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The effects of guessing confidence on anticipatory behaviour in context understanding

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Abstract

The study investigates the anticipatory behaviour in a word guessing experiment with Slovak L2 speakers of English of varying proficiency levels. The L2 speakers are trying to correctly identify the word that the interlocutor is hinting at with two consecutive cues as soon as they are confident enough to provide the answer. This created a connection between anticipation and guessing confidence. The effect of guessing confidence on the anticipatory behaviour is measured through the change in response latency of how quickly the guessers produce their guesses after listening to the cues. The aim is to study how the response latencies of the listeners are affected by their previous correct or incorrect guesses. The findings suggest that the correctness of guesses has a measurable impact on response latency.

Keywords: communication anticipation, response latency, communication confidence, L2 communication success

1 Introduction

1.1 Previous research of anticipation

Anticipation in its purest form is a term used throughout a large variety of disciplines, such as computing (Dubois, 2010; Vachiratamporn, Legaspi, and Numao, 2012), economics (Theodos, Brash, Compton, Masken, Pindus and Steuerle, 2010, Realyvásquez, Maldonado-Macías, Arredondo, 2018), psychology (Riegler, 2001; Huron, 2006; Gamble and Gamble, 2013), linguistics (Nooteboom, Cohen, 1975; Jörg, 1997; Butz, Sigaud, Gérard, 2003; Butz, Sigaud, Pezzulo, Baldassarre, 2007; Rietvelde, Eyckmans, and Bauwens, 2010; Lorenz, 2013; Chappell, 2014; Busse, Moehlig-Falke, 2019; Poli, Valerio, 2019) and many others (Fry, 1973; Chernov, 1994; Chernov, 2004; Johansson and Balkenius, 2007; Kokinov, Grinberg, Petkov, Kiryazov, 2008; Dastyar, 2019; Zaborowski, 2019) although the understanding of the term changes based on the setting. However, some basic features of anticipation are shared throughout the disciplines, which may prove helpful in understanding the concept of language anticipation. The

general understanding of what anticipation is paraphrased as conducting an action based on the expected continuation of a process. Furthermore, a distinction in terms of linguistic approaches to anticipation needs to be highlighted between anticipation and anticipatory behaviour. As defined by Crystal (2008, p. 27) anticipation is "a term used by some psycholinguists to refer to a type of tongue-slip where a later linguistic unit influences an earlier, as when *catch the ball* might become *batch the call*". In our view, anticipatory behaviour is an ongoing process that we subconsciously execute while listening to interlocutors, as it is often observable in simultaneous interpretation. It is a process, which over time improves the understanding of communication through already gathered information extracted from verbal and non-verbal cues. This process allows the prediction of upcoming words and messages.

This approach to what language anticipation and anticipatory behaviour is suggests that when interpreters are translating for a client, they can very often predict what the speaker is going to say based on their understanding of the topic, the overall message, and the usual patterns they observed from the speaker. This is an interesting concept, which leads us to believe that the human brain tries to predict the upcoming words and messages based on what has already been said to enhance communication success. We can further support this claim by the definition that anticipation is "future based information acting in present" (Poli, 2017), which can also be interpreted as the act of considering several possible scenarios of what may appear in conversation and based on our current knowledge we choose the most probable continuation of speech. We then use this hypothetical continuation as the basis for interpreting the message of the interlocutor.

In other words, while we listen to other people's speech, we are executing several tasks at the same time, which help us understand what is being said by the speaker. We are creating and communicating messages, but we are also listening to others speak and we learn to understand the way in which they communicate and think. This helps us create or identify the pattern of how they are building sentences and structuring messages. We subconsciously use this pattern to predict how they are going to continue their speech. The outcomes and predictions based on our anticipatory behaviour are not always correct, since we cannot perfectly predict what the other speaker is going to say, but we can reliably assess what the speaker may say next. Therefore, being an active participant of a conversation does not merely require verbal production of speech, but also both the conscious and subconscious act of listening, thinking, understanding, and anticipating of what is to be said. It is perhaps the human nature to try and understand the point of view of the other interlocutors by attempting to "walk in their shoes" by adjusting our thinking, trying to understand their message, and anticipating what they may say

next. Such behaviour demonstrates a higher understanding of communication beyond just word order, sentence structure, or collocations.

The understanding of what anticipation is was further discussed by Poli (2017), who described anticipation from the linguistic viewpoint as a term which "refers to all forward-looking attitudes and activities". This supports our view of language anticipation, since it falls directly under his explanation of what constitutes as anticipation. He then further discussed the existence of "anticipatory behaviour", which in a real-life situation would be like taking an umbrella after hearing a forecast stating that it should rain the next day. In this case, we can highlight two important differences between what is anticipation and anticipatory behaviour. Based on previously acquired information we anticipate that it should rain the next day, therefore, we conduct the anticipatory behaviour of taking an umbrella. This leads us to the conclusion that in order for anticipation to be effective, we need to take action to try and affect the future outcome of a situation based on the anticipated outcome. If we anticipate that it should rain, the result may be that we will get wet if we do not act. In such a situation, anticipatory behaviour or action would always be in our benefit, however, in case of anticipatory behaviour in communication, there might be some negatives, which may occur. Such negative outcomes could be the incorrect understanding of the message or of the context of a conversation.

To put this into more concrete language related terms, let's use the example of an interpreter translating the speech of a politician regarding the opposition of a law. The interpreter anticipates the usage of vocabulary related to politics and since the law in question relates to conservation efforts connected to a national park, it is also valid to anticipate the usage terms related to environment. Such communication anticipation is closely related to priming effects through their close relation to vocabulary and memory as demonstrated by Tulving, Schacter, and Stark (1982). Although priming can prepare the brain for the used vocabulary, semantics of communication, and syntactic structures, anticipatory behaviour facilitates the word-to-word prediction of what is to be said in communication. This distinction highlights the necessity for further analysis of anticipatory behaviour in human communication and also the influencing factors of anticipatory behaviour, which may increase or decrease its success rate.

Therefore, we conclude that anticipatory behaviour of a person is affected by several factors during communication. Some of the factors relate to the person's own understanding of the language and their overall proficiency. Speakers of a higher proficiency level possess a better understanding of the workings of the respective language; therefore, they can more reliably predict what is to come (Pöchhacker and Liu, 2014). This is especially true for native speakers, but it is also observable with L2 speakers. It is logical to assume that a higher proficiency level speaker should also have a better understanding of the language he/she uses.

Other factors were also previously linked to anticipation and prediction. One such factor is confidence (Nadin, 2015; Pezzulo, Butz, Castelfranchi, Falcone, 2005), which can be thought of as the ability of choosing the best option or conducting the best action. This means that by listening to someone's speech we learn how they create messages and we narrow down the possible options of how they may proceed in their communication. As we understand the speaker more, the confidence in our predictions should rise and allow us to choose the best possible continuation of their speech. This is an essential factor in being able to reliably and effectively interpret speech.

The role of confidence could therefore have a measurable impact on our ability to anticipate what is to come. If a listener has acquired enough information and understanding of the context, he/she should in turn be able to build up confidence in the topic. This confidence could then affect the time it takes the listener to accurately anticipate the upcoming words and messages. The accuracy of anticipation was previously studied by Herriot (2013), who states that: "When perceiving speech, the listener can anticipate what is going to be said so ably that he can often supply the word or words", which is hinting at the ability to decipher deeper meaning subconsciously in order to better understand the message. The confidence in one's abilities to understand the conversation could therefore affect the ability to anticipate. Such an understanding could be also useful in anticipating of what is meant but not said. To clarify this statement, we should think of a guessing game. In this game a speaker is given a word to which he/she is supposed to create cues. The speaker is given the word summer. He/she then creates the following cues: "In a year we get one of these. They are autumn, winter, spring, and…", after which the listener can easily anticipate that the following word should be summer.

As it can be seen in the example, the quality of the cues might vary. The first sentence ("In a year we get one of these") seems to be weaker than the second one, because it suggests a wider range of possible outcomes, since summer is not the only logical option. This could in turn affect the confidence of the listener. To clarify this statement, when the listener hears the first cue, he/she is uncertain of what it means or what is to come. Only after listening to the second cue, they are able to reliably say that the speaker was hinting at summer. This varying change in the quality of the cues may have an impact on the listener's overall confidence in guessing. If the speaker constantly provides cues that are weak or hard to understand, the listener cannot reliably build up the confidence to anticipate the words for guessing. On the other hand, if the speaker provides easily understandable cues, which the listener uses to correctly guess, then in turn the listener's confidence and understanding should improve.

Such an effect on confidence could hypothetically be measured. To measure it, we need to use a reliable and quantifiable variable such as response latency.

Response latency in our case is defined as the time between the end of a cue and the beginning of the answer. We hypothesize that there is a decrease in response latency caused by the listeners' rise in confidence because of previous successful guesses. That should also mean that if the listeners guess incorrectly, their response latency should increase. This means that we assume a measurable change in response latency that is linked to the success of guesses. This idea is supported by previous research conducted by Kimble and Seidel (1991) in the effects of confidence on vocal loudness and response latency. Based on their results, the participants got louder and responded faster the more confident they were.

1.2 Aims of the paper

In the following study, we were trying to answer several research questions linked to guessing confidence and anticipation. We were analysing the consistency of a measurable difference in response latency between guesses. The consistency in this case is meant as an increase in response latency after an incorrect guess and a decrease after a correct guess. We thus tested whether the hypothesized "gaining of confidence" from a correct guess lowers the response latency in any following guess. The second set of tests focused on the act of "losing confidence" after an unsuccessful guess and its effect on increasing the response latency for any guess that follows. Thirdly, we hypothesized that there is a measurable impact of cue quality on the success rate of guessing. Lastly, we hypothesize that there is a measurable relationship between communication success and proficiency levels of L2 speakers.

2 Methodology

2.1 Preparation and procedure

The research is based on a semi-spontaneous word guessing experiment. This experiment involved 13 Slovak L2 speakers of English of varying proficiency levels (B1, B2, C1). Each of the participants was given a set of 10 unique words. These words were chosen from the British National Corpus based on their frequency of use. They belong to the 5000 most commonly used words; therefore, they should be known to all the participants regardless of proficiency level. Each word had to be 1-3 syllables long and it had to be a noun, a verb or an adjective. The experiment was divided into two main phases. In phase one, the participants were given the aforementioned ten-word sets. However, they were only shown one word at a time for ten seconds. They were asked to use these ten seconds to create two cues for the word. They were prohibited from using the word itself, but also any part of the word. For example, if the speaker is given the word "holiday" they cannot use the word day, since it is a part of the main word. The participants were asked to provide "wholesome" cues, preferably sentence cues, instead of just using one or

two words. We recorded the cues that the participants have given and processed the recordings for usage in phase two.

2.2 Recording processing

The recordings were processed using PRAAT speech analysis software, where the cues were labelled and extracted using a script. These cues were concatenated into a sound file, which consisted of all the cues with 3 second pauses included between the cues. The purpose of the pauses was to give listeners time to guess the speaker's word. Two versions of the sound files were created for all of the speakers. In version 1, the original order of the cues was maintained. This set of recordings was titled as the A set. In version 2, the cues were switched, so first the listener would hear cue 2, then three seconds of silence, and then cue 1, again followed by three seconds of silence. This set of recordings was titled as the B set. Table 1 offers an easier visualization of the setup of sets A and B. These two sets were created to allow the determination of the cue quality.

Set A	Word 1 Cue 1	3 seconds of silence	Word 1 Cue 2	3 seconds of silence	Word 2 Cue 1
Set B	Word 1 Cue 2	3 seconds of silence	Word 1 Cue 1	3 seconds of silence	Word 2 Cue 2

Tab. 1: The design of sets A and B

2.3 Data acquisition

In phase two, we had all the participants listen to the concatenated recordings from phase one. We split up the participants into two groups, where group A listened to set A and group B to set B. They were tasked with guessing the word that the speaker was describing. They were asked to guess as soon as they are confident with their answer. As mentioned before, each cue was listened to at least five times. This provided a minimum of five evaluation data points for each of the cues. Phase two was also recorded. These recordings were labelled using PRAAT, in order to measure the response latencies between the end of the cue and the beginning of the answer. The labelling methodology is shown in Table 2.

As the table infers, the response time data could be extracted from three of the four possible label areas, since the GC label offers no response latency data, because the word was already successfully guessed. The NG label indicates that full three seconds were used without any guess made. The RTA and RTB labels confirm the presence of a guess, although as it is obvious from the table, in these cases the successfulness of the guess is not recorded. To clarify, the data extracted during the PRAAT analysis was used only to extract the response latency data. No guess success data was extracted even though some of the labelled areas may hint at the correctness or incorrectness of guess.

Label name	**Label description**
NG	*No guess – this label is used whenever the listener provided no guesses or simply stated "I don't know"*
RTB	*Response time (before) – this label indicates that the guess was made before the cue was finished*
RTA	*Response time (after) – in this case, the guess was made after listening to the cue, in other words, during the three seconds of silence*
GC	*Guessed correctly – the GC label was used in case, when the word was already correctly guessed following the previous cue*

Tab. 2: Labelling methodology

A check sheet was used for the recording of the success rate of guessing, which was later transferred into a database. An example of such a sheet is shown in Table 3, which illustrates how the results were recorded by the experimenter. Three symbols were used to mark the success of the listener's guess, where the symbol "o" was used in case of a successful guess, the symbol "x" showed an incorrect guess or no guess, and the symbol "-" indicated that it was previously answered correctly.

Listener 1			Speaker 1				Set A	
Word no.	Word 1 bird		Word 2 prison		Word 3 happy		Word 4 keyboard	
Cue no.	Cue 1	Cue 2	Cue 1	Cue 2	Cue 1	Cue 2	Cue 1	Cue 2
Success	x	o	o	-	x	x	o	-
Word no.	Word 5 subject		Word 6 window		Word 7 curious		Word 8 to swim	
Cue no.	Cue 1	Cue 2	Cue 1	Cue 2	Cue 1	Cue 2	Cue 1	Cue 2
Success	x	x	x	o	x	x	o	-

Tab. 3: Check sheet of guess successfulness

2.4 Data processing

A total of 240 data points was extracted from the check sheets per listener, since every listener was given twelve recordings consisting of ten words with two cues each. This provided us with 3120 data points for further analysis regarding the success of guessing. In simpler terms, each cue possessed twelve data points,

which showed the success of guessing. Due to previous creation of two separate sets A and B, we can also extract data regarding the quality of a cue based on how often it was followed by a successful guess.

To specify this idea, in pilot research all the participants listened to a recording with cues in their original order, just like in set A. They constantly guessed correctly on the second cue. From this it was difficult to determine whether they guessed correctly, because the second cue was of a higher quality or if they guessed correctly, because they gathered information from both cues. We therefore took another recording and created two versions of it, as mentioned above. We had 6 participants listen to version A with the original cue order and the other 6 to version B, where the order was switched. To provide an example, the participants were guessing the word "keyboard". In both cases, most participants guessed correctly on cue 1 both in version A, where this cue came first, and B, where the cue came second. This indicates that this cue was of a higher quality, than cue 2. The creation of two versions also guaranteed that each cue was listened to at least five times. When we used only version A, some of the cues, which went second were used for guessing only two or three times. This occurred, because participants already successfully answered after the first cue and therefore, no guess was needed for the second cue.

The collection of raw data from PRAAT and the check sheets resulted in the creation of two independent data sets consisting of response latencies and guess correctness. Further analysis of these data sets was conducted to provide answers for the research questions stated in the introductory paragraph.

3 Data analysis

Firstly, all of the data was used during the analysis regardless of it being from set variants A or B. This data was divided into four groups based on guess success as shown in Figure 1. The difference in response latency was calculated in each of the categories. These categories only consisted of response latency differences corresponding to a specific setting, as shown in figure 1. The arrows indicated how the guesses followed, for example in group B an incorrect guess is followed by a correct guess. Therefore, the difference was calculated as the second response latency minus the first.

First of the groups, which were analysed was group A. A two-tailed on sample t-test was used to calculate the mean of the group. The t-test resulted with a mean of -0.055, a p-value of <0.219, and a t-value of -1.229, which was lower than the critical t-value of 1.962. The data shows that the null hypothesis of the hypothesised mean of 0 cannot be rejected, since the t-value did not surpass the critical t-value as well as p-value being higher than 0.05. The data also suggests a very minor tendency for the response time to decrease when an incorrect guess is followed by another incorrect guess, although the difference is an almost negligible

0.055 seconds. This result does not however conclusively answer our research question whether incorrect guesses increase the response latency for any following guess. Since almost no change was observed, we need to further analyse the following group B, which also starts with an incorrect guess.

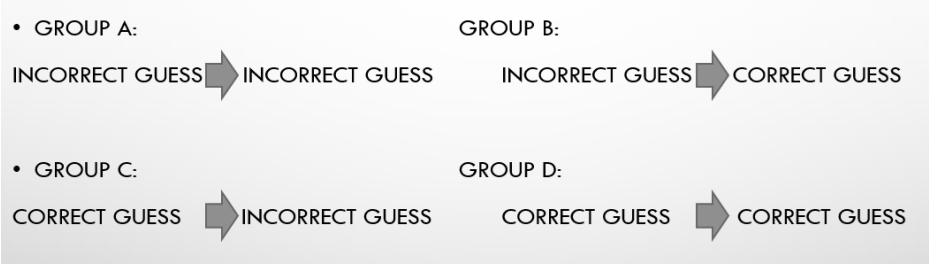

Fig. 1: Guess success groups

The intention of analysing group B was to find data supporting or rejecting the hypothesis that incorrect guesses increase the response latency of any following guess. As it was already stated, both group A and B start with an incorrect guess, while group A results in another incorrect as opposed to group B, which results in a correct guess. Another two-tailed one sample t-test was calculated to calculate the mean of this group. A null hypothesis of 0 being the mean was also created. The t-test resulted with a mean value of -0.445, accompanied by a p-value of <0.001 and a t-value of -4.333. If we compare the resulting t-value of -4.333 to the resulting critical t-value of 1.964, we can see that it is much lower and therefore cannot be used to reject the null hypothesis, however, the p-value of <0.001 is conclusive enough for rejection. This suggests a statistical significance of the calculated mean, which was -0.445. Our original hypothesis expected to see a positive result instead of a negative. This tells us that incorrect answers in fact decrease the response latency of the following guesses. The results therefore show an interesting outcome, which goes completely against what was expected.

To further examine the data, we chose to calculate a two-tailed one-sample t-test for group C as well. This group is the first, which starts with a correct guess, same as group D, although in this case the result is an incorrect guess. The calculation of the t-test was used to prove the statistical significance of the mean value, which was again calculated. The t-test resulted in a mean value of 0.439, with a p-value of <0.001 and a t-value of 4.238. As with the previous two groups, the null hypothesis was that the mean would be zero. P-value of <0.001 together with the t-value of 4.238 being higher than the critical p-value of 1.964 lead us to reject the null hypothesis and prove the statistical significance of the data. Again, we may observe a surprising outcome, where the mean is a significantly high enough mean value of 0.439. This data shows that correct guesses in fact increase

the response latency opposed to the hypothesised decrease, which was stated in the research questions.

To confirm this trend of response latency increase following a correct guess, we lastly calculated another two-tailed one-sample t-test for group D. This group consisted of both guesses being correct. In this case, the resulting mean value of 0.328 was lower than the mean value of group C, but it again showed a tendency of increasing the response latency following a correct guess. To examine the statistical significance, the p-value of <0.009 was calculated together with a t-value of 2.632. As with the previous group, both the resulting p-value and t-value being higher than the critical t-value of 1.971 lead us to reject the null hypothesis. As with the previous group, the null hypothesis was that the mean of this group should be 0.

Both sets	mean value	p-value	t-value	critical t-value
Group A	-0.055	<0.219	-1.229	1.962
Group B	-0.445	<0.001	-4.333	1.964
Group C	0.439	<0.001	4.238	1.964
Group D	0.328	<0.009	2.632	1.971

Tab. 4: One-sample t-test data based on groups for both set variants

These initial t-tests showed an interesting result, which is also visualized in Table 4. Further testing of the data is needed to analyse the effects of the two different set variants on the results, which could provide us with more valuable results. During the following analyses, the data set was divided into two set variants A and B. The same one-sample t-tests were calculated to analyse, whether the variant composition does somehow affect the resulting values as compared to those shown in Table 4. The group composition stayed the same as it was originally shown in Figure 1. The results of these t-test are shown in Table 5.

Set A	mean value	p-value	t-value	critical t-value
Group A	-0.512	<0.392	-0.856	1.963
Group B	-1.795	<0.001	-16.708	1.968
Group C	1.826	<0.001	20.378	1.968
Group D	0.318	<0.082	1.752	1.979

Tab. 5: One-sample t-test data based on groups for set variant A

Again, we can see a set of interesting results seemingly confirming the original outcome, where correct guesses increase the response latency for any following guesses. On the other hand, we can also see a significant change in the mean value for almost all of the groups. Logically, this result is connected with exclusive usage

of set variant A. For group A, we can observe a significant increase in the mean value, but also in the p-value suggesting a smaller statistical significance. However, the mean value is still interesting enough in the sense that this change is much more impactful than the previously calculated value of -0.055 when both variants were taken into account. This would suggest that incorrect answers truly do decrease the response latency, which is also supported by the statistically much more significant mean value calculated for group B.

As with the previous group, we can see a dramatic increase in the mean value. With group B we can observer a mean decrease of latency of -1.795 as compared to the previously calculated value of -0.445. This shows us a dramatic decrease of 1.35 second in response latency. The same significant increase is also observable in group C, where the mean value for set variant A are 1.826. As with the previous results, this is a huge change in the impact of answer correctness on response latency. In case of group C, we observed a further 1.387 second increase in response latency as compared to the results from Table 4. Group D was the only one of the four, which resulted in an almost negligible change in response latency. A further analysis and discussion of the data is needed to thoroughly examine the possible causes behind these occurrences.

The last of the one-sample two-tailed t-tests were calculated for all of the four groups belonging to set variant B. As with the previous calculations, the results are visualized in Table 6.

Set B	mean value	p-value	t-value	critical t-value
Group A	-0.060	<0.370	-0.898	1.965
Group B	1.410	<0.001	12.999	1.970
Group C	-1.450	<0.001	-10.806	1.970
Group D	0.342	<0.039	2.099	1.986

Tab. 6: One-sample t-test data based on groups for set variant B

For set variant B, the results for group A correspond with the findings from the original two variant t-test. The more significant and also the most interesting changes are observed in groups B and C. Even though both the t-test result from two variant calculation and variant A calculations contradicted our proposed hypothesis, we can see the opposite being true in this case. The mean value for group B is a positive value for the first time, which would suggest that our original hypothesis may still be partially true. The value of 1.410 suggests that in this set variant the response latency significantly increased after an incorrect guess was made. With group C, a negative value is observed for the first time, which would again lead us to believe that the proposed decrease of response latency does in fact occur after a successful guess. These results further suggest the presence of other factors influencing response latency. We believe that guessing confidence is in

these cases affected by the quality of the cues. To prove this claim, we need to return to the data set consisting of guess success values.

Firstly, we needed to create a reliable measure for the purposes of testing the quality of cues. The mean value of a listener's guessing rate seemed to be the best identifier of how well he/she was able to utilize and understand the cues to successfully guess the word. Using a one-sample two-tailed t-test we calculated the mean value for each of the listeners. The values could then be easily transferred into percentages, which showed show how successful the listener was at guessing. This could be done because of the simple nature of the calculation, which acquired its result from the sum of the guess values divided by the number of guesses. The guess values were only number 1 in case of a successful guess and 0 in case of an unsuccessful guess. As it was mentioned, a set of t-tests was used, which also showed the statistical significance of these values.

	Variant	Prof. level	mean value	p-value	t-value	critical t-value
Listener 1	A	C1	0.320	<0.001	9.754	1.972
Listener 2	A	B2	0.357	<0.001	10.408	1.972
Listener 3	A	B1	0.255	<0.001	8.648	1.971
Listener 4	A	B2	0.349	<0.001	10.566	1.971
Listener 5	A	C1	0.292	<0.001	9.259	1.971
Listener 6	B	C1	0.353	<0.001	10.523	1.972
Listener 7	A	B1	0.220	<0.001	7.828	1.971
Listener 8	B	B1	0.263	<0.001	8.930	1.971
Listener 9	B	B1	0.150	<0.001	6.402	1.970
Listener 10	B	B2	0.362	<0.001	10.888	1.971
Listener 11	B	B2	0.312	<0.001	9.623	1.972
Listener 12	A	B2	0.291	<0.001	10.117	1.971
Listener 13	B	C1	0.467	<0.001	13.029	1.972

Tab. 7: Mean values of the guess success data

The results are shown in Table 7 demonstrate a significant variance in the mean values, which are used to represent the success of guesses. We can see several extreme outcomes, first of which is based on the logical assumption that proficiency level does impact the success rate of guessing. This statement is supported by the means for each of the proficiency levels shown in Table 8. C1 proficiency level was the best at guessing, followed by a B2 with a slightly smaller guess rate, with the B1 level being the least successful. These results are supported the findings of previously cited Pöchhacker & Liu (2014) and strongly hint at the improvement of anticipatory behaviour with higher proficiency levels. This also

suggests that the level of listener 9 may be even lower than B1 based on how far below the average he/she is.

Prof. level	mean value	p-value	t-value	critical t-value
C1	0.358	<0.001	9.336	3.183
B2	0.334	<0.001	24.027	2.777
B1	0.222	<0.001	8.584	3.183

Tab. 8: Mean success of guessing for each proficiency level

The second extreme variance of mean values in Table 7 is observed in connection with both proficiency levels and set variants. We can see that both the highest and the lowest value are observed in connection to variant B. If we were to omit listener 9 from the data set for being bellow the required proficiency level, then the data may have shown a clearer picture of true effect of set variants in connection with the que quality. To fully understand how the set variants A and B affect the guessing success of listeners, a last pair of one-sample t-tests was calculated. The results of these calculation are shown in Table 9. Even though only a small difference was observed between the mean values of guess success, it still seems to be significant enough to cause the extreme results, which were observed during the analyses shown in Table 6 during the group analysis of set variant B.

Variant	mean value	p-value	t-value	critical t-value
A	0.298	<0.001	15.942	2.447
B	0.318	<0.001	7.314	2.571

Tab. 9: Mean success of guessing for each of the set variants

4 Discussion and conclusion

In the current study, we set out to explore the relationship between the success rates of guessing and response latencies. In the original hypothesis we expected to see an increase of response latency after an incorrect guess and a decrease after a correct guess. However, the data showed the exact opposite of what was hypothesized in most cases apart from 2 of the 12 studied scenarios. This result does not fully disprove our original hypothesis, although a strong trend can be observed. This trend first emerged during the initial analysis of response latency change, which showed that incorrect guesses in fact decrease the response latency for any following guess. This was confirmed in 5 of the 6 tested cases. The only time the opposite was true was while analysing group B in set variant B. This was the only group, which showed an increase in response latency following an incorrect guess.

In case of guesses following a correct guess, our results were as surprising as in the previous section. Contrary to our original hypothesis, we observed that correct guesses in 5 of the 6 tested cases increase the response latency. We expected that a correct guess would provide a confidence boost, which would result in a decrease. The idea behind this claim was that the listener would be able to guess a word more quickly, because he gained confidence in his understanding of how the speaker constructs messages. We were expecting this confidence to allow him/her to assess the best guess more quickly. There was only one case in which this was true. As with the previous exception, this one also occurred in connection to set variant B. A significant decrease in response latency was calculated from the means. We therefore presumed that there was a deeper connection, which influenced the changes of response latency. In the introduction, we presented the concept of cue quality, which may be the influencing factor causing these differences.

Although the results were initially surprising, they seem to be at least somewhat logical. If we consider a situation, in which the listener correctly guesses, then possibly the thing that gets boosted is not purely confidence, but also stress. This may cause this person to try harder and therefore take a longer time to provide another answer. On the other hand, if we think of an opposite situation, in which a listener answered unsuccessfully, then possibly his confidence does not suffer as much and the level of stress is lower due to the lowering of his/her expectations. This in turn could result in the reason for the decrease of response latency. In the light of these findings, we therefore propose that stress and expectation both may have an effect on guessing confidence, response latency, and also the success of anticipation. One other factor we proposed was the aspect of cue quality.

We decided to measure the quality of each of the cues in both set variants based on how successfully they were guessed. There two significant differences between these variants, the people, who listened to them and the cue order. Therefore, some of the variance in guess success may be attributed to listeners themselves, although we tried to create as uniform groups as possible. The test results showed that there is in fact a difference between the two set variants. Therefore, we believe that some of this variance can also be attributed to the quality of cues. Such a conclusion would require a more thorough analysis of each of the cues and their effect on the overall guess success rate.

5 Limitations and future study

The findings of the current study suggest that there are other factors, which affect anticipatory behaviour than just guessing confidence and cue quality. Although these two factors were examined, we cannot yet conclusively state how strong of an influence they have on anticipation. We almost entirely disproved our

original hypothesis, but there were two cases with significant enough results, which still prevent us from entirely dismissing the hypothesised effects of guessing confidence on anticipation. A further study of this connection could provide a definite resolution to this matter.

A second limitation of the study is that response latency is not necessarily the best measure of confidence. A previous study by Kimble and Seidel (1991) linked confidence to loudness, which may be a more reliable source of data. Other indicators of confidence may also be connected to physiological attributes. Heart rate, sweating, or even the dilation of pupils may be a much better indicator, which could provide more comprehensive results in the study of the connection between confidence and anticipation.

One of the other factors, which we previously suggested as influencers of speaking confidence and anticipation could be stress. The effects of stress on speech have been previously studied, but the connection of how stress influences anticipation has not yet been fully examined in terms of communication. The hypothesis for such a study would be that stress could negatively affect the ability to use anticipation in communication and therefore decrease the level of message understanding. Gap filling tasks could be conducted to assess the impact of stress on anticipation. The involvement of physiological measurements may also help understand how different levels of stress affect anticipation. Another factor, which we already mentioned during the discussion, is expectation, which we believe could be closely connected to confidence and possibly to anticipation as well. If the speaker's expectations are not met, for example by incorrectly interpreting the message, then their anticipatory behaviour may worsen.

The impact of stress on the response latency may have been caused by the time limit, which was given to the participants. The level of impact could therefore be tested in a future study involving several groups with varying response time limits other than the three second time limit, which was used in the present study. We hypothesize that the effect of stress on response latency could be almost completely eliminated, if the experiment would not involve any time limit at all. This however offers new problems, which could impact the validity of the study. If there is no time limit, the participants may not feel the urge to hurry and give the answer as soon as they are confident enough. In turn, they may take longer amount of time to rethink the answer even if they have already made their mind up about their guess. Another form of motivation could therefore be used.

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