Insights from computational Social Network Analysis in study-abroad second language acquisition

Michał B. Paradowski*, Andrzej Jarynowski†, Jeremi Ochab‡, Chih-Chun Chen‖, Karolina Czopek§, Magdalena Jelińska*, Agnieszka Cierpich¶
*Institute of Applied Linguistics, University of Warsaw; †Interdisciplinary Research Institute in Wrocław/Głogów; ‡Theory of Complex Systems Department, Jagiellonian University; ‖ Engineering Design Centre, University of Cambridge; §Institute of English Studies, University of Warsaw; ¶Institute of English Studies, Jesuit University Ignatianum in Kraków

Social networks play a vital role in individual attainment, including processes such as second language acquisition. While the importance of learners' social network configuration has been recognised by a number of researchers, and some studies have attempted to recreate students' social graphs, so far few have operationalized the interactions in a quantifiable manner that would allow measuring the degree of the influence of students' interactions on their L2 progress. Unlike studies focusing on the micro-level of individual participants' ego networks (e.g. Dewey et al., 2012, 2013; Zappa-Hollman & Duff, 2015; Gautier, 2019), thus presenting an *emic* view only, we show how and why peer learner networks can be examined in their entirety, complementing an *etic* perspective.

We demonstrate how the computational and anthropological tools of Social Network Analysis (SNA) in a mixed-method study design can contribute to the understanding of the influence of peer interaction dynamics and social graph topology on measurable outcomes among immersion/ SA sojourners. One study was carried out among Erasmus exchange students in Germany (n=40), another among two cohorts of participants in an intensive summer course of language and culture in Poland (n_1=181; n_2=210). Unlike in most of the existing research that only tends to identify *ego networks* (when a respondent is asked about her/his contacts, but not the other way round), we focus on the *full network* approach, because such networks of interactions of individuals over time allow to better apprehend processes such as SLA. Established metrics were used such as node degree, closeness, betweenness and other centrality measures as well as local clustering coefficients, using generalisations of these metrics to weighted graphs. Additionally, we used community detection algorithms and stochastic blockmodeling. These quantitative tools were supported by questionnaires and interviews with the students and their language teachers.

In the German course, we find among others i) that the best predictor of progress is reciprocal interactions between students *in the TL*, ii) that outgoing interactions in the TL are a stronger predictor than incoming interactions, iii) a negative relationship between performance and interactions with same-L_1 speakers (r_{outgoing}= −0.31, CI [−0.63, 0.00], p=.048; r_{incoming}= −0.38, CI [−0.68, −0.08], p=.15) and iv) more intense interactions taking place *across* proficiency groups.

In the Polish course, participants' patterns of social embeddedness in TL communication are significantly moderated by their i) *individual* entry TL competence (positively) and ii) psycho-situational portrait, while iii) negatively by competence in *lingua-franca* English. iv) The influence of the network is strongest in the domains of pronunciation and lexis, where degree centrality *in TL* positively correlates with progress ($r_{\text{outdegree}}$=0.258, p=.001 for pronunciation; $r_{\text{outdegree}}$=0.304, p=.0002 and r_{indegree}=0.263, p=.001 for vocabulary), while betweenness *in total communication* is significantly anticorrelated (r=−0.242, p=.003 and r=−0.204, p=.01, respectively). v) This mirrors the influence direction—on global TL progress—of closeness centrality. Combined with the detrimental impact on language acquisition of a high in-degree, this

suggests that for language acquisition, the structural properties of the network matter more than processes such as information flow.

Transciplinary research paradigms such as anthropological computational Social Network Analysis provide fresh insights into the link between social relations and language acquisition, and offer novel methodologies for investigating linguistic phenomena.

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