Motivation in computer-assisted pronunciation training: Online and face-to-face environments

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Abstract

This study investigated how learners’ motivation to improve their pronunciation (i.e., pronunciation-focused motivation) influences their L2 pronunciation achievements. This relationship was explored separately in an online (n = 28) and a face-to-face (F2F) (n = 49) learning environment with beginner learners of German. In the online learning environment, learners were divided into two groups: a group that received computer-assisted pronunciation training (CAPT) over the course of the semester and a group that did not receive targeted pronunciation training. In the F2F learning environment, learners were divided into three groups: a group that received CAPT assigned as homework, a group that received teacher-led, in-class pronunciation training, and a group that did not receive pronunciation training. Pronunciation gains were assessed by means of native speaker ratings of learners’ comprehensibility and accentedness at the beginning and end of the semester. Pronunciation-focused motivation was measured with a 12-question survey administered at the beginning of the semester. Results from both learning environments showed a relationship between motivation and pronunciation achievement, but only among the groups that had received pronunciation training. Findings further suggested that motivation had a larger influence on gains in accentedness than in comprehensibility. Pedagogical implications of these findings are discussed.

Keywords: Distance Learning, Online Teaching & Learning, Pronunciation, Motivation

Language(s) Learned in This Study: German


Introduction

In today’s globalized world, which often demands competent use of a second language (L2), L2 communication skills are very important. A crucial factor in successful oral communication is intelligible pronunciation (Celce-Murcia, et al., 2010). One factor that has shown promise to positively influence success in pronunciation achievement is motivation (Nagle, 2018b; Saito, et al., 2017). Motivation is one of the most thoroughly researched topics in the field of Second Language Acquisition (SLA; for an overview of the research, see Boo, et al., 2015). Nevertheless, studies on the motivation-L2 pronunciation link—and most notably those that specifically investigate the role of pronunciation-focused motivation (i.e., how motivated a learner is to improve their own L2 pronunciation)—are still scarce (but see e.g., Elliott, 1995a; Sardegna et al., 2018; Smit, 2002). This is unfortunate, seeing that researchers and instructors alike can benefit from understanding the significance of motivation for L2 pronunciation learning because research suggests that motivation is just as important as language aptitude in learning an L2 (Noels, 2001). Crucially, however, motivation can be influenced by instructors and administrators, which ultimately leads to larger learning gains (Dörnyei & Ushioda, 2011). Thus, research on learner motivation has important pedagogical implications. The aim of the present study is to address this gap in the literature by exploring the relationship between pronunciation-focused motivation and L2 pronunciation gains. It adds to the
existing body of L2 motivation research by investigating pronunciation-focused motivation specifically, rather than motivation for L2 learning more generally. If there is a positive relationship between pronunciation-focused motivation and gains in L2 pronunciation skills, instructors can favorably influence their learners’ pronunciation learning by educating them about the importance of pronunciation and by raising their motivation to improve their pronunciation skills.

Importantly, however, the rapid growth in online courses in the past decade (Seaman et al., 2018) will most likely continue in the aftermath of the COVID-19 pandemic (Kim, 2020). This rapid growth demands that such a relationship be explored not only in more traditional face-to-face (F2F) environments, but also in fully virtual online learning environments. Therefore, the present study explored the relationship between pronunciation-focused motivation and gains in learners’ L2 comprehensibility and accentedness not only in F2F, but also in online environments. For the present paper, the field of education’s terminology (Dobrovolny et al., 2015) was followed in defining online learning as fully virtual learning—synonymous to distance learning—with various degrees of synchronous and asynchronous instruction1. Importantly, however, online learning differs from blended learning or hybrid classes in that no F2F interaction is taking place.

Literature Review

Motivation and Pronunciation Development

While research on the predictive power of motivation for language learning in general has been conducted for half a century now (Gardner & Lambert, 1972), examinations of the role of motivation for L2 pronunciation in particular have been more recent. Nevertheless, there is a solid body of research that addressed different aspects and/or goals in pronunciation attainment, often focusing on other factors alongside motivation (e.g., Baker Smemoe & Haslam, 2013; Elliott, 1995a; Huensch & Thompson, 2017; Martinsen et al., 2014; Moyer, 2007; Nagle, 2018b; Saito et al., 2017; Saito et al., 2018). Saito et al. (2017), for example, explored the role of learner motivation in L2 speech learning in English as a Foreign Language (EFL) classrooms in Japan. They developed a tailored questionnaire for their target population and found that context-specific motivation (e.g., short-term vs. long-term goals) predicted the longitudinal development of the learners’ comprehensibility (but not accentedness) in the foreign language. Nagle (2018b), on the other hand, who tracked the development of comprehensibility and accentedness of American learners of L2 Spanish as well as their motivational orientations over the course of three semesters, found significant effects between motivation variables and accentedness (but not comprehensibility). From a pedagogical perspective, the distinction between intelligibility (Is the utterance actually understood?) and comprehensibility (How easy or difficult is it to understand the utterance?) on the one hand, and accentedness (How strongly do speech sounds and patterns differ from a native target?) on the other hand, is crucial (Derwing & Munro, 2009). Researchers and teachers have moved away from prioritizing accent-free speech as a goal for L2 pronunciation and rather strive for intelligible, comprehensible speech as a more realistic objective in instructed SLA (Levis, 2005; Huensch, 2019). It has to be pointed out, however, that learners themselves often still report great concern for their accentedness, which encourages researchers to investigate this dimension alongside a focus on comprehensibility or intelligibility (Derwing & Munro, 2009; Simon, 2005). Furthermore, while a focus on accent-reduction is often seen as discriminatory in a second language context (e.g., immigrants learning the language after arriving in a new country), this is less applicable in a foreign language context (e.g., in higher education classrooms), which again makes it worthwhile to investigate accentedness, as long as accent-reduction is not the sole focus of pronunciation teaching (Derwing & Munro, 2015; Sturm, 2019).

One common feature of all previous studies exploring the relationship between motivation and pronunciation/oral proficiency mentioned above is that they investigated motivation for L2 learning in general, but not motivation for improving one’s pronunciation in particular. This is an important difference when pedagogical implications are considered: influencing learners’ overall motivation for L2 learning might be more challenging than influencing their motivation only for improving their L2 pronunciation.
Saito et al. (2018) therefore call for future research to probe the relationship between motivation and L2 oral proficiency at a fine-grained level by looking specifically at pronunciation-focused motivation. There is a limited number of studies which have done so by devising instruments that tap into motivation that is specific to pronunciation aspects (e.g., Elliott, 1995a; Sardegna et al., 2018; Smit, 2002). While Sardegna et al. (2018) and Smit (2002) developed a stand-alone questionnaire that fit their specific instructional context and research questions, Elliott (1995a) developed the Pronunciation Attitude Inventory (PAI) that has been frequently used since to measure pronunciation motivation for different purposes (Elliott, 1995b; Ducate & Lomicka, 2009; Huensch & Thompson, 2017; Lord, 2008; Kissling, 2014; Roccamo, 2014). Elliott (1995a), for example, investigated the extent to which cognitive, affective, and instructional variables could predict pronunciation gains and found that attitude towards pronunciation was the best predictor of pronunciation accuracy. Both Lord (2008) and Ducate and Lomicka (2009) investigated whether learners’ pronunciation improved after participating in podcasting activities and used the PAI to gauge learners’ attitudes towards the pronunciation tasks comparing their attitudes before and after the pronunciation intervention. Kissling (2014) explored which individual difference factors predict learners’ improvement of Spanish consonants. One of the individual difference factors investigated in this study was attitude towards pronunciation instruction, which again was measured using the PAI. While she did not find a relationship between pronunciation attitudes and pronunciation improvement in Spanish FL learners, pronunciation attitudes contributed to explaining the variance with one of the consonants: the interdental fricative. Notably, the PAI was designed to measure attitude towards pronunciation, which some researchers operationalize as a separate construct than motivation (e.g., Huensch & Thompson, 2017). The present study, however, follows previous research that operationalizes attitude as synonymous to motivation (most notably, Masgoret & Gardner, 2003, in their meta-analysis of L2 motivation studies conducted by Gardner and his colleagues, but see also Martinsen et al., 2014).

**Computer Assisted Pronunciation Training**

The rapid development of technology over the past two decades has changed the landscape of language learning and teaching. The wide range of technological applications allows not only for a new approach to teaching languages in general, but also for teaching pronunciation in particular. Despite findings that stress the importance of intelligible pronunciation in L2 communication (Celce-Murcia et al., 2010), pronunciation instruction is often neglected in L2 classrooms. Two major reasons for this discrepancy are lack of in-class time and lack of instructor preparedness (Darcy, 2018; Foote et al., 2011). That is, teachers often report that they just do not have enough time to address pronunciation in the classroom, or that they simply do not know how to best help their students improve their pronunciation, since teacher education does not always include appropriate training in this domain (Foote et al., 2011). Computer Assisted Pronunciation Training (CAPT) can help solve these problems and has additional advantages: (a) pronunciation training no longer has to be dictated by the instructors’ level of preparedness for teaching this skill; (b) CAPT offers the possibility to move pronunciation training outside of the classroom since it usually does not require the physical presence of a teacher, saving valuable in-class time; (c) moving instruction outside the classroom further aids in creating a stress-free environment in which learners can practice at their own pace, which promotes learner autonomy and can help shy learners practice their pronunciation without the perception of losing face in front of peers; (d) while in-class pronunciation instruction often has to take a one-size-fits-all-approach by focusing on common pronunciation problems, CAPT allows for training that can address individual learners’ problems in a more targeted fashion (O’Brien, 2011).

It has to be pointed out, however, that despite its evident advantages, the use of CAPT also comes with some constraints and should always be considered from a pedagogical perspective before using it as part of classroom-based instruction (O’Brien et al., 2018). Lee, et al.’s (2015) meta-analysis of L2 pronunciation studies, for example, showed a smaller effect size for the effectiveness of CAPT resources than in-class instruction. Therefore, it is of crucial importance that the CAPT being used in classroom learning is pedagogically sound courseware, ideally vetted by the teacher and chosen specifically for each unique learning environment and aligning with the goals of communicative language instruction. Ideally, this
would be applications that address not only segmental features (individual sounds such as consonants and vowels), but also suprasegmental features (such as prosody or stress assignment), which play an important role for L2 comprehensibility (O’Brien et al., 2018).

**Pronunciation in Online vs. F2F Learning Environments**

The most recent report of the state of online learning in U.S. higher education (Seaman, et al., 2018) underlines the undeniable fact that online learning is on the rise. The authors report that 31.6% of all learners in higher education take at least one online course during their studies and 14.9% take all their classes online. Importantly, these numbers have gone up consistently every year since 2012. Even before COVID-19 forced most higher education institutions to deliver their classes temporarily online, this rising trend comes as no surprise considering the advantages of online learning. That is, distance learning can make education available to learners who need flexible access to instruction, for example, for geographical reasons (living in rural areas without access to higher education or specific classes) or if work or family life restricts them from attending F2F classes. While there is no data yet on how the sudden transition to online instruction during COVID-19 will affect future online offerings and enrollment, many voices in higher education predict that this will lead to a lasting increase in post-pandemic online instruction (Kim, 2020).

For the field of L2 learning, a major concern in online instruction is the insufficiency of spoken contact among learners, peers, and teachers to promote oral proficiency. That is, language learning occurs through interaction, but even if part of the curriculum is synchronous, there is simply less interaction in the L2 when the learner is in a different location than teachers and peers (Lin & Warschauer, 2015; Xiao & Hurd, 2010). Research on the development of pronunciation skills—as opposed to the more general area of oral proficiency which entails speaking ability more broadly, including parameters such as fluency, accuracy, and syntax—in online L2 learning is scarce (but see Inceoglu, 2019; Martin, 2020b). While previous research found that overall, the effectiveness of online and F2F language instruction is comparable (Blake et al., 2008; De Paepe et al., 2018; Isenberg, 2010), Martin (2020b) showed that first-semester online language learners’ L2 pronunciation does not improve significantly in the absence of pronunciation training, even if other skills develop on par with F2F learners. Further research on the role of pronunciation development in online language learning is therefore indicated.

Given the differences between online and F2F environments—that is, in the former, learners are generally more autonomous by having flexibility in scheduling their study time, and are responsible for monitoring their progress and selecting their route through the material (Murphy, 2011)—, it is plausible that motivation plays a larger role in online learning than in F2F learning. While there are a few studies that investigated the role of motivation in online language learning (Lin et al., 2017; Murphy, 2011; Ushida, 2005; Xiao & Hurd, 2010) and found motivation to play an important role overall in distance language learning, research in this area is still in its early stages. Crucially, it appears that to date, the relationship between motivation and the acquisition of pronunciation skills has not been investigated for online learning. The present study aims to address this gap.

**Present Study**

The goal of the present study was to investigate how motivation to improve one’s pronunciation influences learners’ pronunciation achievement in an online and a F2F learning environment. In order to explore this question, a CAPT and in-class pronunciation training were designed and administered in first-semester L2 German classes. Pronunciation achievement was measured by means of native speaker (NS) ratings of learners’ comprehensibility and accentedness at the beginning and end of the semester. Moreover, a motivational questionnaire that specifically targeted motivation for improving one’s own L2 pronunciation was designed and administered to the learners at the beginning of the semester. The relationship between motivation and gains in pronunciation skills was then investigated separately in the two learning environments: (a) in the online learning environment, this relationship was explored among a group of learners who received CAPT (Online CAPT group) and among a group of learners who received no
pronunciation training (Online Control group); and (b) in the F2F learning environment, this relationship was explored among a group of learners who received CAPT as homework assignments (F2F CAPT group), a group of learners who received in-class pronunciation instruction (F2F In-class group), and a group of learners who did not receive pronunciation instruction (F2F Control group). The present study therefore poses the following research questions:

1. To what extent does pronunciation-focused motivation influence learners’ pronunciation achievement in an online learning environment?
2. To what extent does pronunciation-focused motivation influence learners’ pronunciation achievement in a F2F learning environment?

Methods

Participants

The 77 participants for this study were first-semester German learners at a large public university in the Northeastern U.S. Information about the participants in each group is reported in Table 1. Participants were either enrolled in online courses (four sections) or in traditional F2F courses on campus (six sections). The online courses were conducted virtually and did not include any F2F components. They were asynchronous except for a spoken live chat component that totaled four hours of live chat over the course of the semester. This spoken live chat component was set at a total of only four hours to account for the fact that the learners were located in different time zones, but to ensure that they still had some synchronous spoken interaction. The F2F courses met four times a week for 50 minutes and was followed a communicative curriculum. The online and the F2F courses were offered at the same university, taught by instructors in the same department who all taught both online and an in-person at some point. Learners received the same amount of credit hours for the courses whether they were taught online or F2F and were expected to spend an equal amount of time on their classwork in total. All courses used the coursebook *Sag Mal* (Anton et al., 2014), including its online activities.

| Table 1 | Participant Information |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Group           | Participants  |   | Age  |   |   |
|                 | N  | Female | Male | M  | SD | Range |
| Online CAPT     | 17 | 5      | 12   | 28.8 | 8.0 | 18-44  |
| Online Control  | 11 | 3      | 8    | 28.5 | 4.9 | 22-38  |
| F2F CAPT        | 19 | 10     | 9    | 19.3 | 1.4 | 18-23  |
| F2F In-class    | 14 | 3      | 11   | 21.8 | 5.5 | 18-40  |
| F2F Control     | 16 | 4      | 12   | 19.7 | 2.0 | 18-25  |

Instruments

CAPT

The CAPT employed in the present study was the method of innovative Cued Pronunciation Readings (iCPR; a representative sample of the materials can be accessed in the IRIS database [www.iris-database.org](http://www.iris-database.org)). iCPRs have been shown to lead to significant improvements in learners’ pronunciation in online environments (Martin, 2020b) and in F2F environments, in which they not only led to significant
improvement compared to a control group, but also showed a slight edge over in-class pronunciation training (Martin, 2020a). This type of CAPT has further been successfully used as the means of pronunciation training in studies investigating the role of peer corrective feedback in pronunciation development (Martin & Sippel, 2021). iCPRs are delivered through Microsoft PowerPoint, making them easily accessible for learners. They include training on both segmental and suprasegmental features to help learners simultaneously improve their intelligibility, comprehensibility, and accentedness (Derwing, 2013). Moreover, iCPRs include both perception and production exercises, in the ratio of 1:2 (one day of perception training followed by two days of production training). This design is based on findings that show that perception often precedes production in L2 pronunciation learning (Nagle, 2018a) and that even perception training alone can lead to improvement in production (see Sakai & Moorman, 2018 for a meta-analysis). Both the perception and the production units include the voices of nine NSs, accounting for findings in High Variability Phonetic Training that have found more robust gains when learners received input from multiple voices and in varying phonetic contexts (Barriuso & Hayes-Harb, 2018). iCPR perception units consist of two types of practice activities: a sound-discrimination-task and an accentendness-detection task. Production units always start with explicit information on the targeted linguistic feature—modelling and explaining how to produce each segmental or suprasegmental target—and then prompt the learner to practice by repeating NSs models of words containing the target. For a more detailed account of research principles underlying the design of iCPR CAPT, see Martin (2018), and for a description of how to create these materials for one’s own classroom, see Martin (2017). The CAPT was designed as 30 units (10 pronunciation targets x 3 units per week) with each unit requiring between 10-15 minutes of work, depending on learners’ effort and willingness to practice each targeted pronunciation error. The ten pronunciation targets were (a) allophones of /r/: consonantal [ʁ] and vocalic [ɾ], (b) [c] and [x], (c) [ɛː], (d) [oː], (e) [ʏː], (f) [ʊː], (g) the orthographic-phoneme-correspondence <z> → /ts/, (h) the orthographic-phoneme-correspondences <ie> → /ɪʃ/ and <ei> → /ai/, (i) the orthographic-phoneme-correspondence <v> → /fl/, and (j) lexical stress in German-English cognates.

**In-class Pronunciation Training**

The in-class pronunciation training materials were designed to mirror the CAPT as closely as possible. That is, they targeted the same pronunciation errors, included perception and production exercises (in the same ratio as the CAPT), and tried to include the same vocabulary items for practice to the largest degree feasible. To control for equal time-on-task, the in-class materials also consisted of 30 days of 10-minute interventions. They always started with the instructor introducing the pronunciation focus of the week and modelling correct production or use. Then, the learners engaged in practice activities that usually took the form of partner work, while the instructor provided feedback and corrections where necessary.

**Pronunciation Assessment Instrument**

Pre- and post-test recordings were elicited from the learners to compare their achievement in comprehensibility and accentedness from the beginning to the end of the semester. Learners were prompted to read 75 words, split into three blocks of 25 words, embedded in a carrier phrase. None of these words were included in the training or part of the first semester German core vocabulary and were therefore judged to be mostly unknown to the learners\(^2\). While the gold-standard in pronunciation assessment is a free-speech task (Saito & Plonsky, 2019), this was not deemed feasible for the present study, seeing that the first round of recordings was administered to absolute beginners in their second week of language instruction. The present study therefore followed Kissling (2014) and used a word list with the goal of not cognitively overburdening the learners with the task and ensuring that they could mainly focus on their pronunciation.

**Motivational Questionnaire**

To measure learners’ pronunciation-focused motivation, Elliott’s (1995a) well established PAI was used (Elliott, 1995b; Ducate & Lomicka, 2009; Huensch & Thompson, 2017; Lord, 2008; Kissling, 2014; Roccama, 2014). The instrument consists of 12 statements to be rated on a five-point Likert scale from 1 (never or almost never true of me (totally disagree)) to 5 (always or almost always true of me (totally
agree). All items were adjusted in wording to target L2 German rather than Spanish. The full questionnaire is provided in the Appendix.

Procedure

In the online environment, two sections each were pseudo-randomly assigned to the Online CAPT group, and two sections were pseudo-randomly assigned to the Online Control group. All four sections were part of the same standardized curriculum for online instruction at the respective university. They only differed in the fact that the Online CAPT group was additionally assigned CAPT activities for 10 of the 15 weeks of the semester (the remaining four weeks were blocked for course introductions and two exam periods), while the Online Control group was additionally assigned grammar and vocabulary activities during the same time frame, so that both groups received the same amount of German instruction.

In the F2F environment, six sections each were pseudo-randomly assigned to the F2F CAPT, the F2F In-class, and the F2F Control group with two sections each. All six sections were part of the same standardized curriculum, overseen by one course coordinator for all sections. Learners in the F2F CAPT group were assigned the CAPT activities as homework on three of four instructional days a week for ten weeks. Learners in the F2F In-class group received pronunciation instruction from their teacher in the classroom on the same days that the former group received CAPT as homework. All materials were provided to the instructors by the researcher. Learners in the F2F Control group did not receive targeted pronunciation training, but instead received vocabulary, grammar, and communicative activities to control for time-on-task.

The ten sections were taught by five different instructors. To control for possible instructor effects, the sections were assigned such that in the online environment, two instructors each taught one CAPT and one Control group, and that in the F2F environment, two instructors taught one section each of the CAPT and the In-class group and another instructor taught both sections of the Control group.

In the second week of the semester, all learners completed the motivational questionnaire either by uploading it to the course platform (in the online environment) or by filling it out in-class (F2F environment). Afterwards, they were assigned the production pre-test recording as a homework. In the penultimate week of the semester, the learners were assigned the production post-test recording as a homework. The post-test differed from the pre-test in counterbalancing the three blocks of 25 words for group and instructor, but all 75 words to be read were the same as on the pre-test.

Results

Scoring for Data Analyses

**Pronunciation Achievement**

Forty-eight words (matching between pre- and post-test) were randomly chosen for each learner. These words were extracted from learners’ recordings and normalized by scaling them to a peak intensity of 70db and by inserting 500ms of silence by means of a Praat script (Boersma & Weenink, 2014). The tokens were then rated by NSs for comprehensibility and accentedness on a 9-point Likert scale after hearing the item once. The present study employed NSs for the ratings since research has shown that non-NSs might judge comprehensibility significantly harsher than NS raters, which constitutes a concern for interrater consistency (O’Brien, 2016). All NSs were ‘naïve’—that is, they had no linguistic training and had never taught German. As the large amount of data did not allow for all tokens to be rated by the same raters, the data were split among two lists: four NSs rated the data from learners in the online environment, and eight NSs rated the data from the F2F environment (for a detailed account of rating methodology, NS rater background, and reliability measures, see Martin, 2020a, 2020b). Each rater came to the lab for multiple rating sessions, totaling six to eight hours of ratings per person. All sessions began with a brief training, giving examples for how to complete the ratings and having raters judge a few items that were not included in the analyses as a warm-up. Audio files were randomized and presented using PsychoPy software (Peirce,
Interrater consistency within each group of raters—calculated by means of intraclass correlation coefficients (ICCs)—was high (Cronbach’s alpha = .82-.92) and fell within the 25th-75th percentile range of [.82,.96] reported for the field of SLA in Plonsky and Derrick (2016). Therefore, mean comprehensibility and accentedness scores for each learner were calculated for each testing time, averaging across raters. Since the current study was interested in improvement in comprehensibility and accentedness over the course of the semester, a gain score for each participant was computed by subtracting the pre-test score from the post-test score. For example, if a learners’ comprehensibility rating was a 3.5 out of 9 (9 = best rating for each category) at the pre-test and a 5.0 at the post-test, their gain score was 1.5. These gain scores for each learner for comprehensibility and accentedness served as data points for the correlations presented below. See Table 2 for a summary of each group’s mean gain scores.

Motivation Measurement

Responses to the negatively worded statements on the motivational questionnaire were reversed. Each learners’ mean motivation score was then calculated by averaging across their responses to all 12 questions. As such, a mean score of 1 indicated the lowest pronunciation-focused motivation and a mean score of 5 indicated the highest pronunciation-focused motivation. See Table 2 for each group’s mean motivation score.

Table 2

Descriptive Statistics for Motivation and Pronunciation Development

<table>
<thead>
<tr>
<th></th>
<th>Motivation Score</th>
<th>Gain Score Comprehensibility</th>
<th>Gain Score Accentedness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>95% CI</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Online CAPT</td>
<td>3.89 (.60)</td>
<td>[3.59,4.20]</td>
<td>.85 (.78)</td>
</tr>
<tr>
<td>(n = 17)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online Control</td>
<td>3.64 (.43)</td>
<td>[3.35,3.93]</td>
<td>.24 (.45)</td>
</tr>
<tr>
<td>(n = 11)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2F CAPT</td>
<td>3.80 (.54)</td>
<td>[3.54,4.06]</td>
<td>1.00 (.95)</td>
</tr>
<tr>
<td>(n = 19)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2F In-class</td>
<td>3.62 (.48)</td>
<td>[3.34,3.89]</td>
<td>1.06 (.77)</td>
</tr>
<tr>
<td>(n = 14)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2F Control</td>
<td>3.52 (.54)</td>
<td>[3.23,3.81]</td>
<td>.37 (.54)</td>
</tr>
<tr>
<td>(n = 16)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. M = Mean, SD = Standard Deviation, CI = Bootstrapped (BCa) Confidence Interval.

Analyses

A one-way ANOVA confirmed that there were no significant differences between the average motivation scores of the five groups: $F_{4,72} = 1.31, p = .274$.

The data met the assumptions for a parametric correlation (Pearson’s $r$): the Loess line closely following the regression line indicated a linear relation (Larson-Hall, 2016, p.193), data were gathered independently, normally distributed, and homoscedastic (had equal statistical variances). Bootstrapped (BCa) 95% Confidence Intervals (CI) of the correlation coefficients are presented to indicate the level of measurement precision, which provides more information and is preferable to null hypothesis significance testing (Norris,
If the CI does not pass through 0, the correlation is statistically significant (Larson-Hall, 2016, p. 211). For parity with previous work using null hypothesis significance testing, $p$-values are still reported below, but the reader has to be cautioned that $p$-values in correlations are strongly influenced by sample size, whereas robust statistics are less perceptible to sample size. Another reliable measure that does not change based on the number of participants is the effect size. $R^2$ is therefore reported for all correlations to provide a measure of how much of the variance in one variable is accounted for by the other variable. $R^2$ interpretation guidelines are inferred from Plonsky and Oswald’s (2014) field specific guidelines for the $r$-family of effect sizes for SLA: $R^2 = 0.06$ is small, $R^2 = 0.16$ is medium, and $R^2 = 0.36$ is large (see Larson-Hall, 2016, p. 209). Table 3 summarizes the results of Pearson’s correlation ($r$) to examine how learners’ motivation was related to their longitudinal development in comprehensibility and accentedness in each group and provides an interpretation of statistical significance and effect sizes. For a visual representation of the data for each group, see the correlation scatterplots in Figures 1-4.

Table 3

<table>
<thead>
<tr>
<th>Motivation in each Group</th>
<th>Comprehensibility Gain</th>
<th>Accentedness Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$r$</td>
<td>95% BCa CI</td>
</tr>
<tr>
<td>Online CAPT (n = 17)</td>
<td>.64</td>
<td>[.31, .87]</td>
</tr>
<tr>
<td>Online Control (n = 11)</td>
<td>.31</td>
<td>[-.37, .86]</td>
</tr>
<tr>
<td>F2F CAPT (n = 19)</td>
<td>.26</td>
<td>[-.07, .59]</td>
</tr>
<tr>
<td>F2F In-class (n = 14)</td>
<td>.59</td>
<td>[.21, .80]</td>
</tr>
<tr>
<td>F2F Control (n = 16)</td>
<td>.11</td>
<td>[-.44, .53]</td>
</tr>
</tbody>
</table>

Note. * = correlation statistically significant based on the 95% BCa CI not passing through 0; — = negligible effect size; # = small effect size; ## = medium effect size; ### = large effect size
Figure 1

*Online Learning Environment: Data Spread of Motivation x Comprehensibility Correlation*
Figure 2

*Online Learning Environment: Data Spread of Motivation x Accentedness Correlation*
Figure 3

*F2F Learning Environment: Data Spread of Motivation x Comprehensibility Correlation*
Discussion

The present study investigated the relationship between pronunciation-focused motivation and learners’ development of pronunciation skills over the course of their first semester of language learning. This relationship was explored in both an online and a F2F learning environment. Learners in this study received either CAPT (one group each in the online and F2F environments), teacher-led, in-class pronunciation training (one group in the F2F environment), or no targeted pronunciation training (one group each in the online and F2F environments). Measurements of pronunciation achievement were collected by means of learner recordings that were rated for comprehensibility and accentedness by NS raters. Motivation measurements were collected by using Elliott’s (1995a) PAI, a questionnaire targeting motivation specific for improving one’s pronunciation.

Online Environment

Among the online learners who received CAPT, the results show a significant, positive correlation between pronunciation-focused motivation and improvement in learners’ comprehensibility and accentedness, with a large effect size for the former and a medium effect size for the latter correlation. In the Online Control group, however, the correlations between motivation and gains in pronunciation were not significant, with small and negligible effect sizes for comprehensibility and accentedness respectively.

As outlined earlier in the review of the literature, one might expect motivation to be particularly important in an online learning environment where learners are more autonomous than in traditional learning environments and have more flexibility, and with it more responsibility, in scheduling their study time due to the often at least partially asynchronous nature of online instruction (see Murphy, 2011). The results of the present study neither support nor contradict this theory in full. That is, in the absence of pronunciation...
training, we did not see a relationship between pronunciation-focused motivation and gains in pronunciation skills. Yet, the results showed that if learners are given the opportunity for pronunciation training, as in the form of CAPT in the present study, motivation appears to have predictive power for gains in pronunciation skills. This finding is not surprising, seeing that in most CAPT applications, learners have a large degree of freedom in how much time or effort they invest in practicing or engaging with the activities. Therefore, if improving their own pronunciation is more important to them personally (as would be reflected in a higher average score on the motivational questionnaire), it is likely that they would invest more time or effort in their training and have better learning outcomes than learners to whom pronunciation does not matter much and who therefore invest less effort in their pronunciation training.

Based on the present study only, however, it would be premature to claim that pronunciation-focused motivation plays no role in online learning in the absence of pronunciation training. There are two important implications to consider in this context. First, the group size of the Online Control group \( (n = 11) \) was much smaller than the other groups, making it less likely to see a correlation, even if there actually were a relationship to be found. Secondly, Martin (2020b) found that, while learners who received pronunciation training in an online environment significantly improved over the course of their first semester of L2 instruction, learners who did not receive pronunciation training did not improve significantly in measures of comprehensibility and accentedness. For absolute beginners with almost no knowledge of the L2 at the beginning of the semester, this lack of significant improvement should be alarming, seeing that the learners had a full semester of L2 instruction and that, in a F2F environment, learners usually do significantly improve their pronunciation skills over the course of their first semester even in the absence of targeted pronunciation training (Martin 2020a). Thus, this finding might be driven by the lack of improvement, seeing that in the absence of improvement, it is harder to find a relationship between motivation and improvement. Overall, the verdict on the relationship between pronunciation-focused motivation and pronunciation development in an online environment is therefore still out. However, the present data suggest that, at least when pronunciation training is provided, it appears as if higher motivation predicts better outcomes in learners’ pronunciation gains.

Since the role of motivation—let alone the role of pronunciation-focused motivation—for L2 pronunciation has not previously been investigated in online environments, we cannot compare the findings of the current study to previous findings. However, the present findings are in line with previous research that showed that higher motivation (i.e., general motivation for language learning) leads to more successful outcomes in L2 learning in online environments. Ushida (2005), for example, who investigated the role of learners’ motivation in L2 learning in online French and Spanish courses, found that more motivated learners studied more regularly and productively, leading to better learning outcomes.

While these are just initial findings, some important limitations must be addressed in future research to further advance our knowledge of the role motivation plays in pronunciation development. That is, future studies investigating the motivation-pronunciation link need to be designed with larger group sizes. Moreover, Nagle (2018b) showed that L2 motivation declines over the course of learners’ language study. It would then be interesting to see to what extent proficiency level influences the relationship between motivation and pronunciation improvement. Finally, when investigating this relationship with learners of higher proficiency levels, it would be important to elicit connected or free speech samples, seeing that the current study only focused on the word-level since it targeted absolute beginners of L2 German.

**F2F Environment**

In the F2F environment, results for the learners who received CAPT as homework showed a significant, positive correlation with a medium effect size for the correlation between pronunciation-focused motivation and gains in accentedness, but the correlation with comprehensibility did not reach significance and showed a small effect size. For the learners who received pronunciation training in-class from their instructor, results revealed a significant, positive correlation between motivation and both measures of pronunciation, with medium (comprehensibility) and large (accentedness) effect sizes. No significant relationships were found in the F2F Control group and the correlations showed only a negligible (comprehensibility) and small
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Similar to what we found for the online environment, the results suggest that motivation has predictive power for gains in pronunciation skills, but only if learners receive pronunciation training as part of the coursework. Again, this finding is not very surprising, as it just confirms that learners who are more motivated to improve their pronunciation are more successful in doing so over the course of one semester. This might simply be the case because they apply themselves more, but there could also be cognitive or emotional factors that interact with the motivational component and lead to better learning outcomes (see e.g., Saito et al., 2018). The lack of a significant correlation in the F2F Control group is in line with the findings in the online environment and again suggests that learners’ motivational profile does not predict pronunciation gains in the absence of targeted pronunciation training. That is, it does not matter for the actual gains in pronunciation accuracy how highly motivated a learner was if they did not receive training. The results here can be seen as more robust than in the online environment since the group size was more in line with the experimental groups and because Martin (2020a) found that even in the Control group, learners’ L2 pronunciation improved significantly over the course of their first semester of learning German. Thus, it is likely not the lack of improvement that is driving the absence of a relationship in this case.

Comprehensibility vs. Accentedness Measurements

As outlined earlier in the review of the literature, previous studies investigating the motivation-pronunciation link have reported different findings on whether L2 motivation influenced learners’ improvement in comprehensibility or accentedness. Saito et al. (2017), who investigated the relationship between learner motivation and L2 pronunciation for EFL learners in the F2F environment over one academic semester, found a significant relationship between motivation and learners’ gains in comprehensibility, but not accentedness. Nagle (2018b), however, found the opposite. In his study, no significant relationships emerged between the motivational variables targeted in his survey and gains in comprehensibility, but there was a significant relationship with gains in accentedness. To shed more light on this issue, both dimensions of pronunciation measurements were included in the present study.

While we found overall that pronunciation-focused motivation was a predictor for gains in both measurements (as seen in the Online CAPT and the F2F In-class groups), interestingly, this trend was not found in the F2F CAPT group. That is, in this group, only the correlation between motivation and gains in accentedness reached significance. Taken together with the finding that in the F2F Control group the correlation between motivation and accentedness had a small effect size whereas the correlation with comprehensibility merely had a negligible effect size, the findings of the present study seem to echo Nagle’s (2018b) findings. As an explanation for his results, Nagle (2018b) suggests that in an environment of communicative language learning, as is the case in most language classrooms in the U.S., higher motivational profiles (and the advantages conferred by these) might be nullified when it comes to comprehensibility, but not when it comes to accentedness. That is, since the objectives of communicative language learning align more with a focus on comprehensibility (i.e., the ease of understanding) than with accentedness (i.e., linguistic nativelikeness), motivational factors might have less predictive power for comprehensibility gains. This is a plausible explanation that might account for the findings in the present study as well. Moreover, it has to be pointed out that, while teachers and researchers have oriented themselves towards goals of improving learners’ comprehensibility and intelligibility rather than their accentedness (Levis, 2005; Huensch, 2019), this might not be the case for the learners themselves. Learners themselves have often reported great concern for their accentedness (Derwing & Munro, 2009; Simon, 2005), which could further play a role in findings of the predictive power of pronunciation-focused motivation on gains in accentedness.

Pedagogical Implications

The findings of the present study showed a relationship between pronunciation-focused motivation and improvement in learners’ L2 pronunciation, especially when the instruction included some type of
pronunciation training. Why is this of pedagogical importance? The answer lies in the fact that motivation can be influenced (Dörnyei & Ushioda, 2011). That is, if teachers know that there is a relationship between motivation and strength of pronunciation gains, they can set out to increase their learners’ pronunciation-focused motivation. Instruction should then not only focus on methods of training learners’ pronunciation—that is, practicing sounds or prosodic features—but also on the meta-level. For example, teachers could explain why pronunciation skills matter for successful communication, why certain pronunciation targets are more important for comprehensibility or intelligibility than others, how learners will benefit from a certain type of training, and so forth. Such an approach could succeed at increasing learners’ motivation, which then in turn, could help improve learners’ development of their pronunciation skills and improve their oral proficiency and success of communication in the L2. This might be especially relevant for online learning pedagogy, seeing that we found a large effect size for the correlations between motivation and both comprehensibility and accentedness, which suggests that the relationship between motivation and pronunciation improvement in online environments is particularly strong. Ushida (2005) summarizes this aspect eloquently for L2 motivation and L2 learning more generally when she says that “Motivated students can take advantage of the LOL [= online] instruction, and effective LOL instruction can motivate students” (p. 69).

**Conclusion**

This study investigated the relationship between learners’ motivation to improve their pronunciation and L2 pronunciation achievement when given the opportunity for targeted pronunciation practice either by means of CAPT, by teacher-led in-class training, or in the absence of training. The motivation-pronunciation link was explored separately in online and F2F learning environments. Results from both learning environments were in line with previous studies that found a positive correlation between degree of motivation and improvement in learners’ pronunciation (Nagle, 2018b; Saito et al., 2017). Importantly, however, results of the present study suggest that a higher pronunciation-focused motivation is only related to gains in learners’ L2 pronunciation skills when learners receive either CAPT or in-class pronunciation interventions throughout the semester. That is, just being more highly motivated to improve one’s own pronunciation does not seem to be related to actual outcomes in pronunciation gains if learners follow a standard online or F2F curriculum that does not include targeted pronunciation instruction. Moreover, the results revealed a tentative trend that pronunciation-focused motivation has more predictive power for gains on accentedness than comprehensibility. Taken together, these findings should encourage teachers, especially those who teach pronunciation in their L2 courses, to work on increasing pronunciation-focused motivation among their learners, for example, by raising awareness of the importance of intelligible pronunciation for successful L2 communication. This could lead to better outcomes in learners’ pronunciation gains over the course of the semester, especially among online learners.

**Notes**

1. Most online courses seem to have some synchronous component (Seaman et al., 2018), but time spent on synchronous vs. asynchronous instruction varies in previous research looking at L2 online classes. This can be a confounding variable and there might also be a “before” and “after” COVID-19. That is, before 2020, online instruction might have more often been asynchronous, catering to non-traditional students who took online classes because they could not attend F2F classes during the day. The forced, large-scale shift to online instruction under COVID-19, however, made synchronous instruction via Zoom and Google Meets more common than it was before 2020. Time will tell how this shift will affect future online classes in terms of synchronous and asynchronous instruction.

2. One exception were the target items for a segmental feature, that is, the cognate stress condition. The instructional goal here was training for correct stress placement on specific high frequency German–English cognates, rather than a transferrable skill as was the case for the other conditions. Therefore, known words were included. These made up less than 10% of all tokens.
References


Appendix. Motivational Questionnaire

Note: All statements were taken from Elliott’s (1995a) PAI, but adapted in wording for L2 German. Statements marked with an asterisk (*) were reverse-coded.

Please rate these statements on a scale from 1 to 5. Ratings are described below.
5 = always or almost always true of me (totally agree)
4 = usually true of me
3 = somewhat true of me
2 = usually not true of me
1 = never or almost never true of me (totally disagree)

1. Good pronunciation skills in German are not as important as learning vocabulary and grammar.*
2. I want to improve my accent when speaking German.
3. I will never be able to speak German with a good accent.*
4. I’d like to sound as native as possible when speaking German.
5. Acquiring proper pronunciation in German is important to me.
6. Sounding like a native speaker is very important to me.
7. I’m concerned with my progress in my pronunciation of German.
8. I believe I can improve my pronunciation skills in German.
9. I try to imitate German speakers as much as possible.
10. I believe more emphasis should be given to proper pronunciation in class.
11. Communicating is much more important than sounding like a native speaker of German.*
12. One of my personal goals is to acquire proper pronunciation skills and preferably be able to pass as a near-native speaker of the language.

About the Author

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