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Revisiting rhetorical claims of breathing for persuasive speech

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Evidence of a production experiment is presented suggesting that, unlike often claimed in rhetorical manuals and coachings, it is actually the chest breathing rather than the abdominal "belly" breathing that supports the acoustic-prosodic parameter settings of a (more) charismatic/persuasive tone of voice.

INTRODUCTION

Persuasive speech is often associated with charisma and, due to that, it is also called charismatic speech. We will use these terms interchangeably in the following, however, focusing on the more effect-oriented term of persuasion. Linguistic research on charismatic speech revealed specific changes of acoustic-phonetic parameters relative to matter-of-fact (neutral) speech, both at the segmental level [1] and at the prosodic level (see [2] for a summary). The changes at the prosodic level include higher values of f0 mean, f0 range, and f0 maximum, as well as a higher intensity level, and a greater spectral emphasis [3,4,5,6,7].

The starting point of the present study is that virtually all rhetoric manuals and coachings dealing with a speaker's persuasive 'delivery' on stage stress directly or indirectly associate the acoustic changes above with appropriate breathing patterns. More specifically, these manuals and coachings recommend a specific type of breathing, i.e. abdominal breathing that is dominated by muscular activity of the diaphragm. This is therefore also called diaphragmatic breathing, or, in more popular rhetorical terms, "belly breathing". For example, [8:192] reminds her readers: "make sure you're breathing deeply into your belly". Similarly, [9:223] claim that "deep breathing - breathing from the diaphragm - give[s] the voice a better support [and] a stronger resonance" both of which are implicitly stated to be key features of the art of (persuasive) public speaking; [10:132] draws a direct connection between belly breathing and persuasive (charismatic) speech by stating that "the deepest kind of breathing, which works from the stomach rather than the upper part of the lungs [...] works wonders for the voice: it gives it depth and power, and makes for a more convincing delivery". The latter quote illustrates that some rhetorical manuals and coachings not only recommend belly breathing, they also explicitly discourage speakers from using "chest breathing" on stage, i.e. breathing dominated by the intercostal muscles.

There is, in fact, empirical evidence that abdominal breathing is beneficial for singers [11] and successfully used to treat voice and breathing disorders [12]. But, to the best of our knowledge, it has never been tested so far

whether there is also a link between abdominal "belly" breathing and persuasive speech. At least one fact casts doubt on the existence of this link: Singing as well as many voice/breathing disorder treatments rely on maintaining a long phase of powerful exhalation. In contrast, for persuasive speech, prosodic phrases should be fairly short [3,4], with many pauses in between. Thus, if persuasive speakers split up their messages into small bites of a few seconds, why should they employ and benefit from abdominal breathing?

The present study scrutinizes the prevailing recommendation of rhetoric on breathing. If the rhetorical claim about the superiority of abdominal breathing over chest breathing for a speaker's charismatic delivery is true, then we expect a positive correlation between measured variables of abdominal breathing and prosodic changes towards more persuasive prosodic parameter settings.

METHOD

Participants were asked to present a text about 200 words. The text is a successful English investor pitch taken from the e-learning course on "How to write a killer elevator pitch" by Mike Simpson¹. It was selected firstly for its well-designed verbal charisma-inducing strategies [13] and, secondly, because the pitched business idea, a mobile app for employee work-time tracking, is relatively neutral with respect to gender stereotypes.

The elevator pitch was given in two conditions by our speakers: (i) an emotionally neutral, matter-of-fact presentation with no special audience in mind, here called the neutral presentation; and (ii) an expressive, committed investor-pitch presentation that was supposed to be emotionally "contagious" and persuade an imagined jury of potential investors to invest money into the new app. Condition (ii) is therefore referred to as the persuasive presentation condition henceforth.

The two presentations were performed in L2 English by 18 native speakers of German, 9 men and 9 women. The speakers' mean age 25.5 years (min 22, max 37 years). All 18 speakers were fluent speakers of English at level

¹ <https://theinterviewguys.com/write-elevator-pitch/>

B2 or higher according to SDU-internal study entry tests. All 18 speakers had basic experience with entrepreneurial activities, including giving elevator pitches². In this context, they had also received formal training in charismatic public speaking at the SDU over several hours.

Recordings were conducted in individual sessions of about 20 minutes. The speakers' investor-pitch presentations were recorded simultaneously with a microphone and the Resp-Track device [14], measuring time-aligned volume changes of abdomen and chest. We refrained from a cross-speaker order balancing of the neutral and persuasive presentation conditions as, according to our experience, a persuasive presentation has a stronger influence (e.g., in the form of a prosodic "afterimage") on a subsequent neutral presentation than vice-versa. Therefore, all speakers started with the neutral presentation condition and then moved on to the persuasive presentation condition.

RESULTS

The overall results pattern of acoustic parameters is simple: Besides obvious significant difference in parameter level due to speaker sex, the mean values of all acoustic parameters are significantly higher for persuasive presentations than for neutral presentations. The f_0 maximum (in semitones, st, re 100 Hz) is on average at 100 st in persuasive presentations and at 96 st in neutral presentations; the mean f_0 range covers 15 st in persuasive presentations and only 11 st in neutral presentations. The mean spectral emphasis is 2.8 dB in persuasive presentations and only 1.6 dB in neutral presentations (with all differences at least ($p < 0.001$)). Note that the higher spectral emphasis level produced by speakers in the persuasive presentation condition coincides with a 2 dB higher global breathing amplitude that we found for the chest. The f_0 -peak rate, i.e. the number of pitch accents per time unit, also showed an increase from the neutral to the persuasive presentation condition. However, this increase was only a significant trend ($p < 0.1$).

The breath-cycle variables explain, in all linear regression models, a significant amount of the variance in the acoustic variables. The highest explained variance associated with a single acoustic parameter is 11 %: The higher the inhalation amplitude of the chest, the lower is the subsequently produced f_0 minimum. This holds true for both persuasive and neutral presentations and is slightly more pronounced for female than for male speakers. Other correlations between individual variables of acoustics and breathing are significant, but very weak in terms of explained acoustic variance, particularly those related to abdominal breathing. Regarding correlations between breath-cycle variables, we found the

expiration duration to be significantly correlated with the amplitude and the duration of inhalation.

DISCUSSION

Besides sex-related differences in breathing and f_0 that are all explainable in physiological terms [15], our results show with respect to the acoustic measurements an intra-individually consistent increase of all parameters from the neutral to the persuasive presentation. Thus, in view of the known correlations between acoustic parameter settings and perceived speaker persuasion, the acoustic data suggest that all speakers performed better (i.e. were more charismatic) in the persuasive than in the neutral presentation condition.

Given that, the major new contribution of the present study is that our male and female speakers enhanced their chest breathing rather than their abdominal breathing when holding the persuasive investor pitch presentations, men even more so than women. Women switched more strongly from abdominal to chest breathing in the persuasive condition, but men breathed longer and far deeper on the chest than the women did. So, at least on the basis of the patterns of acoustics and speech breathing, there are no supporting empirical indications that belly breathing -- the training of which often fills a considerable amount of pages and personal coaching time in rhetoric -- has a positive effect on a speaker's persuasion and charisma. In fact, rather the opposite seems to be true. The better acoustic performances of the speakers coincided with stronger chest-breathing activities. Moreover, the significant correlation between a higher chest-inhalation amplitude and a lower f_0 minimum (a key change in persuasive speech, both in its own right and in connection with an extended f_0 range [3]) may be seen as direct evidence for the positive effect of chest breathing on acoustic persuasion. Thus, we have to reject our hypothesis based on the present data.

However, to date we have measured only a small selection of acoustic parameters. Relevant f_0 parameters such as kurtosis [16] were excluded here, as were intensity (i.e. loudness) measures and voice parameters based on the long-term average spectrum (LTAS) of a speaker [17]. It is therefore important for future studies that we measure other prosodic parameters and correlate them with the findings on chest and abdominal breathing. Furthermore, we need to relate the breathing data from the present study to perceptual ratings of listeners. If chest breathing has a persuasion-enhancing effect and abdominal breathing has no or a less persuasion-enhancing effect, then there will be a clear correlation between perceived speaker persuasion and the amplitude and/or standard deviation of chest breathing, but not (to the same extent) of abdominal breathing. We are conducting this perception experiment at the moment, and initial results point exactly in the direction outlined above. Abdominal breathing creates a more pleasant and sonorous, but chest breathing a more persuasive and charismatic voice.

² An elevator pitch "is a concise, carefully planned, and well-practiced description of your company that your mother should be able to understand in the time it would take to ride up an elevator"², Robert Pagliarini, MIT Blossoms: <https://blossoms.mit.edu/sites/default/files/video/download/The-Art-of-the-Elevator-Pitch.pdf>

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