

Unraveling Students' Liking of Teachers: The Impact of Multimodal Cues during L2 English Vocabulary Teaching

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Abstract

While speakers' wording, prosody and gestures may affect perceivers' liking of speakers, few studies investigate how teachers' multimodal cues jointly impact students' evaluation of second language (L2) teaching. We extracted 54 videos of vocabulary instruction delivered by four female L2 English teachers, varying features of prosody, linguistics, and gestures. 156 university students randomly watched 12 videos and rated their liking of each vocabulary teaching. Prosodic (speaking rate, mean pitch), linguistic (utterance length, question rate, total words) and gestural cues (iconic, beat) of videos were coded and analysed as predictors, while controlling for different teachers, teachers' dressing formality, students' working memory, English proficiency, and familiarity with the target vocabulary. Results showed that better working memory, higher English proficiency, and prior knowledge of the target word were positive predictors of students' liking of teaching. Teachers using longer utterances, asking more questions tended to be less liked by students. Furthermore, male students significantly preferred teaching with a slower speaking rate, lower mean pitch, higher iconic gesture rate but lower beat rate, and more formal teacher attire. However, these effects were not significant for female students. In conclusion, teachers' multimodal cues influence students' liking of L2 teaching, with implications for education practice.

Index Terms: multimodal cues, speaking rate, pitch, gender, students' liking, vocabulary learning, beat, iconic gestures.

1. Introduction

In second language (L2) instruction, multimodal cues such as linguistic features, prosody and gestures play a crucial role in language processing. These cues, extending beyond verbal interaction, not only facilitate comprehension but also enhance instructional appeal and effectiveness [1]. Take prosody for example, intonation can alter the conveyed meaning [2]. Lower pitch voices are perceived as more trustworthy [3] and having a stronger leadership capacity [4]. Teachers' tone of voice affects children's psychological needs, well-being, and willingness to interact with teachers, particularly a controlling (demanding/pressuring) tone, which has a negative effect [5]. Additionally, speaking rate is linked to perceived competence and benevolence [6], while how teachers' L2 speaking rate influences students' liking is unknown.

Gestures also influence perceivers' perceptions and evaluations. For example, deictic and dialogic gestures (linked to the speech structure and rhythm) can significantly enhance

speech persuasiveness and the perceived competence of the speaker [7, 8]. In education, examinees with limited linguistic skills can engage evaluators and achieve success by using nonverbal strategies to sustain conversations [9]. Students who gestured more were even assessed as having higher L2 proficiency in audiovisual assessments than in audio-alone assessments [10]. For teachers, while gestures are known to aid teaching [11], their influence on students' liking for teachers remains underexplored.

Furthermore, linguistic features such as the mean length of utterances (MLU) and use of questions affect linguistic processing and learning [12]. A shorter MLU is easier to be processed, while questioning prompts analysis, evaluation, and more engagement. Hence, they may enhance teacher likability.

Students' internal factors such as gender, working memory, content familiarity and English proficiency significantly influence their perception of teaching. Gender stereotypes may subconsciously influence teacher's methods and student responses [13] (e.g., perceptions of teaching, learning, and assessment). Gender also affects how prosody and nonverbal cues are interpreted [14]. Additionally, working memory is crucial for vocabulary acquisition [15]. A better working memory allows for more effective focus and information encoding and enhances students' learning efficiency and enjoyment [16]. Furthermore, familiar contents are easier to comprehend and leads to a more favourable view of the teacher's instructional effectiveness [17]. Finally, students with higher English proficiency are more confident engaged in the L2 classroom discussions and activities [18]. This positive interaction enhances their perception of teachers.

While speakers' wording, prosody, and gestures influence how teachers are perceived and liked, existing research often investigated these cues separately. Yet, communication is multimodal, and it is unknown about the respective role and weight of each cue and the combined influences. Furthermore, most studies focuses on L1, which may not be applied to an L2 context that has diverse processing challenges. Therefore, in the current study we investigated the role of teachers' multimodal cues on students' liking in naturalistic L2 teaching, while considering individual characteristics.

If lower pitch signifies trustworthiness [6] and gestures aid L2 proficiency assessment [9], L2 teachers employing such cues may be more liked. While no studies have examined the effect of teachers' speaking rate and gestures on students' liking in L2 teaching, we expect that content complexity (e.g., word familiarity) and the students' processing ability (working memory) or language proficiency (L2 skills) will affect their

preference. Similarly, factors that alleviate processing demands (e.g., slower speech, shorter utterances, meaningful gestures) may be more appealing. Additionally, if males and females decode nonverbal cues differently, gender may interact with these cues in teacher liking.

2. Method

2.1 Participants

Two hundred seventy-five students ($M=20.08$ years, $SD=1.49$, 164 men; 111 women) from Chaohu University in China were invited to participate in an online study as volunteers. We excluded 106 participants who did not complete the survey and 13 participants who provided uniform responses across the entire questionnaire. Thus the final sample size was 156. All were native Chinese speakers, primarily majoring in Mechanical Engineering, Business Administration, and the Arts. Participants signed online consent for the study and the research was approved by Chaohu University.

2.2 Materials

We extracted 54 video clips of vocabulary instruction ($M=26.01$ sec, $SD=19.82$) from 14 classroom recordings of 4 female EFL (English as a foreign language) teachers, which varied in speaking rate ($M=3.71$ syllables/sec, $SD=0.76$) and mean pitch ($M=239.91$ Hz, $SD=30.93$), mean utterance length ($M=7.13$ words, $SD=4.44$), mean number of English words ($M=16.2$, $SD=12.28$). We studied female teachers as the majority of EFL teachers are female [19], especially in China.

In all clips teachers provided clear explanations and fully defined vocabulary, typically using a mixture of Chinese and English in their instruction. To ensure a comprehensive representation of varied multimodal cues, these clips also had variations in nonverbal cues. Our pilot study showed that viewers became fatigued after watching 12 videos, so we created six versions of the stimuli, each containing 12 clips. Specific clips were shared across versions.

Reflecting on student feedback regarding the impact of teacher attire and recognizing that attire can signal role embracement [20], we gathered still images of all teachers in their typical attire from various teaching sessions. Then 30 students (10 men; 20 women) categorized teachers' attire in each video into four levels, ranging from formal to informal.

We adapted a working memory test from materials on the Arealme website [21], which had 13 items, including 9 textual, 3 visual images and 1 numerical information.

2.3 Procedure

Participants were randomly assigned to watch 12 clips from one of the six versions. They first indicated prior knowledge of the vocabulary presented in each clip and then rated liking (scale 1-10) using a Tencent questionnaire. They also answered ten questions for the working memory test. Students' demographic data were collected, including gender, age, major, and self-evaluated English proficiency (scale 1-10, $M=6.26$, $SD=2.0$), etc.

2.4 Coding

2.4.1 Linguistic features

Speech transcriptions: the researcher transcribed teachers' utterances, which involved watching recordings, writing down

the speech in real-time, and frequently pausing and replaying to ensure accuracy. The transcriptions were rigorously reviewed and cross-checked against the videos for precision.

For each video, we measured: (1) Mean length of utterance, calculated as the average number of words per utterance [22]. (2) Direct questions to students and self-questioning. Direct questions link to increased student engagement and critical thinking [23, 24]. Self-questioning occurs when teachers pose a question and then provide the answer themselves, typically used to clarify complex topics and facilitate information delivery and understanding. (3) Total number of words: the number of words in a clip.

2.4.2 Prosody

Boundaries of sentences were annotated in Praat [25]. A Praat script was used to automatically extract the utterance duration, pitch and intensity values of each vocabulary instruction and we computed the following measures: (1) Speaking rate: the average number of syllables per second excluding pauses over 200 ms [26]. (2) Pitch: mean F_0 and F_0 range, which were transformed to semitones [27]. (3) Intensity (dB): mean intensity and intensity range. (4) Pauses: mean pausing duration and pausing rate.

2.4.3 Gesture

Gestures of all clips were coded by the first author in ELAN and checked by a second coder. Inter-coder agreement reached 94.44%, with a Kappa coefficient of 0.88, indicating strong consistency. Disagreements were resolved through discussions between the two coders. Gesture rate was calculated by the number of gestures per 100 words for the following types: (1) Iconic gestures: conveying semantic meaning, like a hand motion depicting 'kick'. (2) Pragmatic gestures: unconscious circling hands movements to maintain the process of the dialogue [28]. (3) Beat gestures: hand moving up and down to make an emphasis, aligning with the prosodic rhythm of speech. (4) Pointing: referring to concrete events (pointing to a pen) or abstract ideas (e.g., space and time) [29].

2.5 Data analysis

Linear mixed-effects models in the R environment [30] were used to assess students' ratings of liking of teachers' explanations of vocabulary. Prosodic (e.g., speaking rate, mean pitch), linguistic (MLU, question rate, English words, total words) and gesture rates (e.g., iconic, beat) of each video were coded and analysed as independent variables, with control variables of different teachers, their dressing formality, students' working memory, English proficiency, versions, target vocabulary familiarity. We added two-way interactions between gender and mean pitch, speaking duration, gestures and attire. We included a random intercept for each participant and each word in the models. No random slope was added as it led to convergence errors. As MLU is often highly correlated with speaking rate [31] (here: $r = 0.57$, $p < .001$), we ran a separate regression model for MLU or speaking rate. We used the AIC values to compare and select models.

3. Results

Table 1 presents descriptives about main variables and their corresponding ratings of liking teachers. The mean rating on liking was 8.71, indicating that students had an overall high preference for teaching. Key factors included English proficiency, where students of higher proficiency rated 0.59 points higher in liking than their lower proficiency

counterparts. Working memory also played a role, as students with higher working memory slightly favoured teaching more (8.78 vs. 8.64). Gender differences were evident, with females rating 0.23 points higher than male students. In addition, MLU, word familiarity, speaking rate, mean F0, iconic gestures, and beat gestures all seemed to contribute to students' liking.

Table 1: Overview of students' liking by key factors.

Category	Group	Mean	SD
General liking	/	8.71	1.36
Familiarity with words	Familiar words	8.78	1.34
	Unfamiliar words	8.36	1.38
Question techniques	Asking Qs	8.67	1.38
	Not asking Qs	8.72	1.35
Student gender	Male	8.62	1.42
	Female	8.85	1.24
MLU	Shorter	8.72	1.34
	Longer	8.68	1.39
Working memory	Higher	8.78	1.23
	Lower	8.64	1.46
English proficiency	Higher	8.91	1.22
	Shorter	8.32	1.52
Speaking rate	Higher	8.60	1.39
	Lower	8.79	1.33
Mean F0	Higher	8.64	1.37
	Lower	8.77	1.35
Iconic rate	Higher	8.80	1.38
	Lower	8.67	1.35
Beat rate	Higher	8.75	1.39
	Lower	8.70	1.36
Dressing formality	Higher	8.79	1.36
	Lower	8.65	1.36

Note: For descriptive purposes, variables are categorized into 'Higher' and 'Lower' groups based on their mean, with scores above and below the mean defining the respective groups.

First, we started with a full model of all predictors (except MLU) and related interactions, and then improved the model by dropping insignificant factors after model comparisons. The final regression analyses showed that students who had a better working memory ($\beta=0.07$, $p=.035$), higher English proficiency ($\beta=0.10$, $p=.022$) and had known a target word ($\beta=.11$, $p=.047$) positively predicted their liking of teaching.

Teachers with a slower speaking rate ($\beta=-.06$, $p=.046$) and a lower mean pitch ($\beta=-.004$, $p<.001$) were significantly more liked by students. These effects were mostly driven by male students ($\beta_{\text{speaking rate}}=-.09$, $p=.016$; $\beta_{\text{pitch}}=-.05$, $p<.001$), with no significant effects observed among female students ($\beta_{\text{speaking rate}}=-.02$, $p=.70$; $\beta_{\text{pitch}}=-.02$, $p=.34$). The interaction between gender and speaking rate ($\beta=-.07$, $p=.19$) did not reach significance, but the interaction between gender and mean pitch was marginally significant ($\beta=-.04$, $p=.06$) (see Figure 1).

Interestingly, male students also preferred teachers with more iconic gestures ($\beta=.029$, $p=.036$) and fewer beats ($\beta=-.05$, $p<.01$), whereas the effects were not significant for female students ($\beta_{\text{iconic}}=-.001$, $p=.96$; $\beta_{\text{beat}}=.03$, $p=.23$). There was a significant interaction between beat frequency and gender ($\beta=.09$, $p=.01$), but not between iconic frequency and gender ($\beta=-.03$, $p=.16$). Regarding dressing formality, teachers with a more formal attire received a significantly higher rating by male students ($\beta=.28$, $p=.008$) but not by female students ($\beta=-$

.02, $p=.85$), as also confirmed by a significant interaction between gender and dressing formality ($\beta=-.31$, $p<.01$). Additionally, teachers asking more questions ($\beta=-.027$, $p=.088$) or talked fewer words ($\beta=.001$, $p=.09$, two-tailed) in a vocabulary explanation tended to be less favoured by students.

All effects were general robust when running a separate model replacing speaking rate with MLU ($\beta=-.009$, $p=.029$), additionally showing that a shorter MLU is more preferred.

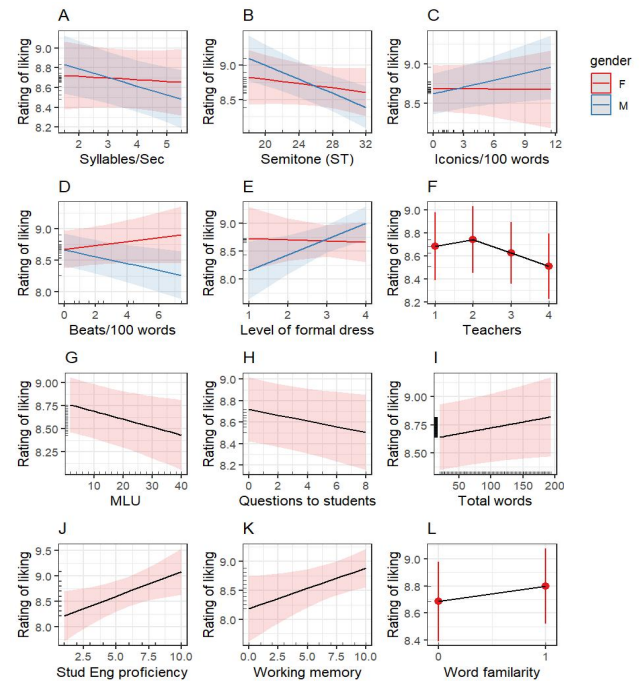


Figure 1. Effects of different factors (A-L), with 95% CI.

4. Discussion

Our study explored the impact of linguistic, prosodic and gestural cues on students' liking of L2 vocabulary teaching, while controlling for various factors. We found that teachers' multimodal cues influence students' preference for teaching, with differences between male and female students.

Earlier research emphasized the importance of teacher characteristics in shaping students' learning attitudes and perceptions [32]. There is a significant link between students' foreign language enjoyment and classroom anxiety with teacher traits like friendliness and accent. Additionally, pre-service EFL teachers' judgments of teaching competence are influenced by perceptions of the teacher being a native or non-native English speaker [33]. Unlike previous studies that typically focused on one or two factors, our research is the first to comprehensively quantify a variety of multimodal cues while accounting for significant individual differences.

Linguistically, while the benefits of teacher questioning in student learning have been highlighted [34], our study uncovers that teachers who asked more questions tended to be less liked by students. This finding shows a gap between what is pedagogically effective and what students prefer. In video-based learning contexts, students expecting direct answers might view teacher questioning as a deviation from their anticipated learning path, requiring extra cognitive effort. This might be less effective and less preferred in video formats to real-life interaction. However, providing more information in

explaining a vocabulary but with shorter utterances seem to be preferred by students.

Moreover, students who knew a target word showed a higher liking of the teaching. Familiarity with certain concepts can reduce cognitive load, making the learning process smoother. This highlights the role of content familiarity in shaping students' preference for teachers. Our research shows that previewing activities like defining challenging words enhance students' comprehension and attitudes, boosting academic performance and engagement [35].

Prosodically, our findings on speaking rate differ from prior research indicating a preference for faster speech rates in perceived ability in informal conversation or employment interview [36]. Notably, a study [37] identified an interaction between speaking rate and speakers' gender regarding social attractiveness. It found that attractiveness was associated with moderate to relatively faster speaking rates by a male speaker, but not by a female speaker. Despite our teachers being female speakers, we found that male students preferred teaching with a *slower* speaking rate. This suggests that preferences for speaking rate may vary depending on factors such as speakers' or perceivers' gender, linguistic context and cultural background. In educational settings, especially in L2 learning context, male students may prefer a slower speaking rate as it aids in better comprehension and assimilation of complex information, thus reducing cognitive load.

Moreover, we observed male students showed a strong preference for teaching with a lower mean pitch. Given that our teachers were all female, this result seems to be consistent with studies indicating that adolescents increasingly prefer lower pitches in the opposite sex as they age [38]. Such preferences could be attributed to gender differences in voice and language processing, with male students typically have lower pitches, which may resonate more with female teachers exhibiting similar vocal characteristics (lower pitch) [39]. Furthermore, lower-pitched voices are often perceived as more trustworthy [40]. Future research could explore if these preferences similarly affect perceptions of male teachers.

Non-verbally, we found that male students predominantly liked a higher rate of iconic gestures. This is supported by Dual Coding Theory, which suggests that cognitive processing involves two systems: one for non-linguistic objects and events (like images), and another for language [41]. In a video example, the teacher visually spelled out "unique" in the air with her index finger, creating a memorable visual association for students to help them recall the word's spelling. The teacher's iconic gesture activated students' non-linguistic processing systems and provided dual coding, which enhances the retention and understanding of linguistic information of the word "unique". Such an understanding may improve students' liking of the teaching, as liking is linked to students' positive perceptions of greater learning gains [42].

Surprisingly, teachers' beat gestures were perceived to have a negative effect on the liking of the teaching by male students. Previous studies show beat gestures facilitate information emphasis [43] and enhance memorization [44]. However, studies also show that beat gestures may trigger perceptions of anger or negative sentiment [45] and increase processing workload [46]. Our study suggests that overuse or inappropriate application of beats may negatively impact male students' liking of teaching. It is recommended that teachers carefully consider the frequency and alignment of beat gestures with verbal content, taking into account the students'

gender. Additionally, male students expressed a higher liking for teachers who dressed more formally, a trend supported by findings that formal attire positively influences student engagement [47]. Therefore, we recommend that teachers consider adjusting their dress style to be more formal.

However, the effects of gestures or dressing formality were not significant for female students. This does not imply that females are insensitive to nonverbal behaviors or attire, but it could be that our teachers were all female. Future research should consider including male teachers to determine whether these findings can be generalized across genders. Culture and language could also impact perceptions of likeability. A nuanced approach is needed to understand likeability across cultures and linguistic contexts.

Important individual characteristics were also significant. Students with higher English proficiency and stronger memory skills rated teaching more positively. This finding expands our understanding of how cognitive abilities influence students' liking in educational settings. Working memory is positively associated with outcomes in L2 processing and language proficiency [48]. Additionally, students' satisfaction is linked to academic performance [49]. This suggests a complex interplay between students' academic competence and their preference for teaching.

5. Conclusions

This is the first study to quantitatively analyze how teachers' multimodal cues, alongside students' individual characteristics, jointly impact students' evaluation of teaching. Our findings contribute to a deeper understanding of student preferences for teachers, enabling educators to refine their multimodal teaching strategies and address gender-specific needs. By enhancing teaching effectiveness, this research not only fosters a more engaging and responsive learning environment but also positively impacts teachers' careers. Future research should analyze how multimodal cues affect learning outcomes.

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7. References

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