yields a variety of models for classifications on nominal and ordinal scales. All models proposed are log-linear models for the expected table and are applicable to the usual sampling schemes (Poisson or multinomial), since they do not restrict the expected margins. These models are extended to a set of square tables arising from stratification of additional observed covariables. The methods are illustrated for a large data set on the classification of uterine cancer and for another set from the literature.

**Key words:** Agreement, association, cross product ratio, kappa, odds ratio, log-linear models, quasi-symmetry, square contingency tables, uterine cancer.