# Van Manen's Morph Type in Fingerspelling: A Multinomial Logistic Regression Study

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## Abstract

Fingerspelling is a fundamental component of American Sign Language (ASL), serving both lexical and semantic functions. Although previous studies have documented phonological processes in fingerspelling, including assimilation, movement epenthesis, reduction, and elision, most research has remained descriptive and has focused primarily on handshape sequences. Consequently, relatively little is known about how biomechanical and phonological factors contribute to the fingerspelling production at macrostructural and microstructural levels.

This study investigates whether biomechanical and phonological factors predict Van Manen's (2018) morph types through multinomial logistic regression. Specifically, this study examines the extent to which articulatory features of the fingers, thumb, and wrist predict classification as unimorph, bimorph, trimorph, quadmorph, and synomorph.

Data were drawn from a corpus of 550 fingerspelled tokens collected from approximately eight hours of publicly available ASL video data. Tokens were coded according to a structured codebook informed by Van Manen's framework, including phonological processes, Hold-Movement-Hold (HMH), thumb movement, wrist rotation, finger spreading, palm orientation, distal interphalangeal (DIP), proximal interphalangeal (PIP), and metacarpophalangeal (MCP) joint configurations.

Results demonstrated that multiple phonological and biomechanical variables significantly predicted Van Manen's morph types. Movement epenthesis, reduction, and elision significantly predicted morph type classification. Thumb movement variables, including flexion, retroposition, opposition, and radial movement, also significantly predicted morph type classification. At the microstructural level, DIP, PIP, and MCP joint configurations emerged as significant predictors, with recurrent patterns involving the index, middle, and little fingers. Across models, biomechanical and phonological variables produced some of the strongest predictive effects, suggesting that Van Manen's morph types are closely linked to underlying articulatory organization.

Therefore, these findings provide quantitative support for Van Manen's morph type framework and demonstrate that ASL fingerspelling is not simply an arbitrary sequence of fingerspelled letters. Rather, ASL fingerspelling reflects systematic interactions among phonological processes, articulatory features, and biomechanical constraints. The findings have implications for fingerspelling instruction, interpreter education, and sign language pedagogy.

Additionally, this study extends the use of predictive statistical approaches for modeling fingerspelling structure and highlights the importance of biomechanical and phonological processes in linguistic organization.

*Keywords:* ASL phonology, fingerspelling, biomechanics, sign language linguistics, Van Manen's morph type.