

The effects of explicit pronunciation instruction on adult German L2 learners' comprehensibility

By  
Matthew Richard Currie

A Thesis Submitted to  
Saint Mary's University, Halifax, Nova Scotia  
in Partial Fulfillment of the Requirements for  
the Degree of Arts in Linguistics (Honours).

April, 2024, Halifax, Nova Scotia

Copyright Matthew Richard Currie, 2024

Approved: Egor Tsedryk, PhD  
Supervisor

Approved: Daniela Roth, PhD  
Second Reader

Date: April 24th, 2024

The effects of explicit pronunciation instruction on adult German L2 learners'  
comprehensibility

by Matthew Currie

**Abstract**

This thesis investigated the effects of explicit pronunciation instruction on the comprehensibility of adult L2 learners of German. Based on previous research in pronunciation instruction, I predicted that when given sufficient time (30 minutes per session), students who received explicit pronunciation instruction would achieve higher levels of comprehensibility compared to a control group. The participants included seven students across two universities. All students were in their second semester of an introduction to German course. Four of the seven students received four sessions of explicit pronunciation instruction, with a focus on three pronunciation features of German (word stress, allophones of German /ʁ/, final devoicing). After the sessions, all participants then completed a post-test. In the post-test, students read words and sentences, and also responded to questions. Two German speakers listened to audio recordings of the post-tests, and rated the comprehensibility of the participants on a Likert scale from one to five. The results indicate that while the comprehensibility of the control group worsened as tasks became more demanding, the explicit group maintained their level of comprehensibility across tasks. This suggests the explicit group was able to generalize the features they had learned across tasks. These findings have implications for teaching pronunciation in the adult German classroom at a beginner level.

April 26th, 2024

# The effects of explicit pronunciation instruction on adult German L2 learners' comprehensibility<sup>1</sup>

Matthew Currie

## **1 - Introduction**

Although a person's first language rarely needs to be taught to them, by the time one reaches adulthood, they typically require some sort of instruction in order to reach a fluent or even conversational level of proficiency in the target language. The task of providing this instruction to adults has been approached from many different perspectives (Ellis, 1999, pp. 18-19; Segalowitz & Patsy, 1999, pp. 52-54; Street & Leung, 2010, pp. 293-294). Within the broad range of perspectives, two make themselves clear as opposing in the field of second language pedagogy. The first of these perspectives claims that language is best taught to adults in an explicit manner (Norris & Ortega, 2000, p. 500), in which information about the language such as patterns of conjugation are represented consciously in the mind of the learner (Ellis, 2009, p. 11). The second of these claims that language is best taught implicitly, where the language is acquired by the learner in a way in which they may not be consciously aware of the information they have acquired, but they can use it similarly to a native speaker in order to communicate (Krashen, 1982, p. 10). Although these perspectives can be applied on any linguistic level, the focus of this paper will be on how these contrasting approaches apply to pronunciation instruction.

### **1.1 - The goal of pronunciation instruction**

---

<sup>1</sup> I would like to thank my supervisor Dr. Egor Tsedryk for his feedback while designing and writing this thesis. I would also like to express my gratitude to Dr. Daniela Roth for her consistent demonstration of excellent language instruction, her feedback on this thesis, and for allowing me to conduct my study in her classroom. On a similar note, I extend my thanks to Ms. Brigid Garvey for also allowing me to conduct my thesis with her class. I would also like to thank Dr. Lisa Suessenbach whose passion for second language pedagogy inspired this study. Thank you to all the participants who volunteered to take part in the study. Finally, I am deeply grateful for my friends and family whose support has helped me immensely.

Before detailing how each of these approaches contrast in regards to teaching pronunciation, it is important to note what they have in common. Both of these approaches have the same goal in mind when it comes to teaching pronunciation, that goal being in line with the intelligibility principle. This principle states that pronunciation instruction should prioritize the learner's ability to be understood rather than focusing on improving their accent (Levis, 2005, p. 370). Derwing and Munro (1997, p. 2) note the important differences between the accent of a learner (how close they are to native pronunciation), the intelligibility of a speaker (how much of the utterance is understood by a listener), and comprehensibility (how easy or difficult it is for the listener to understand the speaker). Due to this general agreement from differing perspectives, the comprehensibility of the speakers is the aspect of pronunciation most focused on in this study.

### **1.2 - Explicit and implicit pronunciation instruction**

The common goal between explicit and implicit instruction is one of the few similarities between them, as their respective methodologies for reaching this goal strongly contrast. As detailed by Ellis (2009, pp. 17-18), explicit teaching of pronunciation involves using linguistic information to provide students with the target pronunciation directly. An example of this would be using morphology to teach students the change in word stress that occurs with attaching the suffix *-ation* onto the verb *explain* (ex'plain → expla'nation). The result of this would be knowledge of the language that a student knows consciously, and can describe what it is they have learned. Meanwhile, implicit instruction involves directing the attention of the students towards the target form in a way that keeps their attention on communication, rather than the nature of the target form. A common example of this is recasts (Lyster & Ranta, 1997, p. 47), where an utterance with errors in pronunciation is repeated back to the student with corrected pronunciation. The corrected pronunciation typically involves an emphasis on the ill-formed

aspect of the word. The result of this type of instruction is that students may acquire the target form, but are not consciously aware of what they have learned (Ellis, 2009, p. 11).

### **1.3 - Features of German pronunciation**

While explicit instruction only entails directing students directly towards the target form, specific features of German pronunciation are typically selected in order to provide pronunciation instruction in a systematic manner (Roccamo, 2015, p. 61; Peltekov, 2020, pp. 5-6). In the present study, I provided explicit pronunciation instruction utilizing the following features: The allophones of German /ʁ/, which includes the different ways that /ʁ/ is pronounced depending on where it occurs within the word (/ɐ/ at the end of a syllable/word, /ʁ/ otherwise (Roccamo, 2015, p. 62)). Also included was the phonological rule of final devoicing, which states that a voiced consonant, such as /b/ or /d/, is pronounced as its voiceless counterpart, /p/ or /t/, at the end of a syllable (Rubach, 1990, p. 80). The final pronunciation feature is word stress, where the comprehensibility of a word is greatly affected by whether or not the correct syllable is emphasized during pronunciation. A clear example of this in English is the contrast between the word *content* when the first or second syllable of the word is emphasized, or stressed. When pronounced with stress on the first syllable, the word is interpreted as a noun (e.g. *the content was hard to understand*), whereas when stress is placed on the second syllable, it is interpreted as an adjective (e.g. *I am content with this meal*).

I selected these for instruction based on multiple factors in previous literature. One of these factors is functional load (Munro & Derwing, 2006, p. 522). Functional load is fundamentally a measure of how many minimal pairs a given contrast in phonemes makes (King, 1967, p. 831). For example, in English the pair /t/ and /d/ have a high functional load because they differentiate between many words that are otherwise identical in pronunciation (e.g. *teal and deal*). Meanwhile, the pair /g/ and /z/ would have a much lower functional load, as this pair is not used to differentiate as many words as /t/ and /d/ (e.g. *guest and zest*).

Because more minimal pairs exist in English where /t/ and /d/ are the only differing part of the word, one can claim that producing /t/ and /d/ consistently in a target manner is more important to pronunciation and comprehensibility than /g/ and /z/ (Munro & Derwing, 2006, p. 522). Along with segmental features, the importance of suprasegmental features (e.g. word stress) to comprehensibility has been stressed as well (Hahn, 2004, pp. 216-217).

While no study has ranked the functional loads of all pronunciation features in German, some features have been highlighted as important. Peltekov (2020, p. 14) ranked five features of pronunciation by having native German speakers rate the importance of each feature to comprehensibility. It was found that word stress was the most important feature, along with vowel length, front rounded vowels, final devoicing and the allophones of German /ʁ/. I also based the selection of the previously mentioned features (i.e. allophones of German /ʁ/, final devoicing and word stress) on the findings of Caspers (2010). Namely, a combination of segmental and suprasegmental errors in pronunciation are the most detrimental to intelligibility (Caspers, 2010, p. 26).

Peltekov (2020, p. 15) claimed that more complex pronunciation features (e.g. word stress) require longer instruction time. This applies to all explicit pronunciation instruction when compared to implicit instruction, as the target forms must be explicitly detailed using metalinguistic information (Ellis, 2009, p. 18). Meanwhile in implicit instruction, less time is needed because no explanation of the metalinguistic information is required. Because explicit instruction takes more time, I selected three features in order to ensure that each pronunciation feature received sufficient instruction time.

#### **1.4 - Motivation of current study**

In this study, I aim to investigate the literature surrounding explicit and implicit pronunciation instruction in the adult German classroom. In doing so, I hope to identify and contribute

towards answering the questions about which of the two methodologies is suitable for the adult German classroom.

The current study addresses the following question: Does explicit pronunciation instruction of the following features improve overall comprehensibility of adult speakers learning German?

Word stress

Final devoicing

Allophones of German /ʁ/

### **1.5 - Overview of the present study**

This paper is structured as follows: In section two, I review previous literature which has investigated the effects of pronunciation instruction on English adults learning German. The first paper reported is Dłaska and Krekeler (2013), which investigates the effects of supplementing implicit instruction in the classroom with explicit pronunciation instruction. The second paper is Roccamo (2015) which investigates the improvement of particular pronunciation features when instruction is given to adult learners of German. The third is Peltekov (2020), which focuses on comparing implicit and explicit pronunciation instruction to each other and a control group, also focusing on particular features of pronunciation. In section three I present the methodology of the current study. The results are presented in section four. I discuss these results and limitations of the current study in section five. Finally, section six is a conclusion.

### **2 - Past Studies**

In this section I review previous studies focusing on teaching pronunciation in German. These studies present multiple approaches to investigating pronunciation instruction. One of these approaches includes accompanying implicit feedback with explicit feedback (Dłaska & Krekeler,

2013, p. 29). Other papers focus on particular features of pronunciation in instruction (Roccamo, 2015, p. 61; Peltekov, 2020, pp. 5-6). The last paper compares the effects of implicit and explicit pronunciation instruction directly (Peltekov, 2020).

### **2.1 - Dlaska & Krekeler (2013)**

Dlaska and Krekeler's 2013 study aims to determine if adding explicit, individual corrective feedback (ICF) during pronunciation instruction contributes to an increase in comprehensibility, or if pronunciation instruction should be oriented towards implicit feedback. Half of the 169 participants were only taught pronunciation implicitly, meanwhile the other half were taught implicitly, and also received explicit ICF. The students in the implicit group read a piece of text with only a teacher present. They subsequently listened to the recording of themselves reading the text twice, and then listened to the teacher read the text twice. Finally, after practicing pronunciation if desired, the student read the same text again. As noted by Dlaska and Krekeler (2013, p. 26), listening to the teacher read the text qualifies as a form of recast. While the attention of the student in the implicit group is drawn to the target forms of pronunciation, they are not given explicit instruction on how to produce the target forms. Meanwhile, the students in the explicit group went through an identical process of reading the text, but received explicit instruction along with the implicit feedback of the teacher reading the text. This explicit instruction was given both after listening to the students' recording, and after listening to the teacher read. Directly after the instruction was given, the students then read the text again. The explicit instruction included metalinguistic feedback on pronunciation including the articulation of both segmental (e.g. individual consonants and vowels) and suprasegmental elements (e.g. word stress, intonation) of speech. Specifically, it used this metalinguistic feedback to show the students where their utterances were in relation to the target forms, and how to change their articulation in order to produce the target forms.



After the reading was completed, pairs of recordings before and after instruction were presented to raters in a randomized fashion. The raters gave the pair a rating of zero if both recordings were equally comprehensible, and a rating of one if one of the recordings were easier to understand than the other. They found that more of the pairs (44%) associated with the explicit group received a rating of one than those associated with the implicit group (21%). Dłaska and Krekeler (2013, p. 31) note that while there is a considerable gap between the two groups, neither group became easier to understand from first to second reading more than half of the time. They assert that for the implicit group, it appeared that students were not able to properly notice the problematic aspects of their pronunciation in relation to the target form, and thus did not have the knowledge needed to improve. Meanwhile, for the explicit group they assert that being provided with explicit and implicit instruction may not be enough to improve pronunciation if it is only provided once. Dłaska and Krekeler (2013, p. 33) also investigated which aspects of pronunciation the students had improved upon after being given instruction. They noted that pronunciation had overall improved, with no individual aspect of pronunciation improving more than another.

Several aspects of this paper are worth noting. First, the students who participated had a wide range of native languages, including Mandarin Chinese, Spanish and many others. This has a great influence on the ability to acquire pronunciation features of the learned language, as the amount of positive or negative transfer that occurs is greatly dependent on the native language and target language (Bardovi-Harlig & Sprouse, 2017, p. 1). For example, if the native language and target language share a pronunciation feature (e.g. /p/ in both Canadian English and German (Anderson, 2018, p. 68; O'Brien, 2016, p. 46)), then that feature will positively transfer from the native to the target language. Meanwhile, if the native language and target language contrast in regards to a particular pronunciation feature (e.g. English /ɪ/ versus German /ɪ/ (O'Brien, 2004, p. 3; Roccamo, 2015, pp. 61-62)), then the native pronunciation will negatively transfer to the target language, leading to a gap between the native pronunciation and the target

pronunciation. This partly explains the overall improvement in all pronunciation features rather than any individual feature. If the participant population had a consistent first language, the pronunciation features that negatively transfer between the two would likely be the last to improve unless instruction focused on those particular features. For example, if the participants all had English as a first language, the negative transfer between the English /ɪ/ to German /ɪ/ (O'Brien, 2004, p. 3; Roccamo, 2015, pp. 61-62) would lead to German /ɪ/ being one of the last to improve, if it is not specifically targeted by instruction.

Second, the students who participated were studying German at an intermediate level and also living in a German-speaking environment during the experiment. While it has been noted by previous literature that explicit pronunciation instruction may be better suited for non-beginner learners (Kissling, 2013, p. 736), this aspect of the study still leaves a gap in research where the effects of implicit versus explicit pronunciation instruction on beginner learners of German are not seen.

Third, only the immediate effects of the two types of instruction were seen in this experiment. Dłaska and Krekeler note that while this does control for the amount of input the students received between initial reading, instruction, and second reading, it leaves the medium-to-long term effects of this type of instruction up to speculation.

## **2.2 - Roccamo (2015)**

In Roccamo's (2015) study, the effects of pronunciation instruction on adults who were beginners in learning German were investigated. Roccamo aimed to determine if providing pronunciation instruction to beginner learners of German had a significant impact on the improvement in pronunciation. In order to do so, they provided pronunciation instruction to language learners in their first semester of German class. Data from 25 native speakers of English was used, 14 of which composed the experimental group. This study followed a pre-test post-test design, where students wrote a pre-test, received or did not receive the pronunciation

instruction depending on their group, and wrote a post-test. The pre-test and post-test were identically composed of a perception task, a word reading task, a paragraph reading task, and a free speech task. The pronunciation instruction occupied the first 10 minutes of class and was organized into modules. Each module spanned two weeks, totalling 80 minutes per module, and focused on a particular feature of pronunciation. These features included word stress, the pronunciation of the German allophones of /ʊ/, and the pronunciation of the phonemes /ç/ and /x/. Word stress was tested using different contexts, those being in cognates with stress on the first or second syllable, or noncognates with stress on the first or second syllable.

Pronunciation instruction included a set of steps for each feature of pronunciation. First, students listened to audio such as songs containing the target feature. Based on this, students had to do perception tasks, including minimal pair distinction tasks. Then students were given explanations on how to articulate the target feature, and then practiced producing the target feature in gradually longer, more conversational contexts. Notably, the production practice was done with a partner in order to make the process of learning pronunciation as communicative as possible. They were also required to do partner assignments outside of class at the end of each module. These included students recording themselves doing word reading tasks, answering questions given by their partner, and providing/receiving peer feedback.

Upon the completion of the pre-test, pronunciation instruction, and post-test, five native German speakers rated the comprehensibility of the results from the pre-test and post-test using a seven point Likert scale. On this scale, a rating of one signified the students' utterance as 'impossible to understand' and a rating of seven signified 'perfectly easy to understand'. In using the phrase 'easy to understand' in the scale, the comprehensibility, rather than the accent, is what is measured. This aligns with most of the research investigating pronunciation instruction, in that it follows the intelligibility principle that pronunciation should be improved for the sake of communication, rather than sounding more native-like.

It was found that the experimental group showed improvements in comprehensibility which reached significance in three conditions across the word reading task and the paragraph reading task. Meanwhile, the control group only showed significant improvements on two conditions, exclusively in the word reading task. 64% of the experimental group improved from the pre-test to the post-test in the free speech task. Meanwhile, 45% of students in the control group were rated as having improved comprehensibility between the pre-test and post-test in the free speech task. It is also noted that the experimental group improved specifically in word stress conditions in regards to cognates on the word reading and paragraph reading tasks, meanwhile the control group only saw word stress improvement on one condition which was noted as a pattern that is typically easy for English learners to acquire (nongnates with second syllable stress). Based on these findings, Roccamo (2015, p. 73) suggests that the pronunciation instruction given to the experimental group benefited the comprehensibility of their pronunciation when compared to the control group.

While this study provides results that point towards a clear conclusion that pronunciation instruction benefits students early in the process of learning German, it does not make the distinction between explicit and implicit method of instruction. From the description of the pronunciation instruction, it would appear the instruction is mostly implicit, as the exercises used are almost entirely communication-oriented. However, it is not known to what extent metalinguistic information was used in teaching the students how to articulate the target features.

### **2.3 - Peltekov (2020)**

Peltekov's (2020) study addresses the lack of distinction between explicit and implicit methods, and compares the two methods directly. The goal of this study was to investigate the effects of implicit and explicit pronunciation on comprehensibility, as well as accentedness. Students who were in their second semester of an introduction to German language class were given a pre-test

to determine baseline pronunciation. They were then organized into three groups. One group (n=5) exclusively received explicit phonetic instruction, and no implicit instruction. In this case, explicit pronunciation instruction involved using metalinguistic information such as phonological rules and phonetic explanations of articulation to bring the attention of the students directly towards the target forms of five pronunciation features. These features included the German /ʁ/, final devoicing, front rounded vowels, vowel length, and word stress. The second group (n=5) received implicit instruction and no explicit instruction. Implicit instruction also involved the same five pronunciation features of German. However, no linguistic explanations were used during the sessions, and the attention of students were not directed towards any of the pronunciation features individually. Instead, students listened to recordings of native German speakers, and upon attempting to imitate the pronunciation, were given implicit feedback such as recasts. The third group (n=5) was a control group, and received instruction for speaking and listening, with no focus on pronunciation instruction.

Between these three groups, eleven of the students had English as a first language, with the other first languages including Korean and Lithuanian. There were also multiple bilingual participants, including an English-Tagalog bilingual and a French-Arabic bilingual. The last ten minutes of weekly tutorials were dedicated to pronunciation training for ten weeks, totalling 100 minutes. After the ten weeks, students were given a post-test which was identical to the pre-test. Similarly to Dłaska and Krekeler (2013, p. 30), the recordings of the students before and after pronunciation instruction were played in randomized pairs, each pair containing before and after recordings from the same student. These pairs were judged by native German speakers on whether the comprehensibility of the pronunciation improved, declined, or stayed the same. They also judged which utterance sounded closer to native-like pronunciation in order to determine the impact the pronunciation instruction had on accentedness. Finally, the judges were asked to rank the features of pronunciation from one (least impactful) to five (most

impactful) based on how much they impacted the comprehensibility and accentedness of the utterances.

They found that while all participants improved their comprehensibility, none of the groups made significantly more overall progress in comprehensibility than the other. In the sentence reading task, a significant difference was found between the control and the explicit group in regards to improvement of accent. Also noteworthy is that accentedness had less improvement than comprehensibility, with all groups showing minor improvement. If an overall pattern were to be drawn from this paper, it is that for both comprehensibility and accent, the control group performed slightly better than the implicit group, and the implicit group performed slightly better than the explicit group. With the exception of the free speech task, the implicit and control group had similar if not identical results, and the explicit group lagged behind. In the free speech task, the control group performed better than the explicit and implicit group. As noted before, no significant differences were found between overall improvement of comprehensibility or accent between groups, however patterns of the explicit group performing the worst could be seen. Peltekov notes that the reason for this could be due to larger cognitive demand on students, since students had to learn sets of rules within a short time frame of 10 minutes, and also had less time to practice pronunciation compared to the other groups. In regards to the impact of the pronunciation features, they found that word stress had the highest impact on comprehensibility, vowel length and front rounded vowels close behind, followed by final devoicing and then the allophones of German /ʁ/.

As previously mentioned, this paper addresses several elements that were not touched on in previous studies. First, most of the students had English as a native language, which helps to control for transfer between languages. Second, these were beginner students who had only one semester of experience in learning German. This contributes toward filling the research gap of studying the effects of teaching pronunciation to beginner students learning German. Third, because the treatment took place over the course of 10 weeks, the effects of pronunciation

instruction could be seen over a longer course of time than immediately. Peltekov notes that this is especially true for features that were taught at the beginning of the semester, namely the phoneme /κ/ and final devoicing. However, the short time frame of the sessions and the lack of significant differences between groups leaves the question of whether implicit or explicit instruction is better for pronunciation in the beginner German classroom unanswered.

This section presented three similar studies which investigated the effects of pronunciation instruction on adults learning German. When considered together, these studies present mixed results on the benefits of providing students with explicit pronunciation instruction. The following section details how the present study investigates the potential benefits that explicit pronunciation instruction may have on comprehensibility.

### **3 - Methodology**

#### **3.1 - Participants**

The participants in this study were seven students across two universities. The first university was Saint Mary's University in Halifax, Nova Scotia. The second university was Dalhousie University, also in Halifax, Nova Scotia. Two universities were used in order to increase the size of the sample as much as possible, however this still resulted in a low sample size (n=7). All students were in their second semester of an introduction to German. Ages narrowly ranged from 18 to 20 (mean age 18.7). Language experience was also relatively narrowly limited as participants were either monolingual English speakers (n=5), a native English speaker with significant French experience (n=1) or a bilingual French and English speaker (n=1). None of the participants had any formal linguistics experience.

#### **3.2 - Procedure**

Near the beginning of the second semester at the previously mentioned universities, I went to the classrooms of the German classes and recruited the participants for the study. During the recruitment, I read a recruitment script containing an overview of the study, and what was required of the students who chose to participate. Informed consent forms and questionnaires were also given to students in order to acquire consent, and also information relevant to the study including age, language experience, and linguistics experience. After the students agreed to participate and the relevant information was acquired, I sorted the students randomly into the explicit group and the control group. The explicit group received two weeks worth of explicit pronunciation instruction, each week containing two instructional sessions lasting 30 minutes each, totalling 120 minutes of pronunciation instruction. Due to multiple cancellations, the sessions took place over the course of four weeks, with three sessions taking place over the course of two weeks, and one occurring in the fourth week. I held these sessions immediately after the respective German classes.

The content of the sessions were structured in the following way: the first session focused on giving a brief introduction to phonetics and phonology, which detailed how sounds may differ from each other, and how the phonemic inventories of different languages may differ. The second session included teaching the articulation of the allophones of German /ʏ/, and the rule of final devoicing. The third session focused on giving an introduction to morphology, particularly the importance of word stress placement. The fourth session focused on word stress rules in German. In each of the sessions, students were given materials and exercises to supplement the linguistic explanations of the pronunciation features. These exercises were completed during the sessions, with explicit feedback being given to students when necessary. In order to keep the instruction as consistent as possible, I taught all sessions across both schools.

After the sessions, students from both the experimental group and the control group completed an oral post-test. I recorded the students using an apex 325 microphone connected to a Scarlett solo audio interface via an XLR microphone cord. Recordings of the post-tests were



captured and normalized using Ableton 11. The post-test contained three tasks, including a word reading task, a sentence reading task, and a free speech task. The word task contained 20 items. 15 of these were target items, each containing at least one pronunciation feature that was taught in the sessions, while five were fillers which had none of the target pronunciation features. In the sentence reading task, participants were asked to read three sentences, each one containing multiple instances of target pronunciation features. Finally, the free speech task included five questions pertaining to three associated images. I chose the questions and associated images in order to elicit answers which contained target pronunciation features. For example, an image of the German flag was associated with the question *Welche Farben hat die Deutsche Flagge?* 'Which colors does the German flag have?'. These tasks were used in order to investigate to what extent the pronunciation features had been integrated into the speech of the students, whether it be at the word, sentence, or conversational level.

After the completion of the post-test, two native German speakers each completed a comprehensibility evaluation. Both of the German speakers had no linguistics or teaching experience. The comprehensibility evaluations included the following components: Powerpoint slides containing instructions and audio recordings of the students pronouncing the target items of the post-test, as well as a comprehensibility evaluation sheet in which raters filled in their ratings of each utterance. Each item contained one recording from one student, which the native German speaker rated on a Likert scale from one to five. In this scale, a rating of one represented an utterance which was completely incomprehensible, and a rating of five represented an utterance which was perfectly comprehensible. Half of the recordings were taken from the explicit groups' utterances, while the other half were taken from the control groups' utterances. I calculated the average comprehensibility rating for each group overall, and across tasks.

### **3.3 - Hypothesis & Predictions**

Based on the findings in the previous literature, the hypothesis of this study is as follows: When provided with enough time, adults learning German benefit more from explicit pronunciation instruction than implicit pronunciation instruction. Thus, it is predicted that when given a sufficient amount of time for pronunciation instruction, the explicit group will achieve a higher level of comprehensibility when compared to a control group.

#### 4 - Results

Because of the low sample size used in this study (n=7), I did not conduct a thorough statistical analysis. However, patterns across the groups and tasks can still be noted. The average overall scores organized by group are presented in table 1.

**Table 1**

*Average overall scores by group*

Group	Average Score
Explicit	3.4/5
Control	2.98/5

As can be seen by table 1, the explicit group was rated as having an overall greater comprehensibility across all tasks than the control group. This suggests that the explicit pronunciation instruction for the previously described features aided in improving the overall comprehensibility of the students. Notably, the explicit group received an average overall score of 0.42 points (8%) higher than the control group. This pattern of the explicit group achieving a higher score than the control group is reflected in table 2.

**Table 2**

*Average scores of each task by group*

Task	Group	Average Score
------	-------	---------------

Word reading	Explicit	3.36/5
	Control	3.19/5
Sentence reading	Explicit	3.5/5
	Control	3/5
Free Speech	Explicit	3.34/5
	Control	2.75/5

In table 2, across all three tasks the explicit group performed better, to varying extents, than the control group. In the word reading task, the explicit group was given an average score of 0.17 (3%) points above the control group. In the sentence reading task, the explicit group was given an average score of 0.5 (10%) points higher than the control group. In the free speech task, the explicit group received an average rating of 0.59 (12%) points higher than the control group. These results suggest that the more demanding the task was, the more students benefited from explicit pronunciation instruction. This is because while the average scores of the control group decreased from word to sentence to free speech task, the average scores of the explicit group stayed relatively stable across tasks.

## **5 - Discussion**

In the following section, I will detail and interpret the significance of the results of this study within the greater context of implicit and explicit language learning. Subsequently, I will relate the findings of this study to those of previous studies. After discussing the relationship between these findings and the findings of other studies, the limitations and directions for further research will be presented.

### **5.1 - Findings/Significance**

In this study, I investigated the effects of explicit pronunciation instruction on the comprehensibility of beginner learners of German. The findings support the prediction that when given enough time, the explicit group would receive higher ratings of comprehensibility than the control group. Many inferences relating to pronunciation instruction and language instruction can be drawn from these results. First and most clearly based on the results, we can infer that explicit pronunciation instruction leads to achieving higher levels of comprehensibility for adult beginner German learners than implicit pronunciation instruction. This suggests that within the section of second language pedagogy that is teaching pronunciation, it is more beneficial for learners early in their language education to be able to consciously represent the linguistic information relating to pronunciation of their target language.

Two possible explanations as to why explicit pronunciation instruction is best for adult learners who are beginners include the following: First, it is known that as children grow into their language, their ability to produce and perceive phonemic differences outside of their native language decreases (Werker & Tees, 1983, pp. 278-279). Because of this, an adult language learner may not be able to perceive a phonetic contrast that is not present in their own language. Even if they were able to, they may not be able to produce them on a consistent basis. If learners are taught the explicit differences between the sounds of their native language and those of their target language early on, then they would more easily be able to perceive and produce phonetic contrasts that are not present in their native language. This leads to the second possible explanation, which relates to the acquisition of the new articulatory patterns associated with non-native phonemes. As Caldwell-Harris & MacWhinney (2023, p. 10) point out, the motor region closest to the spinal cord is inflexible to change due to being directly linked to the spinal cord. This would lead to difficulty in acquiring new articulatory patterns, as once this region has solidified in the process of learning new sounds, it is resistant to new ones. However, Caldwell-Harris & MacWhinney (2023) note that other motor regions can be changed, but it requires practice and 'mismatch signals' (Caldwell-Harris & MacWhinney, 2023, p. 10). While

explicit and implicit pronunciation instruction allow for practice, only explicit pronunciation instruction results in conscious knowledge of what has been learned (Ellis, 2009, p. 11). In this case, explicit pronunciation instruction would include the articulatory differences between pronunciation of the native language compared to the target language.

These results also suggest that not many pronunciation features need to be explicitly taught in order to improve overall comprehensibility. I only utilized three pronunciation features in this study, which provided multiple allowances that may have contributed to the higher ratings of comprehensibility that were shown in the explicit group. First, only focusing on three features allowed there to be plentiful time for the students to take in the information related to each feature. Second and relatedly, only using three features also limited the cognitive demand associated with the explicit instruction. If more features were to be used within the same time frame, students may have been overwhelmed by the amount of information they had to take in. The inclusion of both suprasegmental and segmental features may have also contributed towards the higher levels of comprehensibility, since it is seen as an important aspect of pronunciation instruction (Caspers, 2010, p. 26). However it is unknown as to which features within this guideline are most important.

Overall, the results imply that while explicit instruction may be more time intensive and cognitively demanding, it can also lead to greater progress than implicit instruction. Interestingly, the nature of this progress appears to be a generalization of the learned features to different circumstances, rather than greater progress in one particular circumstance. In this case, those circumstances are reading on a word and sentence reading level, and speaking in response to a question.

Outside of pronunciation, an example of the generalization of an explicitly learned feature would be the following: If a student learns the syntax of German explicitly, they will learn that when an auxiliary verb is used, the main verb of the sentence is pushed to the end of the sentence (e.g. I can **see** the car → ich kann das Auto **sehen**). The student who learns this

rule explicitly would be able to apply it in more circumstances, such as cases with different auxiliary verbs and main verbs (e.g. I could **do** that → ich könnte das **machen**), longer sentences (e.g. I have to **pick** the kids **up** from school at five → ich muss die Kinder um fünf von der Schule **abholen**), and many other circumstances. Meanwhile, if a student learns a language implicitly, they are left to their own devices to learn these patterns across all linguistic levels, leaving lots of room for error.

This is not to claim that learning implicitly is ineffective, as the control group performed well on the tasks. However, their decline in rating as the tasks became more difficult reveals the problems that can arise from relying on implicit knowledge in language learning. In this case, the problem being that even if a feature of the target language is taken in, it may be vulnerable to being abandoned when the given task becomes more demanding. Based on the results from this study, this does not appear to be the case when information is taught explicitly.

## **5.2 - Comparisons with Previous Studies**

The findings of this study concur with some previous studies (Dlaska & Krekeler, 2013; Norris & Ortega, 2000), and contrasts with others (Peltekov, 2020). While Dlaska & Krekeler (2013, p. 30) also found an improvement in the explicit group greater than the implicit group, there were multiple significant differences present in this study. First, the native languages of the group in the Dlaska & Krekeler's study were much more diverse than the first languages of the group in this study. While the language background of the Dlaska & Krekeler (2013, p. 28) study included Mandarin Chinese, Spanish and many others, this study included mostly monolingual English speakers, with two students having significant French experience as well. This difference is notable because it suggests that regardless of the first language, explicit pronunciation instruction appears to allow for the bridging between the pronunciation of the native language in a given area and the target language. Second, Dlaska & Krekeler (2013, pp. 28-29) only investigated how explicit pronunciation instruction affected comprehensibility immediately

after feedback was given. Because of this restriction, even if the results align in that explicit pronunciation instruction led to an increase in comprehensibility, the difference in the time elapsed between instruction and testing should be noted. While Dlaska & Krekeler (2013, p. 30) provide evidence to support explicit pronunciation instruction in the short term, the present study provides evidence in the short-to-medium term. It is for this reason that future research could investigate the long-term effects of explicit pronunciation via a delayed post-test.

As previously mentioned, the results of this study contrast with those found in Peltekov (2020). Namely, while this study found consistent higher ratings of comprehensibility in the explicit group than the control group, Peltekov (2020, p. 12) found that the explicit group received overall lower ratings than the implicit and control group. While there are many aspects that the present study and the study by Peltekov (2020) have in common (beginner German learners, post-test design, etc), there are a number of notable differences that may have led to the difference in findings.

First, because neither this study nor Peltekov's one have a particularly large sample size ( $n=7$  and  $n=15$  respectively), the difference in findings could simply be a reflection of the capabilities of the individuals within the respective groups. Second, it could be the case that providing explicit instruction for a longer period of time (30 minutes), and providing a longer instruction time for each pronunciation feature could be necessary to yield the improvements in comprehensibility associated with the explicit instruction. Peltekov (2020, p. 15) notes that some features such as word stress had a higher cognitive demand on students, as there were many explicit rules that had to be internalized. This is generally true of explicit instruction on students, as there is more information being brought directly to their attention (Ellis, 2009, pp. 17-18). Therefore, providing too little time for explicit instruction (10 minutes weekly across 10 weeks) could be what led to the results seen in Peltekov's study.

Meanwhile in this study, students were given 30 minutes per instruction session, across four sessions, totalling 120 minutes. 60 minutes were dedicated to information related to the

allophones of German /ʁ/ and final devoicing, and 60 minutes were dedicated to information related to word stress. Therefore, it could be the case that rather than providing many shorter sessions, explicit instruction is best taught in larger windows, with plenty of time dedicated to each pronunciation feature, depending on its complexity. This would provide the students with enough time to absorb the extra information associated with explicit instruction, and apply it.

It should be noted that Dłaska & Krekeler (2013, p. 30) found improvements in the explicit group with a short time window, however this could be seen as a result of the immediate nature of the instruction and testing. Since students were tested immediately after explicit instruction was given, the students were able to apply the information as it was given to them, rather than being required to hold the information for a longer period of time. As a delayed post-test was not used in the current study, it is not known whether the larger window of time across a shorter period translates to improved comprehensibility being maintained over a longer period of time. I leave this for future research. Notably, Roccamo (2015, p. 73) found an improvement in comprehensibility while only providing 10 minutes of pronunciation instruction a day, however the extent to which this instruction was explicit or implicit in nature is unspecified. Therefore, there may have been little metalinguistic information associated with the instruction, and therefore less time needed to dedicate to teaching it.

### **5.3 - Limitations and Further Research**

Similarly to the previous studies, this study also had notable limitations. The most clear of which being the aforementioned low sample size (n=7). Because this study has such a low sample size, future studies could replicate the design and questions of this study, simply on a larger scale.

Also noteworthy is the inconsistent language background of the participants. Despite the relatively narrow language background compared to previous studies, the inclusion of French in the language background of some participants is enough to have notable consequences. Namely, the uvular fricative /ʁ/ of modern Quebec French (Sankoff & Blondeau, 2007, p. 561) may have



contributed towards the acquisition of the allophones of German /κ/. Another limitation, as previously mentioned, is the lack of a delayed post-test. While this study may have investigated the short-to-medium term effects of explicit pronunciation instruction, the long-term effects of explicit pronunciation instruction are unknown and could be investigated in further studies. Another weakness of the study is that for logistical reasons, only two raters were recruited. While it was beneficial that these raters were native German speakers with no teaching or linguistic experience, a higher number of raters would be ideal for future studies.

The results from this study suggest that explicit pronunciation instruction is best provided in larger, more concentrated windows of time to minimize difficulty for language learners. It is for this reason the validity of the following statement could be investigated in future studies: Rather than many short windows of explicit pronunciation instruction, two classes (approximately 120 minutes) could be dedicated exclusively to explicit pronunciation instruction and practice. This instruction would include the explicit instruction of three pronunciation features, including both segmental and suprasegmental features (time could be added or removed to include more or less pronunciation features). This dedication of time would provide students enough time to learn the additional information associated with explicit instruction, in the hopes that their comprehensibility will improve past that of a group taught pronunciation implicitly, or not at all. Also worth investigating is the time-to-feature ratio, where whether or not explicit instruction containing more than three pronunciation features could be successful, depending on how much time is invested into each feature.

## **6 - Conclusion**

In this study, I investigated the effects of explicit pronunciation instruction on the comprehensibility of adult beginners learning German. The explicit instruction consisted of the following pronunciation features of German:

Word stress

## Final devoicing

### Allophones of German /k/

It was found that overall, the explicit group received higher ratings of comprehensibility than the control group. The overall higher ratings can be seen as a result of the following: Whereas the control group declined in comprehensibility as the tasks became less controlled and more demanding, the comprehensibility of the explicit group only varied slightly across all tasks.

The higher levels of comprehensibility the explicit group achieved, in addition to the use of three features over 120 total minutes of instruction have multiple implications. First, a small number of pronunciation features can lead to greater comprehensibility than that of an implicit group. Second, length of instruction for each feature may be a critical factor that must be taken into consideration when providing explicit pronunciation instruction. Third, explicit pronunciation instruction results in a generalization of the learned features to different circumstances. Future studies can investigate the impact each of these aspects of pronunciation instruction have on the comprehensibility of the students.

Overall, the findings are consistent with the hypothesis that when given sufficient time, students who were given explicit pronunciation instruction achieved higher levels of comprehensibility than their control counterparts.

## References

- Anderson, C. (2018). *Essentials of Linguistics* (1st ed.). McMaster University.
- Bardovi-Harlig, K. & Sprouse, R.A. (2017). Negative Versus Positive Transfer. In J.I. Liontas & M. DelliCarpini (Eds.), *The TESOL Encyclopedia of English Language Teaching* (1st ed., pp. 1-6). Wiley-Blackwell. <https://doi.org/10.1002/9781118784235.eelt0084>
- Caldwell-Harris, C. L., & MacWhinney, B. (2023). Age effects in second language acquisition: Expanding the emergentist account. *Brain and Language*, 241, 105269. <https://doi.org/10.1016/j.bandl.2023.105269>
- Caspers, J. (2010) The influence of erroneous stress position and segmental errors on intelligibility, comprehensibility and foreign accent in Dutch as a second language. *Linguistics in the Netherlands*, 27, 17–29. <https://doi.org/10.1075/avt.27.03cas>
- Derwing, T. M., & Munro, M. J. (1997). ACCENT, INTELLIGIBILITY, AND COMPREHENSIBILITY. *Studies in Second Language Acquisition*, 19(1), 1–16. <https://doi.org/10.1017/s0272263197001010>
- Dlaska, A., & Krekeler, C. (2013). The short-term effects of individual corrective feedback on L2 pronunciation. *System*, 41(1), 25–37. <https://doi.org/10.1016/j.system.2013.01.005>
- Ellis, N. (1999). COGNITIVE APPROACHES TO SLA. *Annual Review of Applied Linguistics*, 19, 22-42. <https://doi.org/10.1017/s0267190599190020>
- Ellis, R., Loewen, S., Elder, C., Erlam, R., Philp, J., & Reinder, H. (2009). *Implicit and Explicit Knowledge in Second Language Learning, Testing and Teaching* (D. Singleton, Ed.) . Multilingual Matters, <https://doi.org/10.21832/9781847691767> .
- Hahn, L. D. (2004). Primary Stress and Intelligibility: Research to Motivate the Teaching of Suprasegmentals. *TESOL Quarterly*, 38(2), 201-223. <https://doi.org/10.2307/3588378>
- King, R. D. (1967). Functional Load and Sound Change. *Language*, 43(4), 831-852. <https://doi.org/10.2307/411969>

- Kissling, E. M. (2013). Teaching pronunciation: Is explicit phonetics instruction beneficial for FL learners? *The Modern Language Journal*, 97(3), 720–744.  
<https://doi.org/10.1111/j.1540-4781.2013.12029.x>
- Krashen, S. (1982). *Principles and practice in second language acquisition*. Pergamon Press
- Levis, J. M. (2005). Changing Contexts and Shifting Paradigms in Pronunciation Teaching. *TESOL Quarterly*, 39(3), 369–377. <https://doi.org/10.2307/3588485>
- Lyster, R., & Ranta, L. (1997). Corrective feedback and learner uptake: Negotiation of form in communicative classrooms. *Studies in Second Language Acquisition*, 19(1), 37–66.  
<https://doi.org/10.1017/S0272263197001034>
- Munro, M. J., & Derwing, T. M. (2006). The functional load principle in ESL pronunciation instruction: An exploratory study. *System*, 34(4), 520–531.  
<https://doi.org/10.1016/j.system.2006.09.004>
- Norris, J. M., & Ortega, L. (2000). Effectiveness of L2 Instruction: A Research Synthesis and Quantitative Meta-analysis. *Language Learning*, 50(3), 417–528.  
<https://doi.org/10.1111/0023-8333.00136>
- O'Brien, M. G. (2004). Pronunciation Matters. *Die Unterrichtspraxis/Teaching German*, 37(1), 1–9. <https://doi.org/10.1111/j.1756-1221.2004.tb00068.x>
- O'Brien, M. G., & Fagan, S. M. B. (2016). *German Phonetics and Phonology*. Yale University Press.
- Peltekov, P. (2020). The Effectiveness of Implicit and Explicit Instruction on German L2 Learners' Pronunciation. *Die Unterrichtspraxis/Teaching German*, 53(1), 1–22.  
<https://doi.org/10.1111/tger.12115>
- Roccamo, A. (2015). Teaching Pronunciation in Just Ten Minutes a Day: A Method for Pronunciation Instruction in First-Semester German Language Classrooms. *Die Unterrichtspraxis/Teaching German*, 48(1), 59–83. <https://doi.org/10.1111/tger.10181>

- Rubach, J. (1990). Final Devoicing and Cyclic Syllabification in German. *Linguistic Inquiry*, 21(1), 79–94. <https://www.jstor.org/stable/4178660>
- Sankoff, Gillian., & Blondeau, Hélèn. (2007). Language change across the lifespan: /r/ in Montreal French. *Language*, 83(3), 560–588. <https://doi.org/10.1353/lan.2007.0106>
- Segalowitz, N., & Lightbown, P. M. (1999). PSYCHOLINGUISTIC APPROACHES TO SLA. *Annual Review of Applied Linguistics*, 19, 43–63. <https://doi.org/10.1017/s0267190599190032>
- Street, B., & Leung, C. (2010). Sociolinguistics, Language Teaching and New Literacy Studies. In N. H. Hornberger & S. McKay (Eds.), *Sociolinguistics and Language Education* (pp. 290–316). Multilingual Matters.
- Tasting Table/Carli, K. (2022). <https://www.tastingtable.com/769974/cherry-tomato-caprese-salad-recipe/>
- Werker, J. F., & Tees, R. C. (1983). Developmental changes across childhood in the perception of non-native speech sounds. *Canadian Journal of Psychology/Revue Canadienne de Psychologie*, 37(2), 278–286. <https://doi.org/10.1037/h0080725>

## Appendix A

### Post-test Stimuli

#### *Word reading task:*

1. Mag
2. Machen
3. Tragen
4. Käse
5. Anrufen
6. Krieg
7. Bäckerei
8. Heute
9. Trug
10. Forum
11. Auto
12. Hand
13. Getun
14. Raus
15. Bald
16. Aufgeben
17. Kuh
18. Gitarre
19. Rauchen
20. Energie

#### *Sentence reading task:*

1. Warum haben wir den Raben vergessen?
2. Ich habe im September angefangen, Psychologie zu studieren.
3. Das Kind geht von der Wand weg.

#### *Free speech task:*

1. Welche Farben hat die deutsche Flagge?



2. Welches Essen steht auf dem Tisch? Welche Zutaten gibt es?



*Tasting Table (2022)*

3. Welches Essen steht auf dem Tisch?



*Tasting Table (2022)*

4. Was spielen die Leute? Welche Instrumente gibt es?



5. Welche Instrumente gibt es?



## Appendix B

### Comprehensibility Evaluation

**For each section, a participant recording associated with each individual utterance will be played. Please rate the comprehensibility of the utterances according to the following scale:**

- 1- completely incomprehensible
- 2- nearly incomprehensible
- 3- comprehensible with considerable effort
- 4- comprehensible with little effort
- 5- perfectly comprehensible

**Each recording will be played just once. You cannot go backward after rating an utterance.**

#### Section 1: word rating

Please rate the comprehensibility of the words in the audio recordings from one to five.

	1	2	3	4	5
Word 1: Mag	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 2: Machen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 3: Tragen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 4: Anrufen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 5: Krieg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 6: Trug	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 7: Raus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 8: Forum	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 9: Hand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 10: Bald	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 11: Aufgeben	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 12: Gitarre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 13: Bäckerei	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 14: Rauchen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Word 15: Energie

### Section 2: sentence rating

Please rate the sentences played from one to five.

- 1- completely incomprehensible
- 2- barely comprehensible
- 3- comprehensible with considerable effort
- 4- comprehensible with little effort
- 5- perfectly comprehensible

Sentence 1: Warum haben wir den Raben vergessen?

1	2	3	4	5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sentence 2: Ich habe im September angefangen, Psychologie zu studieren.

1	2	3	4	5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Sentence 3: Das Kind geht von der Wand weg.

1	2	3	4	5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Section 3:

Rate the pronunciation of each answer to a given question with the given scale. Each question and an associated image is shown. The participants' answer will be played with each question.

- 1- completely incomprehensible
- 2- barely comprehensible
- 3- comprehensible with considerable effort
- 4- comprehensible with little effort
- 5- perfectly comprehensible

Question 1: Welche Farben hat die Deutsche Flagge?



Answer: ...

1

2

3

4

5

Question 2: Welches Essen steht auf dem Tisch?



*Tasting Table (2022)*

Answer: ...

1

2

3

4

5

- 1- completely incomprehensible
- 2- barely comprehensible
- 3- comprehensible with considerable effort
- 4- comprehensible with little effort
- 5- perfectly comprehensible

Question 3: Welche Zutaten gibt es?



*Tasting Table (2022)*

Answer: ...

- |                          |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1                        | 2                        | 3                        | 4                        | 5                        |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Question 4: Was spielen die Leute?



Answer: ...

- |                          |                          |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1                        | 2                        | 3                        | 4                        | 5                        |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- 1- completely incomprehensible
- 2- barely comprehensible
- 3- comprehensible with considerable effort
- 4- comprehensible with little effort
- 5- perfectly comprehensible

Question 5: Welche Instrumente gibt es



Answer: ...

1

2

3

4

5

**Thank you for your time!**