Does phonetic convergence reflect personality?

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Introduction. Phonetic convergence, or imitation, a phenomenon by which two speakers become increasingly similar in their phonetic behavior, has received considerable attention since the 1960's and 1970's [18, 10, 4]. In recent years it has been suggested that imitation/convergence is a driving force behind sound change [19, 17]. Our contribution to the workshop assesses the role of personality in phonetic convergence, and thus, potentially, in sound change from one individual to the next.

Personality and convergence. Although personality has been acknowledged as a factor in convergence, there is still a lack of studies that investigate whether phonetic convergence can be related directly to individual personality traits. Considerably more studies investigate inter-personal (i.e. social) factors in convergence or imitation, for instance speakers' attitudes towards each other [13, 14], their personal closeness [11], or speakers' racial bias towards a model speaker [1]. To assess in a more direct way whether convergence behavior is influenced by personality, we use phonetic features that are designed to quantify whether and to what extent speakers converge. If convergence behavior is influenced by personality, then these features should be predictive of personality. We test the hypothesis on the GECO database, which consists of 46 spontaneous conversations (approx. 20.8 hrs) between 13 female German speakers on topics of their choice. The database provides self-assessed personality scores using a German adaptation [3] of Snyder's self-monitoring scale [16]. The scale comprises items in four dimensions: extraversion, acting, other-directedness, and sensitivity to expressive behavior and social cues.

Data preparation. For each syllable involving a monophthong we extracted the F0 rise amplitude, fall amplitude, and absolute peak height, as estimated by the PaIntE F0 approximation method [9, 8], the raw pitch at vowel mid point, F1 and F2 at vowel mid point using Praat [2], and the syllable duration. For each of the 13 speakers, we then individually discarded outliers following standard procedure by discarding syllables where one of the parameters was more than 1.5 times the interquartile range away from the mean. In case of F1 and F2, outliers were removed on a by-speaker, by-vowel basis. This left approx. 146,000 syllables, which we used to establish for each dialog and each speaker (i) the means and (ii) the standard deviations of the above parameters, (iii) the speaker's scores regarding the four personality factors mentioned above, as well as (iv) mutual likeability and competence scores of the speaker for the partner because they are expected to determine whether speakers will converge, and finally (v) a convergence measure for each of the phonetic parameters above. This convergence measure was calculated as the difference between the speaker's mean in this dialog and the speaker's mean in all her other dialogs, normalized by her standard deviation in her other dialogs. We multiplied by -1 in cases where the partner's mean was below the speaker's mean to ensure that positive values occur in cases where the speaker adapted her mean towards the other speaker's mean (i.e. convergence), and negative values in cases where the speaker adapted away from the other speaker (i.e. divergence).

Statistical analysis & results. We used the additive regression algorithm implemented in WEKA [5] to predict each of the personality traits (see iii above) using either only the phonetic features (i and ii), or using only the mutual ratings (iv) and the convergence features (v). We evaluated performance by 10-fold cross-validated correlation coefficients between predicted and actual values. The results are shown in Table 1. The second column indicates the performance when using the convergence features along with the mutual ratings for predicting personality. There is a weak correlation in case of acting and other-directedness, indicating that indeed personality can be reflected in the convergence behavior. This finding supports the intuition that "actors" might be particularly able to suppress their individual behavior, and that other-directed personalities have a higher need to adapt. There is no correlation in the case of extraversion and sensitivity. To give an impression of the predictive power of the features and the validity of the personality scores in the GECO database, we compare their correlation coefficients to those of classifiers using only the phonetic features, which comprise several features that are well-known in personality research [7]. Their scores are indicated in the third column. These features are much more predictive of personality (the scores are similar to those in [12], who predicted the same traits on the same data using intonation features), which is not surprising given that it is well established that some of them reflect personality. However, the scores for the convergence features show that convergence behavior itself is also weakly affected by personality, which supports models that suggest personality as a factor in convergence (e.g. [6]) and thus potentially in sound change. In any case, the results show that the relation between personality traits and convergence warrants further investigation. Given that the GECO database is currently being expanded by 20 participants [15], also including male participants and between-gender dialogs, investigating this relation on more data is a promising research area for the near future.

Table 1: Correlation coefficients obtained by 10-fold cross-validation. The table indicates the personality factor, the coefficients when using the convergence features together with the mutual ratings (2nd column), and the coefficients when using only phonetic features (3rd column).

Personality factor	convergence features	phonetic features
acting	0.27	0.81
extravertedness	-0.11	0.84
other-directedness	0.20	0.60
sensitivity	-0.02	0.81

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