Lewandowski, N. & Jilka M. (2019). Phonetic convergence, language talent, personality and attention. *Frontiers in Communication 4*(18). https://doi.org/10.3389/fcomm.2019.00018

Keywords

phonetic convergence, accommodation, phonetic talent, personality, cognition, inhibition, openness to experience

Research Questions or Hypotheses

- Investigating the effect of phonetic talent and psycho-cognitive individual differences (IDs) on phonetic convergence in a second-language conversational setting
- No previous studies on phonetic convergence have been devoted to the psychological and cognitive IDs of the speaking partners
  - first study of its kind, so no clear hypotheses

Phonetic Convergence

- A process where the pronunciation of directly interacting partners becomes more similar to each other
- Plays role in enhancing communicative effectiveness
- Here, convergence defined as meaning spontaneous, naturally emerging adaptation in conversational interaction

Phonetic Talent

- A separation of pronunciation from other L2 skills, such as syntax or morphology
- Separations between proficiency and aptitude/innate talent
  - Even after controlling for learning circumstances and language experience backgrounds, some learners are inevitably better than others
- Here, phonetic talent measured through a battery of tests covering conditions correlating with phonetic talent (e.g. age of learning, general proficiency), as well as through phonetic tasks

Language Talent Study

- Subjects:
  - 102 native German speakers; 50 were university students of English
  - Subjects shared characteristics such as age, age of onset for L2 English learning, and type of instruction
  - Additional 15 native English speakers
  - Assessed on psychological and cognitive characteristics (refer to Table 1)
- Speech tasks
  - Involved English, German, and Hindi
  - German and Hindi tasks to restrict learning effects
- Phonetic abilities measured in production, perception, and imitation tasks (refer to Table 2)

TABLE 1 | Overview of all tests contained in the convergence study (all measurements were supplied to the statistical models as continuous data).

Acoustic measures	Amplitude envelopes to determine degree of convergence between interactants
Cognitive measures	Phonological Working Memory: digit span forward, digit span backward and non-word repetition span
	Attention/Mental flexibility: Simon Test (RTs)
Personality measures	Big Five: Neuroticism Extraversion Openness Five Factor Inventory (NEO-FFI)
	Behavior Activation/Inhibition: BIS/BAS scale
	Empathy: E-Skala questionnaire

TABLE 2 | Tests of phonetic ability [(Jilka, 2009a,b), in (Dogil and Reiterer, 2009)].

Production Tasks	(Quasi-)Spontaneous Speech (English)	Retelling of cartoon, Conversation about stays in English-speaking countries
	Reading tasks	English: "The Northwind and the sun", extract from a dialog in a short story
		German: "Der Nordwind und die Sonne" (imitating an English accent), short phrases (imitating English, French, Italian accents)
Perception Tasks	Prosody Pair Comparison	Tonal categories differences (English and German; also in low-pass filtered versions)
		Differences in the phonetic realization of identical tonal categories (English and German; also in low-pass filtered versions)
	Prosody Interpretation	Interpreting the meaning or emotion expressed in an utterance (English only)
	Accent Identification	Identifying native language of readers of "Der Nordwind und die Sonne"
Imitation Tasks	Direct Imitation	Hindi words and phrases
		German prosody
		English prosody (RP/SSB and GA)
	Delayed Imitation	German prosody
		English prosody (RP/SSB and GA)

Language Talent Study

- Able to control for experience by using different languages
- Unable to control for motivational factors
  - Concluded that a single clearly-defined experimental method for assessing phonetic talent may not exist

Main Study

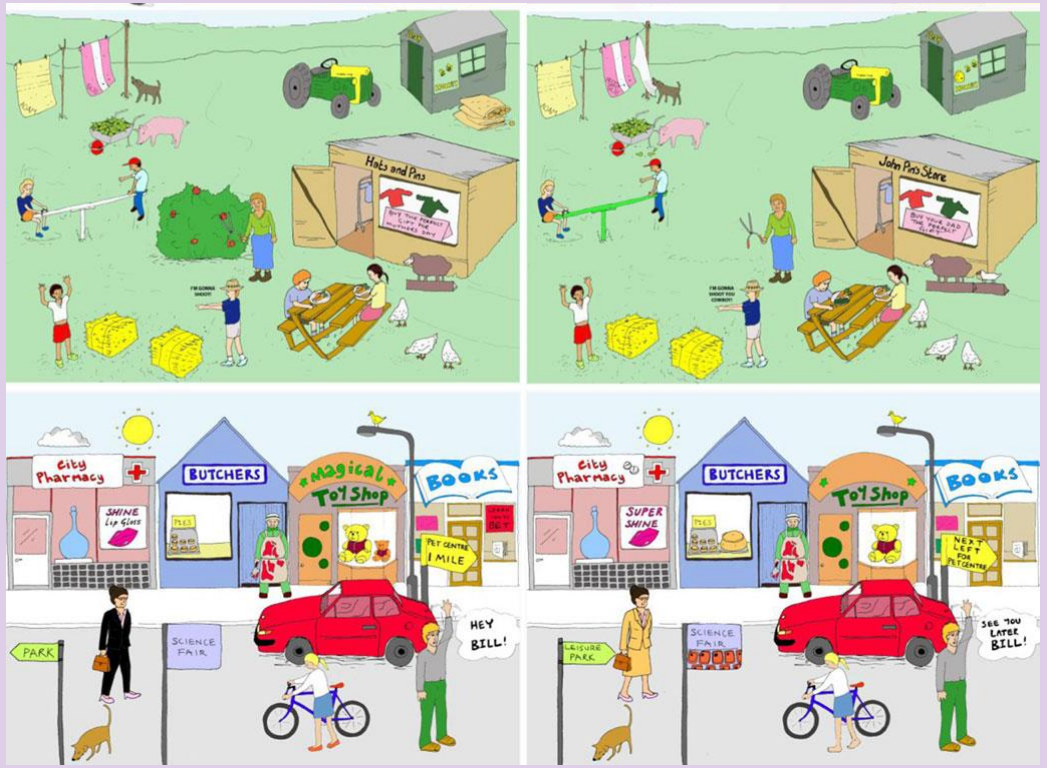
- Past convergence studies (e.g. Pardo's) used Map Tasks
- However, needed a technique that wouldn't impose any predefined roles
  - Map Tasks have fixed talker role assignments
  - Having native and non-native speakers complicated this more
- Opted instead for Diapix method
  - Retained naturalness and spontaneity
  - Ensured ability to repeat usage of content words

Participants

- Chosen from the Language Talent Study
  - Placed speakers on a normal distribution, and selected from the extremes
- Twenty-two total speakers
- Twenty native German speakers (aged 20-42)
  - Ten (5 F) rated very high on phonetic talent
  - Ten (5 F) rated very low on phonetic talent
  - All from same German region, same histories of English acquisition
  - All highly proficient in English
- Two native English speakers
  - M with General American accent (Am)
  - F with Standard Southern British English accent (Br)

Materials

- Used original Diapix materials
  - 10 differences between pictures
  - Only used shop and farm scenes
- Non-native speakers had two separate dialogs, with two different native English speakers
- Re-used the same materials for all 20 conversations
  - Told native English speakers to pretend they didn't know where the differences were



Stimuli

- Mostly used the target words involved in changed/missing items
  - e.g. bird, house, chicken, carpet, dog
- also used “other content words which came to be frequently used by the speakers”
  - Ensured sufficient number of repetitions

Procedure

- Recordings done in a sound attenuated chamber
- Participants separated by a padded wall; communicated through headsets
  - Could not see each other
- Speech saved on two separate audio channels
- No time limit, but had average recording length of 15 minutes
- Participants were not directed towards a corner to start with

Acoustic Analysis

- Took speech from first third and last third of the dialog
- Based on slowly varying *amplitude envelopes*
  - relies on assumption that the stored and used information in speech perception and production may be partially represented as envelopes, stored as linear time sequences
- Used a cross-correlation function to return a *match value* between 0 and 1

Amplitude Envelopes

- A more faithful encoding of the unfolding speech signal over time
  - Makes no assumptions about what types of cues might be extracted, or which regions of the signal are the most important
- Captures spectral information throughout the signal
- Avoids single-feature tracking (e.g. individual formants, VOT measurements)
- Also allows for analyses at the word level
- Refer to Wade et al. (2010) and Lewandowski (2012)

Findings: Language Talent

- Talented L2 learners converged phonetically to their native English-speaking partners
- More gifted speakers did so at significantly larger extent than less talented speakers
  - In an L2 environment, linguistic skill is a crucial factor for phonetic convergence
- Gender not a significant factor
  - Degree of convergence not influenced

Findings: Psycho-Cognitive Factors

- Several psychological and cognitive dimensions implicated, but *openness to experience* seemed to play a particularly important role in convergence
- Pos. impact on convergence: Neuroticism and openness to experience
- Neg. impact on convergence: Behaviour Inhibition Score and Simon Test switch costs
  - Lower switch costs → more convergence could be observed
  - Less behavioural inhibition → more convergence
- Gender did not improve model fit

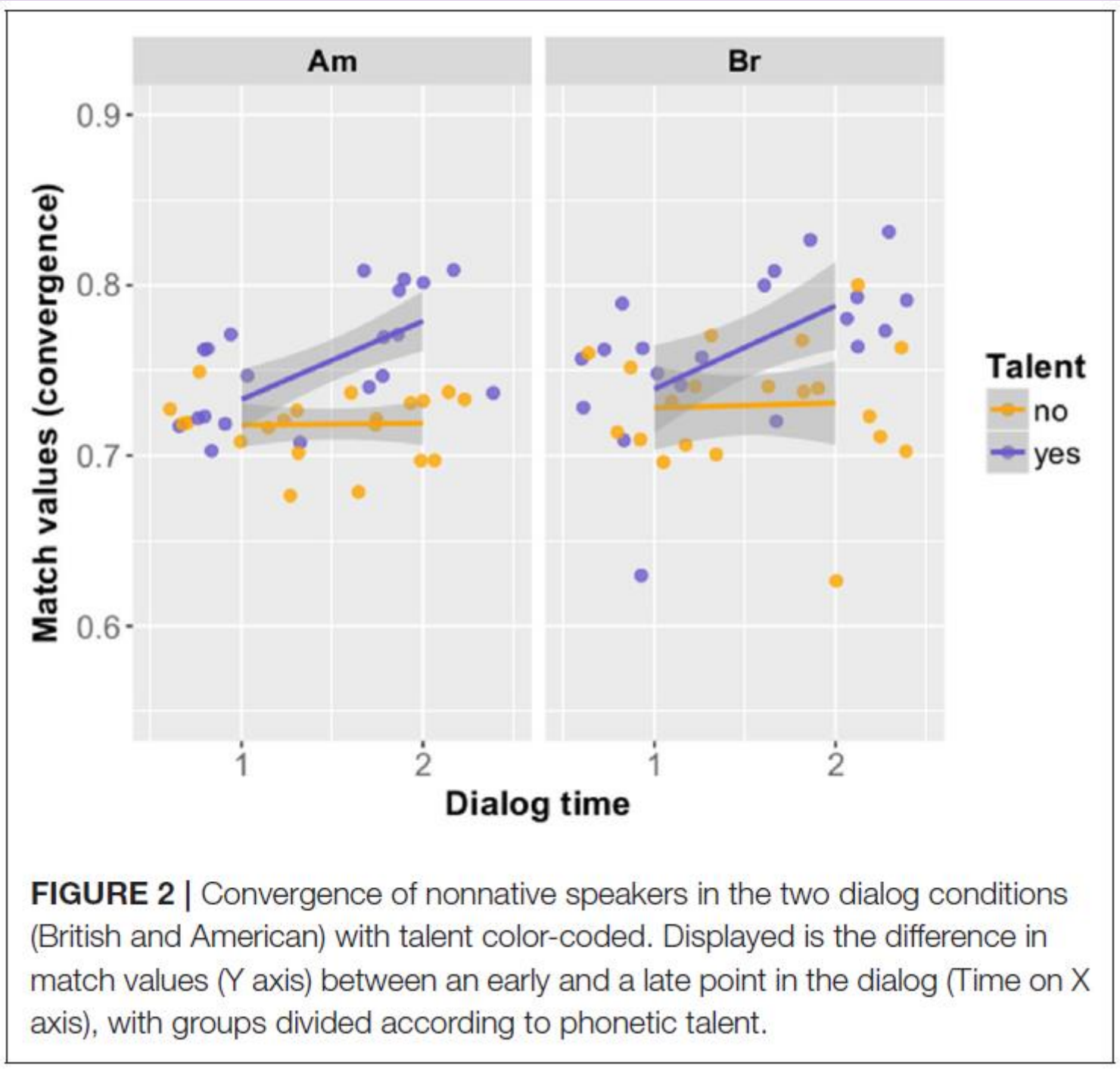


FIGURE 2 | Convergence of nonnative speakers in the two dialog conditions (British and American) with talent color-coded. Displayed is the difference in match values (Y axis) between an early and a late point in the dialog (Time on X axis), with groups divided according to phonetic talent.

Most Relevant Info

- Measures of phonetic talent
- Authors used a number of *R* packages for their statistical analysis
- Repetition or shadowing tasks would allow researchers more control over data, but also gives the subject more control – less difficulty in perception
- Future studies on phonetic convergence should include measures of phonetic skill, as well as personality and cognitive abilities