

Mapping Synesthetic Sequences in Space: Improving Consistency Test by Harnessing Cartography Tools.

Rémy Lachelin¹, <https://orcid.org/0000-0002-8485-7153>, remy.lachelin@fernuni.ch,

Chhavi Sachdeva¹, <https://orcid.org/0000-0002-0074-4371>, chhavi.sachdeva@unidistance.ch

Nicolas Rothern¹, <https://orcid.org/0000-0002-8874-8341>, nicolas.rothen@fernuni.ch

¹UniDistance Suisse, Schinerstrasse 18, 3900 Brig-Glis, Switzerland

Sequence-space synaesthesia (SSS) is the phenomenon of experiencing ordered visual symbols as occupying specific spatial positions. Existing tools to identify SSS primarily rely on self-reports (i.e. questionnaire) and behavioural consistency tests. Consistency tests can be used as an objective tool to characterize and classify synesthetes from controls for experimental settings. However, existing approaches do not systematically exploit the ordinal and geometric features inherent to space-sequence forms. In this preregistered study, we propose an additional optimization of SSS consistency tests diagnostic extracting new geometrical features. We compare established and new geometric features in a large sample (N = 685) aggregated from four datasets. For the new features, we harness a geography toolbox to extract topological characteristics of space-sequence forms. Receiver operating characteristics (ROC) analyses are then used to evaluate each feature's discriminative performance compared to self-reports. Results indicate that permuted topological validity outperforms existing criteria to distinguish SSS individuals from controls. In a second phase, we will assess the predictive validity to diagnose SSS with the best fitting features using an independent dataset that has yet to be collected. Together these findings underline the importance of topological rules in forming space-sequence forms and might improve the SSS diagnosis.