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Do charismatic people produce charismatic speech? On the relationship between the Big Five personality traits and prosodic features of speaker charisma in female speakers

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Abstract

While early research on charismatic communication focused on charismatic language and more specifically rhetoric strategies, recent studies increasingly reveal the acoustic-prosodic features of charismatic speech. Furthermore, the development of the PASCAL score provided a complex metric which assesses the charisma level of a speaker's acoustic voice profile. While this measurement of charismatic speech is attributional and hence assesses charisma through its impact on the listener, we may ask whether speakers whose voices are perceived as charismatic embody certain charismatic personality traits. We assessed the PASCAL charisma score as well as its individual acoustic features of 30 female speakers and correlated them with the Big Five personality traits. The results suggest that charismatic speech is not correlated with a charismatic personality, which supports the hypothesis that charismatic speech constitutes a skill that needs to be learned and is largely independent of personality. However, certain personality facets may facilitate speaker charisma and are correlated with acoustic features that make up charismatic speech. Specifically, assertiveness and activity correlate with a more charismatic f0 mean, articulation rate as well as phrase duration for female speakers, while facets such as anxiety, diligence and surprisingly gregariousness seem to be detrimental to speaker charisma.

Index Terms: speaker charisma, charismatic speech, charisma, PASCAL, personality traits, Big Five

1. Introduction

Speaker charisma describes the ability to communicate in a way that influences other people's opinions, feelings, and behaviors affecting motivation, inspiration and trust [cf. 1-3]. Accordingly, speaker charisma is an important skill in many areas ranging from business and leadership to teaching and consulting and beyond [3-5]. While classical rhetoric focused on the linguistic aspects of charismatic speech such as storytelling, metaphorical language and rhetorical devices [6], we find a major shift in recent times towards the investigation of its physical properties. Several studies have shown that acoustic-prosodic cues contribute to the perception of speaker charisma [7-14]. Research on the complex nature of acoustic speaker charisma accumulated in a complex metric score capable to assess speaker charisma based on acoustic profiles, the so-called PASCAL (Prosodic Analysis of Speaker Charisma: Assessment and Leaning, patent pending) score [15].

Since previous studies on the acoustic features of charisma define charisma through its effects on the listener, all previous phonetic studies follow an attributional concept of charisma. However, there has been an ongoing debate in the psychological literature whether charisma is attributional, i.e. whether a person is perceived as charismatic [3,16,17], or trait based i.e. whether a person has a charismatic personality regardless of situational perception [2,18,19]. Although the trait perspective has been replaced by the attributional perspective in the past recent advances have revived the search for a charismatic personality profile [cf. 19]. Earlier studies found that traits according to the commonly used five factor model (FFM) or Big Five personality traits [20] yielded some insight into the personality of charismatic speaker [21], however [21] concluded that charisma should be assessed in a more fine-grained manner focusing on the more nuanced facets of the Big Five dimensions. A study by [19] found that a combination of facets according to the FFM in the form of a FFM charisma compound can successfully capture a charismatic personality and is even correlated to the effects of charismatic leaders such as career success. According to this FFM charisma compound, a charismatic personality encompasses high degrees of warmth, gregariousness, assertiveness, activity and positive emotions for extraversion, high degrees of openness to actions and values, high ratings for achievement striving, as well as low degrees of anxiety, depression, self-consciousness and vulnerability [19].

While we find acoustic features to affect a charismatic impression on one hand and charisma to be correlated with certain aspects of a person's personality, we can ask whether a charismatic personality is also correlated to the acoustic features of charismatic speech. So far, there are no studies on this topic or related evidence since even studies on the acoustic correlates of personality traits are rare. When investigating personality and acoustics the few existing studies focus on the perception of personality rather than the actual traits of the speaker. [14] hypothesized based on previous findings that while certain personality traits may contribute to acoustic speaker charisma neither does charismatic speech need a charismatic personality nor does a charismatic personality as proposed by [19] necessarily result in charismatic speech.

In this paper we investigate the relationship between the acoustic charisma metric PASCAL as well as its separate acoustic features and the Big Five personality traits (openness, conscientiousness, extraversion, agreeableness and neuroticism) as well as their facets. We want to answer the

10.21437/SpeechProsody.2020-143

question whether acoustic features of charismatic speech can be related to charismatic personality traits.

2. Method

2.1. Participants

The study was conducted with 30 female participants. All subjects were between 20 and 22 years old and students of German studies at the University of Oldenburg with the goal to become teachers. The subjects were all native speakers of Northern Standard German.

2.2. Procedure

For the acoustic measurements, all participants provided a short self-presentation of about two minutes. The subjects were free to talk about any topic they liked but were instructed to choose something they were personally interested in and could speak about in a committed and convinced manner. The recordings were made using smart phones in quite rooms in the participants' homes or at the library.

For the personality traits we used the German version of the Big Five questionnaire [22] with twelve items per domain and hence 60 items in total including three facets per dimension and hence four items per facet. We calculated the mean values for each facet and each dimension respectively. Furthermore, we calculated a reduced version of the FFM charisma compound by [19] using the facets *activity*, *assertiveness*, *gregariousness* as well as reversed values for *anxiety* and *depression* since the questionnaire by [22] does not contain all facets found to be relevant for charisma.

2.3. Acoustic analysis

For the acoustic analysis we used Praat [23]. The sound files were automatically annotated for interpausal units as well as syllable nuclei using the Syllable Nuclei script by [24] with its update by [25] to calculate the articulation rate. The f0 features *f0 mean*, *f0 minimum*, and *excursion size* as well as phrase duration were extracted from the labelled intervals using ProsodyPro [26] and their mean calculated. Measurements for f0 mean and f0 minimum were taken in Hz and measurements of range were taken in semitones to ensure comparability with contemporary research on speaker charisma and persuasion [cf. 7-14]. We calculated a basic PASCAL score from a sub-set of five features of the maximally 16 features that are included in the most comprehensive PASCAL score (typically, the Pascal score is based on 7-9 features). The basic PASCAL score used here relied on five of the six most important prosodic features excluding emphatic accent count for automatic analysis (for detailed information about the PASCAL score see [15,27]).

2.4. Statistical analysis

For the statistical analysis, we conducted linear mixed effects models using *R* [28], the *lme4*-package [29], and the *lmerTest*-package [30]. Model fit was determined by maximum likelihood ratio tests. *P*-values were calculated using the Satterthwaite approximation. We conducted several models to test correlations for the PASCAL score as well as its acoustic components with the FFM charisma compound as well as the Big Five dimensions and the 15 facets. As fixed factors we used PASCAL as well as the five acoustic measurements F0MEAN, F0MIN, F0RANGE, TEMPO and PHRASE_DURATION. As dependent variables we used *charisma_compound*, the five dimensions (*openness*, *conscientiousness*, *extraversion*, *agreeableness* and *neuroticism*) and the 15 facets (*gregariousness*, *assertiveness*, *activity*, *compassion*, *politeness*, *trust*, *tidiness*, *diligence*, *reliability*, *anxiety*, *depression*, *instability of emotions*, *aesthetic sensitivity*, *intellectual curiosity*, and *creative ingenuity*). As random factor we used *course* as the 30 subjects were recruited from three separate introductory courses to phonetics and phonology at the University of Oldenburg.

3. Results

3.1. PASCAL and personality

There were no significant correlations for the PASCAL score with any of the personality measurements. Neither the *charisma_compound*, one of the five dimensions nor one of the fifteen facets of the five-factor model showed significant effects for the overall acoustic charisma score.

3.2. Acoustic features and personality

3.2.1. Charisma compound

There are no significant correlations between the compounded FFM charisma score and any of the acoustic features.

3.2.2. Big Five dimensions

Table 1: *Statistical results for effects of Big Five personality dimensions on articulation rate.*

Dependent	*b*	*SE*	*df*	*t*	*p*
Extraversion	-0.23	0.10	30.00	-2.23	<.05
Neuroticism	-0.26	0.12	30.00	-2.24	<.05

Table 2: *Statistical results for effects of Big Five personality dimensions on phrase duration.*

Dependent	*b*	*SE*	*df*	*t*	*p*
Conscientious-ness	711.60	333.70	30.00	2.13	<.05

As shown in table 1 and 2, we find significant effects of the Big Five personality dimensions for two of the acoustic features. ARTICULATION RATE is negatively correlated with both *extraversion* as well as *neuroticism*. PHRASE DURATION shows a positive correlation with conscientiousness.

3.2.3. Big Five facets

Table 3: *Statistical results for effects of Big Five personality facets on articulation rate.*

Dependent	*b*	*SE*	*df*	*t*	*p*
Activity	0.33	0.14	28.31	2.39	<.05
Gregariousness	-0.26	0.07	27.75	-3.46	<.01

Table 4: *Statistical results for effects of Big Five personality facets on phrase duration.*

Dependent	*b*	*SE*	*df*	*t*	*p*
Activity	-1069.20	425.10	30.00	-2.52	<.05
Assertiveness	-814.60	300.50	30.00	-2.71	<.05
Gregarious-ness	758.40	317.10	30.00	2.39	<.05
Diligence	436.60	191.30	30.00	2.28	<.05

Table 5: *Statistical results for effects of Big Five personality facets on the f0 mean.*

Dependent	*b*	*SE*	*df*	*t*	*p*
Activity	19.64	6.65	28.61	2.96	<.01
Assertiveness	-9.54	3.91	27.92	-2.44	<.05
Anxiety	16.57	5.91	27.94	2.81	<.01
Instability of emotions	-24.41	5.38	28.90	-4.53	<.001
Aesthetic sensitivity	-9.47	2.95	27.57	-3.21	<.01
Politeness	-39.97	11.02	28.50	-3.63	<.01

As shown in table 3 to 5, we find significant effects for several facets of the Big Five dimensions. For the F0 MEAN we find a positive correlation with *activity* and *anxiety* and a negative correlation with *assertiveness*, *instability of emotions*, *aesthetic sensitivity* and *politeness*. Note that *activity* and *assertiveness* both belong to the dimension of *extraversion* and *anxiety* and *instability of emotions* both belong to *neuroticism*. Accordingly, the effects for the F0 MEAN directly contradict each other with respect to their superordinate dimension. For the ARTICULATION RATE we find a positive correlation with *activity* and a negative correlation with *gregariousness*. These are again contradicting each other since both belong to the dimension of *extraversion*. Lastly, for PHRASE DURATION we find a significant positive correlation with *gregariousness* and *diligence* and a negative correlation with *activity* and *assertiveness*. While *diligence* belongs to the dimension of *conscientiousness*, all three facets of *activity*, *assertiveness* and *gregariousness* belong to *extraversion*

4. Discussion

The results suggest that a speaker's personality affects his/her acoustic features in ways that can be both beneficial and detrimental to speaker charisma. However, we do not find that a charismatic personality as a whole or even specific personality traits directly result in a charismatic speaking style. Accordingly, we argue that personality can affect certain acoustic features that indirectly affect perceived charisma, but a charismatic personality is neither necessary for charismatic speech nor immediately results in it.

First of all, we find no effects for the PASCAL score for the charisma compound, the Big Five dimensions nor the fifteen facets. Missing effects for the Big Five dimensions were expectable, since [21] suggested that the Big Five dimensions are too broad to capture a nuanced charismatic personality which has been supported by [19]. We furthermore find no effects for the separate personality facets of the five-factor trait model. One explanation for this may be that charisma is not determined by facets in isolation but by a complex intertwined combination of facets as such as the FFM charisma compound suggested by [19]. However, even this compound did not correlate with the PASCAL score. We have two possible explanations for this. Firstly, the questionnaire we used in this study only contained five of the twelve facets used by [19]. An inclusion of all relevant facets may have yielded different results, which needs to be tested in future research. Secondly, there may be no immediate connection between a charismatic personality and charismatic speech in terms of acoustics. To investigate this explanation, we take a closer look at how personality affects the specific acoustic features of charismatic speech.

We find that a charismatic personality as captured by the FFM charisma compound [19] does not correlate with any of the acoustic features. Accordingly, the reason why the FFM charisma compound does not correlate with the PASCAL score is most likely not found in the ability of the PASCAL score to capture charismatic speech. Again, this could mean that our reduced charisma compound does not adequately capture a charismatic personality. However, we want to follow the alternative explanation that a charismatic personality does not necessarily relate to the features of charismatic speech. Accordingly, we differentiate charismatic personality into the personality trait dimensions and facets and the PASCAL score into the acoustic features and look for connections.

Firstly, we find significant effects for articulation rate for both extraversion and neuroticism with negative correlations for both traits. The effects for neuroticism are largely in line with our expectations. An increase in neuroticism correlates with a decrease in articulation rate. Since, previous studies on charismatic speech have shown that slower articulation rates are detrimental to speaker charisma [7,8,10,12,31] and studies on charismatic personality found high neuroticism to be negatively correlated with charisma in general [21], specifically when it comes to the facets of anxiety, depression, vulnerability and self-consciousness [19], these results are expected. Testing for the separate facets reveals no effects so that we expect that a combination of the three facets instability of emotion, depression and anxiety correlates with a decrease in articulation rate.

The findings for extraversion seem to contradict our expectations. High extraversion was found to be a characteristic trait of a charismatic personality [19,20], especially when the facets of warmth, gregariousness, assertiveness, activity and positive emotions are high. However, in this study we find a negative correlation between extraversion and speaking rate and thus extraverted speakers talking slower rather than faster and hence less charismatic [7,8,10,12,31]. When we look at the facets of extraversion, we get a more differentiated explanation. Both activity and gregariousness are facets of extraversion [20,22] and show significant effects. However, these effects directly oppose each other. While an increase in gregariousness correlates with a decrease in articulation rate, an increase in activity correlates with an increase in articulation rate. So, as a trend, activity is beneficial for charismatic speech while too much gregariousness is surprisingly detrimental. To interpret these findings, we look at the model prediction and find that articulation rate is optimal [cf. 12, 32] for charismatic speech when extraversion as well as all its contributing facets are about average. Accordingly, average degrees of gregariousness fit charisma best, with both too much and too little gregariousness being disadvantageous.

Secondly, we find a significant effect for phrase duration and conscientiousness. Speakers with higher levels of conscientiousness produced longer phrase durations. [19] found only the achievement striving facet of conscientiousness to be associated with a charismatic personality. In our study, this effect seems to be attributed to the facet of diligence. Furthermore, we find that speaker charisma is in general associated with shorter phrase durations [12]. Accordingly, extensive diligence tends to have a detrimental effect on speaker charisma.

In contrast to our expectations, we find no significant effects for extraversion on phrase duration. Then again, we find three of the facets of extraversion to correlate with phrase

duration. However, while increasing activity and assertiveness correlate with shorter phrase durations, gregariousness correlates with longer phrase durations. Accordingly, the effects of the extraversion facets are contradictory with respect to charisma comparable to the effects found for articulation rate with activity and assertiveness being beneficial for speaker charisma and gregariousness again being detrimental.

Thirdly and lastly, we find effects for the f0 mean. While there are no effects for any of the Big Five dimensions, there are several effects for the separate facets. Furthermore, the effects for the facets seem to explain the absence of most of the effects for the dimensions. For extraversion we find a positive correlation for activity, but a negative one for assertiveness. Both effects are expectable since higher degrees of activity and expressiveness typically correlate with higher f0 means [8,33], while assertiveness, self-assurance and dominance are frequently associated with a lower f0 mean [34-37]. For neuroticism we find a positive correlation for anxiety, but a negative one for instability of emotion. The former can be expected since anxiety and more or less related concepts such as stress has been found to increase the f0 mean [38,39]. So far, there are no immediate explanations for the latter. Additionally, we find a negative correlation for aesthetic sensitivity, which also cannot be explained so far. Lastly, we find an unexpected negative correlation for politeness with politer speakers showing lower f0 means. This too needs further research for clarification. Aesthetic sensitivity yields no effects for the superordinate dimension of openness to experience nor politeness for the dimension of agreeableness. When we look at the model prediction and the mean values, we find that the f0 mean lies at about 220 Hz when all four affecting facets are at average values. Accordingly, comparable to the effects for articulation rate, the f0 mean is most charismatic for female speakers, when none of the six facets is especially high or low [cf. 12, 40]. However, we find that the f0 mean approaches a more charismatic register when assertiveness and aesthetic sensitivity are higher. We also find general above average values and a large estimate for politeness, indicating that low values for politeness are detrimental to speaker charisma.

In summary, we find that a charismatic personality does not directly correlate to charismatic speech. Many different types of personality can produce charismatic speech, while the speech of charismatic personalities is not necessarily charismatic. However, this is based on the concept of a charismatic personality as defined and validated by [19]. The major contradiction between the personality facets of speaker charisma and those of a charismatic personality found in this study concerns the facet of gregariousness. While it is assumed that charismatic speakers are overall extraverted including being gregarious, we find that gregariousness correlates with lower articulation rate and longer phrase durations which both are detrimental to speaker charisma [cf. 7,8,10,12,31].

Furthermore, the facets of a charismatic personality as defined by [19] result in several more contradictions. For articulation rate the FFM charisma compound includes both activity and gregariousness which directly oppose each other. For phrase duration we have positive effects for gregariousness and negative effects for assertiveness and activity, with all three being assumed to be part of a charismatic personality. Lastly, for f0 mean we find positive effects for activity but negative effects for assertiveness and low anxiety. Accordingly, when all relevant facets to a charismatic personality are strong then the acoustic effects cancel each other out.

While it may be possible that previous research in personality psychology does not capture a charismatic personality adequately this would contradict a large body of research and seems unlikely. As mentioned above, another possible explanation may be that the reduced charisma compound we used does not capture charisma adequately, however this would not explain why even the facets that are included in this study show contradicting effects. Accordingly, we adhere to our hypothesis that neither is charismatic speech an immediate consequence of a charismatic personality nor does charismatic speech require a charismatic personality. Charismatic speech is a distinct communication skill that needs to be learned and perfected even by otherwise charismatic personalities. Furthermore, it is a skill that can be learned by anyone independent of personality which supports the assumption by [14].

Furthermore, we not only conclude that charismatic speech is not an extension of a charismatic personality but may be not directly based on personality at all. Personality traits that frequently co-occur with each other show contradicting effects on acoustic features. While a combination of facets may form a coherent charismatic personality, the facets that would result in optimal charismatic speech may not. Accordingly, charismatic speech may suggest an idealized personality lacking the negative traits naturally present in charismatic personalities such as extensive gregariousness. We further hypothesize that this is no coincidence but the very point of charismatic speech. Charismatic speech conveys a prototypical leader to rally behind with only strengths and no obvious flaws [1,3,41]. Consequently, the personality of a charismatic person and the personality suggested by charismatic speech are by nature not identical since one is a natural personality while the other is not. This may even be an important contributor to the ongoing debate whether charisma is trait based or attributional since this discrepancy demands to incorporate both perspectives.

However, we must note that this is a very preliminary conclusion that needs to be backed up by extensive further research. Additionally, we restricted our study to female speakers as well as University students with the goal to become teachers and hence a controlled and homogenous but limited group when it comes to generalization. However, our preliminary results hint at a greater contribution of phonetics sciences to a psychological debate and further support interdisciplinary research.

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