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Title

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Journal

Proceedings of the Annual Meeting of the Cognitive Science Society, 48(0)

Authors

Wilkosz, Anna Maria

Caglayan, Melike

Acarturk, Cengiz

Publication Date

2026

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Peer reviewed

NaWID: A Stimuli Dataset for Investigating Spatial Prepositions of Containment and Support

Anna Maria Wilkosz^{1,2} (anna.wilkosz@doctoral.uj.edu.pl) & Melike Caglayan¹ & Cengiz Acarturk¹

¹Centre for Cognitive Science, Jagiellonian University, Poland

²Doctoral School in the Social Sciences, Jagiellonian University, Poland

Abstract

The Na/W Image Dataset (NaWID) comprises 96 visual stimuli designed to investigate the processing of spatial topological relations, specifically containment (w, “in”) and support (na, “on”) in Polish. NaWID has a systematic design, consisting of ambiguous spatial layouts alongside unambiguous exemplars, thus presenting a complementary perspective to existing datasets. We conducted preliminary studies and two experiments with native speakers to evaluate the dataset's adequacy. Experiment 1 (N = 30) demonstrated that ambiguous stimuli exhibit significantly longer reaction times during behavioral verification. Experiment 2 (N = 28), using eye-tracking and fNIRS, showed that while pupillary dilation is sensitive to logical congruency, it does not reflect visual ambiguity. However, gaze measures revealed more extensive scanning for ambiguous layouts, indicating sustained cognitive processing effort. These findings establish NaWID as an effective tool for exploring the spectral nature of spatial ambiguity and the oculomotor strategies involved in processing spatial layouts.

Keywords: Spatial cognition; spatial language; pupil data; eye movements