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Introduction

Voice imitation can be effective in different ways, both consciously and unconsciously, in situations such as language acquisition and for entertainment. The human voice is flexible, and it is possible to change the vocal tract in order to imitate other people's speech behaviour. To succeed with the imitation, we have to figure out important and characteristic features of the target speaker. Such features may be the dialect, the intonation pattern, the speech style, voice quality, as well as the pronunciation of sound segments.

A professional impersonator, who reproduces another speaker's voice and speech behaviour, has to be aware of how to change the vocal tract and get close to the voice of the target speaker. For an impersonator the aim of voice imitation is to entertain or cheat. He probably has to exaggerate some of the features of the target speaker's speech behaviour, like a caricature, for it to be entertaining. One hypothesis is that if he is close to the target speaker in some critical features, he may yet fail with other less important features in his imitation and the audience will still have the impression of a successful voice imitation (Zetterholm 1997).

The present study

The aim of this study

In order to find out how flexible the human voice is, one impersonator and a number of his different voice imitations have been studied. Analysis, both auditory and acoustic, has been done to see how much he changes his own voice. This study concentrates on the flexibility of the impersonator, and there is no comparable analysis with the target speakers. A whole utterance as well as one neutral word has been analysed, and a perception test has also been done. 20 participants were asked to grade the voice imitations and comment on their grades. The purpose of this test was not to identify the original voices,

just to grade the voice imitations, and the names of the target speakers were given in the test.

Material

The Swedish professional impersonator Göran Gabrielsson has recorded a tape for the Swedish telephone company Telia called *Kändissvar*, containing imitations of some well-known Swedish people. Some of them are politicians and some of the target speakers are well-known TV-hosts or newsreaders. 12 voices have been selected for this study and the recordings of each voice vary from 9 to 21 seconds.

The texts have been created, by the impersonator, to suit the vocabulary and other features of the target speaker. That makes it easier for the listener to recognise the voices and it is also for entertainment. In all the recordings one neutral word, which is not a typical or even a frequently used word for any of the target speakers, occurs. That is the word *mobilsvar* (the mobile phone answering machine). As the prejudice seems to be that a successful impersonation depends highly on the choice of vocabulary items, speech style and contextual features, the specific phonetic study of such a neutral word in a number of different voice disguises may tell us something about the validity of this prejudice.

Categorisation of Swedish dialects

The categorisation of Swedish dialects refers to Bruce & Gårding 1978 in their study of accent typology for Swedish dialects. According to earlier analysis five categories were singled out. For this study, three of the categories are useful in the description of the dialects of the target speakers. West (götamål), east (sveamål) and south (sydsvenska).

Short presentation of the target voices

The following presentation is in alphabetic order, except for the impersonator who will be presented first.

Name	*Occupation*	*Dialect*	*Recorded text*
Göran Gabrielsson	Impersonator	Transition area between east and west of Sweden.	
Anders Björck (AB)	Politician	West of Sweden. Characteristic pronunciation of the uvular *r*-segment, sometimes not realised at all. Nasal and breathy voice quality.	Nja, ambassadören säger att han inte använde anteckningsblock, men varför använde ni inte mobilsvar?
Alf Svensson (AS)	Leader of a political party	West of Sweden.	Nej, men herre gud i jösse namn, den mänskliga kontakten och värmen håller man ju vid liv genom att använda mobilsvar.
Bert Karlsson (BK)	Politician for a period and also in show business	West of Sweden. Characteristic speech style with a lot of hedges.	A, det är helt otroligt va' hur dom andra politiska partierna resonerar. A, för jag menar mobilsvar är ju vettigt va'. Då har ju folk verkligen tid att ägna sig åt sån't som är roligt va'. A, jag menar mat och sprit och så'nt.
Bengt Öste (BÖ)	TV-host and newsreader	East of Sweden. A lot of filled pauses and a creaky voice quality.	Ä, ja, ska man va' säker på att få napp genom mobilsvar, ja, då bör man agna med både namn och telefonnummer.
Carl Bildt (CB)	Former leader of a political party; also known as peacemaker in Europe	South of Sweden but affected by a more central dialect. Characteristic pronunciation of the uvular trilled *r*-segment and open vowels. Speech tempo like staccato and a tense voice quality, especially in political speech.	Ä, nu står vi alla inför det faktum att mobilsvar är den enda vägen till bra kontakter i det nya Europa. Ett Europa som kräver mobiltelefonerande i frihet.
Carl Lidbom (CL)	Swedish ambassador to France for some years	East of Sweden. Low pitch with a breathy and creaky voice quality.	Ä, för det första så har jag svårt att svara på den frågan därför att jag har ingen notering om det, och för det andra, det där mobilsvar det är trams för det fanns nämligen ingenting som hette GSM på den tiden.
Harald Treutiger (HT)	TV-host	Typical dialect from Gothenburg in the western part of Sweden.	Okej, en del påstår att mobilsvar är guld värt. Okej, men i så fall borde det väl heta: 'Tiga är silver, men tala är guld'.
Hans Villius (HV)	TV-host well-known for his knowledge in history	Transition area between the south and east of Sweden. Characteristic pronunciation of the uvular trilled *r*-segment. Speech tempo like staccato and sometimes a creaky voice quality.	Året är 1893. Det skulle ta drygt en mansålder, världen skulle få uppleva både Stalin och Hitler innan mobilsvar nådde det svenska folket. En revolution hade startat. Segertåget för NMT-GSM var ett faktum.

Ingvar Karlsson (IK)	Former prime minister of Sweden	West of Sweden. His voice has a high pitch with a tense voice quality.	Alltså det som gör Sverige så unikt är att regering och opposition har kommit fram till att har vi inte ett fungerande mobilsvar, ja, då lägger det en förlamande hand på våra kommunikationer.
Ian Wachtmeister (IW)	Politician for a period and the leader of a political party	East of Sweden. Distinct pronunciation, especially the vowel [i:], like a 'damped' vowel ('Viby-*i*'), a fricative *r*-segment and a low pitch with a nasal and creaky voice quality.	Ja, mitt herrskap, detta är ett så kallat mobilsvar. Så då gäller det för dig att tala in ett meddelande så det fullständigt ryker under galoscherna.
Kurt Olsson (KO)	Well-known TV-character some years ago	Typical dialect from Gothenburg in the western part of Sweden and speaks quickly.	Ja, hej och himla välkomna ska ni va' hit till det här himla käcka mobilsvaret. Nu ska inte jag stå här och tjata sönder allting, utan nu är det upp till dig att tala in någonting efter signalen som kommer strax här. Arne, starta signalen, jag kan inte stå här och tjata.
Olof Johansson (OJ)	Former leader of a political party	West of Sweden. Characteristic pronunciation of the uvular *r*-segment.	Ä, som miljöansvarig inom regeringen så uppmanar jag människor att vara radioaktiva. Dock endast genom att använda mobilsvar.

Results

In the auditory analysis, the dialect, the speech style such as speech tempo and intonation pattern, as well as voice quality and characteristic features and pronunciation have been analysed. In the acoustic analysis, the mean value of the fundamental frequency in the whole utterance, as well as for the target word *mobilsvar*, has been measured and the formant frequencies of the stressed vowels [i:] and [a:] in the target word have also been measured. Waveform and spectrogram have been analysed in order to compare the auditory analysis according to voice quality and specific segments. For the acoustic analysis the programme Praat has been used.

Auditory analysis

Dialect. The dialects of the original voices are all from the southern part of Sweden, but there are obvious differences between the dialects concerning segments such as the *r*-segment, and the intonation pattern. The impersonator seems to capture the dialects very well with regard to intonation patterns and different pronunciation (Bruce 1998, Bruce & Gårding 1978). The individual differences, especially the pronunciation of the *r*-segment, are clear and exaggerated in most of the voice imitations. Some of the target speakers have

dialects from the same area, and even if the impersonator captures the regional dialect, it is possible to recognise the individual features of the target speakers in these voice imitations. For example, in the imitation of HT he exaggerates the dialect, probably in order to focus on the individual features. However, for the other voice, KO, from the same area, Gothenburg, he is closer to the regional dialect concerning the intonation pattern.

Speech style. Some of the target speakers have a characteristic and individual speech style. Both CB and HV use a staccato-like rhythm. CL and KO speak with a fast speech tempo. The pace is slower for some of the other target speakers, like BK, BÖ and HT.

In the voice imitations, the different speech styles are obvious and sometimes exaggerated. Gabrielsson manages to copy the staccato-like rhythm of CB and HV in his imitations, but the individual differences are clear. The voice imitation of CL has a fast speech rate with slurred articulation, while the voice imitation of KO is simply fast. This is very close to the speech style of the target speaker. The slower speech tempo, characteristic for BK, BÖ and HT, is clear and in these imitations the intonation pattern and hesitation sounds are used to strengthen the impression of the speech style.

Voice quality. Only the most common terms and obvious auditory impression of voice quality, like nasal, breathy and creaky voice quality, will be pointed out here. The target voice of AB has a nasal and breathy voice quality. A nasal voice quality also occurs in the target voice of IW, who has a creaky voice quality as well. The voice quality of the target voice CL is breathy and creaky. An almost constant feature of the target voice of BÖ is a creaky voice quality. Tense voice quality occurs for the target voices of CB and IK in this context (politics).

The individual modal voice quality is hard to describe, but the impression is that the impersonator is successful in imitating the different voice qualities. The nasal voice quality, especially in the imitation of IW, is exaggerated. The nasal and breathy voice quality of AB as well as the breathy and creaky voice quality of CL is clear. In the voice imitation of BÖ, he uses a creaky voice in the whole utterance. The creaky voice quality gives the impression of a low pitch. A higher pitch is related to a tense voice quality and that is the auditory impression of the voice imitations of CB and IK.

In the voice imitations of AS and BÖ, it is possible to hear the impersonator's own voice in some syllables, but only in a critical listening and it does not affect the overall impression.

Characteristic features and pronunciations. In these voice imitations the impersonator uses characteristic words and phrases of the target speakers. That strengthens the impression of the imitations.

Characteristic features, like hedges, hesitation sounds and filled pauses (Stenström 1990), in the imitations of BK and BÖ for example, are clear in the imitations. There are differences in the pronunciation of /r/ depending on the regional or social dialect, but there are also individual differences. Some of the target speakers use an alveolar trilled [r] (AS) and some uses a uvular trilled [ʀ] (CB) and IW has a fricative [˛]. The different pronunciations of segments, especially the *r*-segment, are obvious and individual in the auditory analysis of the imitated voices. There are also differences in the pronunciation of the *s*-segment between the original speakers, and this is also evident in the voice imitations. The impression is that BK, for example, pronounces the /s/ just behind his teeth, while CL, for example, has a more [S]-like pronunciation. The target word *mobilsvar* has a long initial /m/ in the voice imitation of CL. A 'damped' Swedish vowel ('Viby-*i*') (Björsten et. al 1999) is a characteristic feature of the target speaker IW and the impersonator has managed to imitate this in his voice imitation. Some of these features are exaggerated, and are sometimes more like a caricature of the target speaker.

Acoustic analysis

F0. The average fundamental frequency of the whole utterance shows a great variation between the voice imitations. F0 means vary from 97 to 255 Hz, see Table 1, and that indicates that Gabrielsson is flexible concerning fundamental frequency. The duration differences depend on the variety of the texts and the speech style in the voice imitations. When the voice imitations are ranked according to the F0 means (Tables 1 and 2), it is clear that the impersonator's own voice is one of the voices with a rather low F0.

The results correspond to the auditory impression, the creaky voices are lower and the tense voices are higher in this investigation according to the acoustic analysis of the average fundamental frequency. The voice imitations of CB and IK, with the highest F0 mean, probably depend on the political speech style.

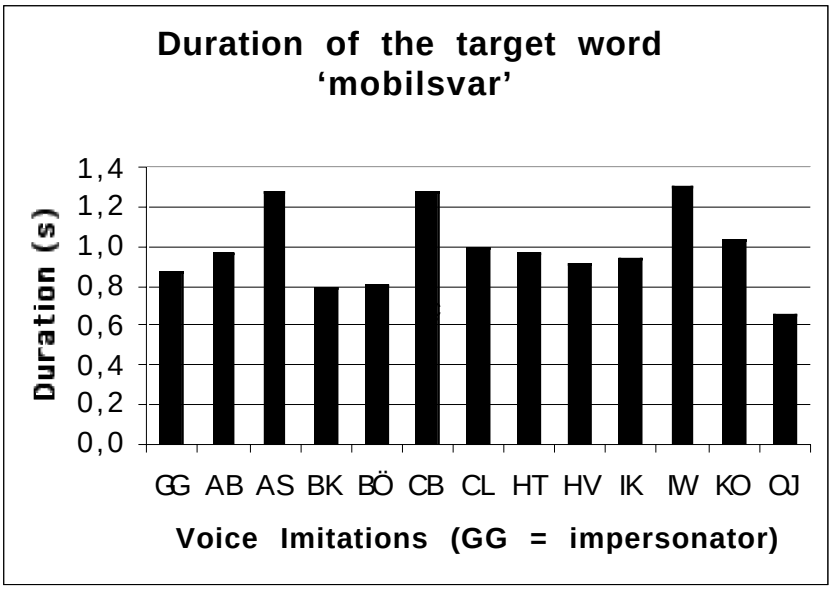

Figure 1. Duration of the target word *mobilsvar*

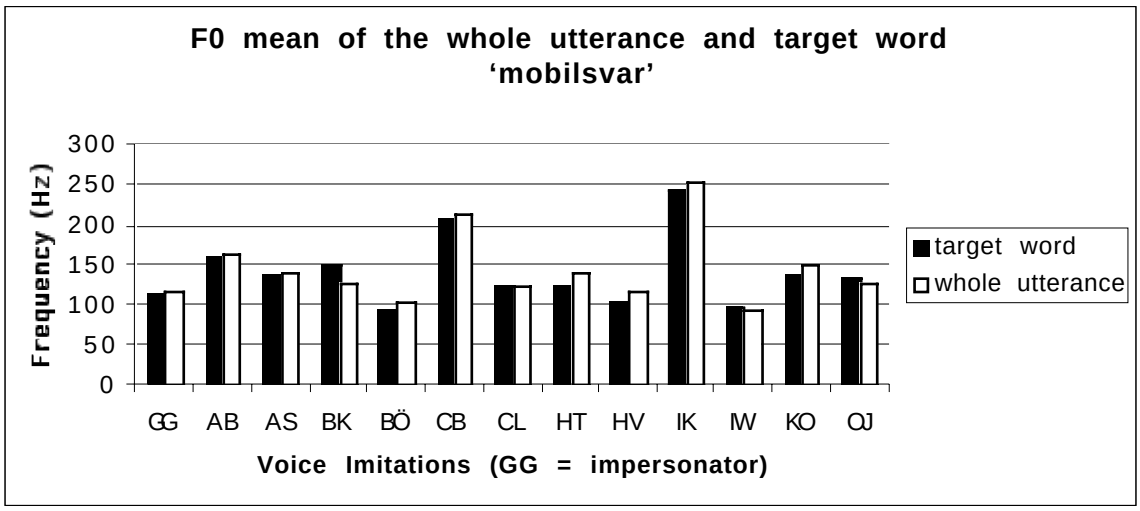

Figure 2. F0 mean of the whole utterance and the target word *mobilsvar*

The duration and average F0 of the target word *mobilsvar* are shown in Figures 1 and 2. There are no significant differences between the average of F0 in the whole utterance and the average of F0 in just one target word. In Tables 1 and 2, the voice imitations are graded according to the average of F0.

Formant frequencies. The formant frequencies, F1-F4, of the stressed vowels [i:] and [A:] of the target word *mobilsvar* have been measured and a comparison made between the imitated voices and the impersonator's own voice. The measurements have been done, every 10 ms, in the Praat programme, and the average value for each formant is presented in Tables 3 and 4. There are individual differences, but it is hard to find some uniform pattern

Table 1. The voice imitations graded according to the F0 means, for the whole utterance.

	F0 mean (Hz)
Ian Wachtmeister	97
Bengt Öste	105
Göran Gabrielsson	118
Hans Villius	119
Carl Lidbom	123
Olof Johansson	127
Bert Karlsson	127
Harald Treutiger	139
Alf Svensson	142
Kurt Olsson	151
Anders Björck	165
Carl Bildt	215
Ingvar Karlsson	255

Table 2. The voice imitations graded according to the F0 means, for the target word *mobilsvar*.

	F0 mean (Hz)
Bengt Öste	96
Ian Wachtmeister	99
Hans Villius	104
Göran Gabrielsson	116
Harald Treutiger	122
Carl Lidbom	126
Olof Johansson	133
Kurt Olsson	137
Alf Svensson	138
Bert Karlsson	151
Anders Björck	163
Carl Bildt	207
Ingvar Karlsson	243

for voices representing the same dialect. The measurement of the vowel length also present individual differences. Figures 3 and 4 show the average values of the formant frequencies of the vowels for each voice imitation.

The vowel [i:]. The auditory impression of ‘damped’ vowels in Swedish (‘Viby-i’) (Björsten et. al 1999) corresponds to the result in the acoustic analysis with an expected lower F2 and lower F4 (IW) than in the analysis of the other voices. According to the acoustic analysis it is obvious that a ‘damped’ vowel occurs in the imitation of AB as well. In the voice imitation of CB it is clear that F2 is lowered but F4 is not lowered.

The duration of the vowel differs between the voices. The differences seem to be individual since it is hard to find some similarity with other voices with the same dialect or speech style for example.

The vowel [a:]. There are evident individual differences between the formant frequencies in the *a*-vowel. The distance between F1 and F2 is more constant in each voice imitation compared to the relation between F1 and F2 in the *i*-vowel.

The individual duration differences of the vowel [A:] are larger than for the vowel [i:]. From 0,059 s (OJ) to 0,293 s (CB) for the *a*-vowel, and from 0,087 s (KO) to 0,176 s (IW) for the *i*-vowel. One explanation can be that the *a*-vowels with the longest duration occur when the word *mobilsvar* is focused at the end of a phrase (AB, AS, IK and IW). That is not the case for the imitation

Table 3. The duration and average value of the formant frequencies of the vowel [i:], in Hz.

	Duration (s)	F1	F2	F3	F4
G Gabrielsson	0,135	342,79	2142,43	2806,25	3308,04
Anders Björck	0,098	366,68	1989,27	2947,92	3094,50
Alf Svensson	0,164	284,35	2234,71	2504,13	3536,20
Bert Karlsson	0,112	485,89	2018,71	2824,53	3618,76
Bengt Öste	0,105	363,73	2105,62	3129,78	3739,21
Carl Bildt	0,155	486,26	1975,48	2922,46	3721,63
Carl Lidbom	0,102	347,49	2397,77	3000,72	4525,10
Harald Treutiger	0,152	299,17	2174,92	2969,70	3565,12
Hans Villius	0,143	279,19	2198,45	3214,73	4338,37
Ingvar Karlsson	0,110	282,85	2535,20	2910,28	4360,24
Ian Wachtmeister	0,176	363,29	1863,56	3006,78	3252,52
Kurt Olsson	0,087	349,61	2107,60	2965,72	3801,99
Olof Johansson	0,099	275,0	2304,51	2754,34	3762,19

Table 4. The duration and average value of the formant frequencies of the vowel [A:], in Hz.

	Duration (s)	F1	F2	F3	F4
G Gabrielsson	0,133	590,32	886,08	2300,29	3109,00
Anders Björck	0,212	761,49	1041,11	2561,98	3528,95
Alf Svensson	0,177	515,80	843,73	2790,69	3484,93
Bert Karlsson	0,048	677,45	1358,93	2635,08	3488,10
Bengt Öste	0,101	628,16	997,59	2704,91	3371,47
Carl Bildt	0,293	758,97	1064,08	2680,88	3472,64
Carl Lidbom	0,083	586,78	1027,38	2746,61	4489,79
Harald Treutiger	0,085	447,34	835,36	2528,47	3398,83
Hans Villius	0,145	525,21	830,30	2545,05	3057,86
Ingvar Karlsson	0,196	673,96	1061,96	2485,83	3456,22
Ian Wachtmeister	0,229	808,45	1102,04	2737,86	3477,04
Kurt Olsson	0,143	507,23	877,90	2288,07	3452,35
Olof Johansson	0,059	519,24	784,88	2672,21	3513,59

of CB, the target word is not phrase-final but stressed. To stress important words is a characteristic feature of the target speaker CB.

Waveform and spectrogram. Different voice qualities can be seen both in the waveform (Zetterholm 1999) and the spectrogram. In particular, a creaky voice quality is often easy to recognise. According to the auditory analysis the creaky voice qualities are observed in the waveforms, as well as in the spectrograms, of the voice imitations of BÖ, CL, HV and IW, but the time distribution of the creaky voices differs between the voices. The auditory impression of breathy voice qualities in the imitations of AB, CL and OJ are obvious in the acoustic analysis. The tense voice quality of IK is clear as well. The spectrograms of CB and IK show that the fundamental frequency is

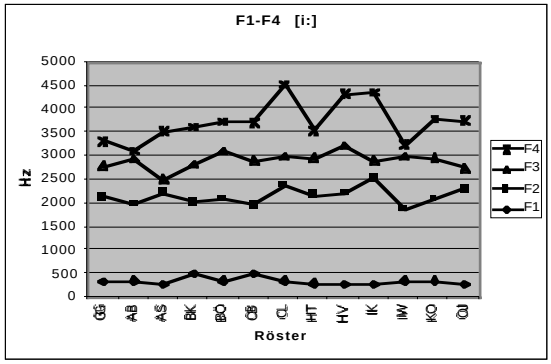

Figure 3. The mean values of F1-F4 of the vowel [i:].

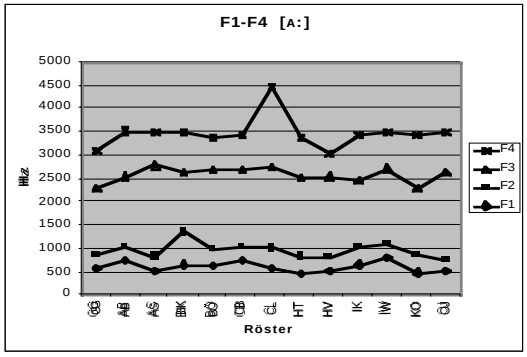

Figure 4. The mean values of F1-F4 of the vowel [A:]

weakened, which is often a characteristic feature of a tense voice quality (Lindblad 1992).

In the spectrogram, the duration of the segments in the target word *mobil-svar* is clear, for example for the long vowel [A:] in the imitation of CB. In the acoustic analysis it is obvious that the imitation of CL has a very long /m/ in the beginning of the target word corresponding to the auditory analysis.

According to the auditory analysis there are differences in the pronunciation of the *s*-segment in the word *mobilsvar* (see Figure 5). The lower limit of the frequencies of /s/ are different, but no measurement of the *s*-segments has been done.

Perception test

In order to get an objective judgement of the voice imitations a perception test was done. The test was designed on a Unix work station. The participants were asked to grade the voice imitations according to degree of success. The names of the target voices were given since the purpose of the test was not to identify the original voices. The test consisted of two parts. In the first part the participants listened to the target word, *mobilsvar*, and in the second part they listened to the whole utterance with the imitated voices. The listeners had to grade the voice imitations on a scale from 1 ‘not like the original voice at all’ to 5 ‘very close to the target voice’. The listener could choose ‘unknown’ if he/she was not familiar with the target voice. There were no comparison recordings with the original voices. The imitated voices were not presented in the same order in the different parts of the test. The participants were requested to comment on their judgements.

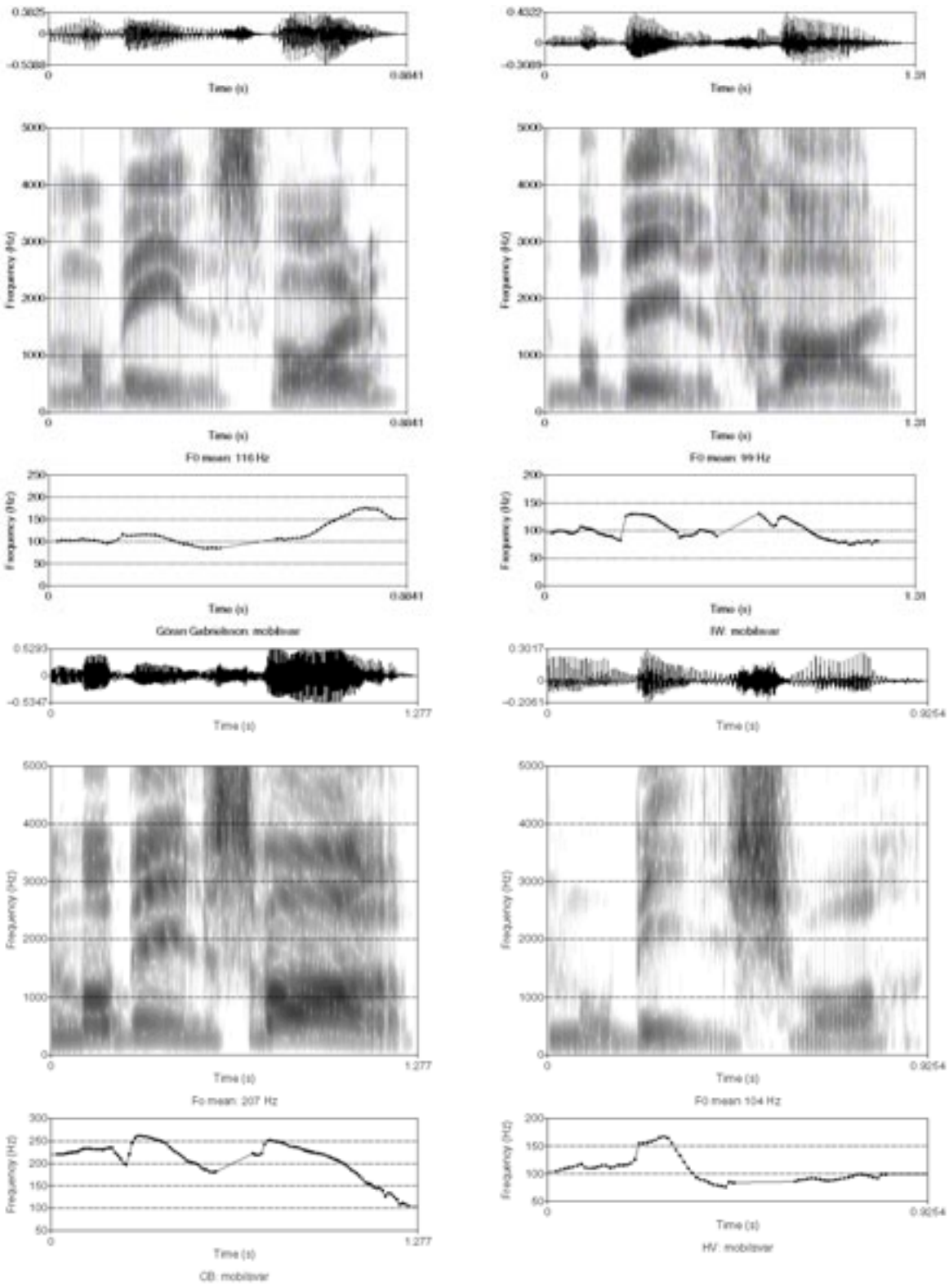

Figure 5. Four examples of different waveforms and spectrograms

Results of the perception test

Table 5. The mean judgement of the target word *mobilsvar*

Hans Villius	4,58
Carl Bildt	3,90
Carl Lidbom	3,69
Ian Wachtmeister	3,61
Bengt Öste	3,45
Ingvar Karlsson	3,40
Kurt Olsson	3,26
Anders Björck	2,83
Olof Johansson	2,79
Harald Treutiger	2,78
Bert Karlsson	2,67
Alf Svensson	2,45

Table 6. The mean judgement of the whole utterance

Hans Villius	4,75
Kurt Olsson	4,21
Carl Lidbom	4,00
Carl Bildt	3,95
Ian Wachtmeister	3,78
Harald Treutiger	3,24
Ingvar Karlsson	3,25
Alf Svensson	3,00
Bengt Öste	3,00
Bert Karlsson	2,95
Olof Johansson	2,80
Anders Björck	2,44

Generally the results show that most of the imitations received a higher grading in the second part of the test (whole utterance) than in the first part (one word), but typically there is not a big difference. The mean value of the judgement for each voice imitation is presented in Tables 5 and 6, graded according to ranking order. According to the comments from the participants voice quality, pronunciation of sound segments, such as vowels and the *r*-segment, and the intonation pattern seem to be important features, especially for estimating only the target word *mobilsvar*. When judging the whole utterance, the overall impression of the voice imitation is the most important thing according to the comments from the listeners.

The voice imitation of HV has the highest mean value in both tests. The impersonator is successful with the voice quality and speech style of the target speaker, according to comments from participants in the test. The mean values for the voice imitations of CB and CL are also high in both tests. The imitation of KO got a higher mean value for the whole utterance compared to the test with one word.

The number of ‘unknown’ voices is lower in the second part of the test with the whole utterance, 23 ‘unknown’ compared to 27 ‘unknown’ in the first part of the test, with one word. Some of the participants comment that the text was important to recognise the original speaker.

Discussion

Speech behaviour and the sounds of a person’s voice are cues for the listener about the speaker’s identity (Laver 1994). Personal style, like pronunciation and accent, make it possible for listeners to identify familiar voices. The results in this study suggest that it is possible to recognise imitated voices as well.

Listeners are aware of characteristic features of well-known voices, and the overall impression of the voice imitation is more important than separate segments. Individual and characteristic pronunciation of segments of the target speaker may be exaggerated in the voice imitation and that strengthens the impression of the imitation.

Almost all of the target speakers in this analysis have a dialect from the, south, southwest or eastern part of Sweden, according to Bruce & Gårding 1978. There are obvious differences between these dialects, especially the pronunciation of the *r*-segment, but even the intonation pattern differs. In speech, the listener gains information about the speaker, called attributive 'markers' by Laver & Trudgill 1979. One of the 'markers' are "social markers – those that indicate social characteristics such as regional affiliation, social and educational status, occupation and social role" (Laver 1994:14). In this study there are differences between the voices depending on the regional dialect, but speakers from the same area show obvious individual differences as well. There are obvious individual differences in the voice imitations and it is hard to find any uniform pattern compared to the dialect of the target speakers. The impersonator captures the individual differences very well in his voice imitations. The individual style is a combination of the regional and social identity, and one question is whether it is necessary for the impersonator to be aware of the features of the regional dialect to be able to point out the individual features to succeed with the voice imitation.

There are obvious different speech styles of the target speakers in this analysis. CL and KO represent a fast speech tempo and for the speakers BK, BÖ and HT the pace of speech is slower. A staccato-like rhythm also occurs as a characteristic feature of the speakers CB and HV. In these imitations, the impersonator shows his flexibility and we realise the importance of speech style for identifying the target voices. He even uses hedges and hesitation sounds as distinctive markers for the listener. The speech style of CB and IK in this analysis is a typical style for political speech.

Voice quality is a part of our personality but it is hard to describe different voice qualities in normal voices (Zetterholm 1999). There is no useful terminology for different voice qualities in normal voices. In this analysis only obvious voice qualities like nasal, breathy and creaky voice are mentioned. The auditory impression of pitch and voice quality is confirmed in the acoustic analysis. According to the auditory analysis the voices with a creaky voice quality, BÖ, CL, HV and IW, have the lowest fundamental frequency in the acoustic analysis and the two tense voices, CB and IK, seem to have a high

fundamental frequency, which correspond to the auditory analysis. The impression is that Gabrielsson is successful in imitating the different voice qualities even if it is possible to hear his own voice particularly in the beginning, the first syllable of the target word *mobilsvar,* in the voice imitations of AS and BÖ. According to the results of the perception test, voice quality seems to be an important feature in voice imitations.

Characteristic features such as the pronunciation of sound segments, especially the *r*-segment, are obvious in the imitations. There are quite big differences between the *r*-segment of the speakers in this analysis, depending both on regional and social dialects. For some of them it is an important individual feature, AB, CB and HV for example. Gabrielsson manages to copy this feature and he often exaggerates the *r*-segment in order to entertain and strengthen the impression of the voice imitation.

In these imitations the texts are created to suit vocabulary and other features of the target speaker, which strengthens the impression and it is also for entertainment. The results in the perception test show that the texts are important for the listener in recognising and judging a voice imitation. An imitation can be like a caricature with a lot of ‘overshoots’ and with some fails, ‘undershoots’ (Zetterholm 1997) in some features, but it does not seem to affect the overall impression.

Conclusion

This study indicates that this impersonator, Göran Gabrielsson, is very flexible in his voice imitations, and that he is aware of the characteristic features of the target voices and of other people’s impressions of these well-known Swedish voices. Many positive comments from the participants in the perception test also indicate that Gabrielsson is flexible and is able to capture characteristic features of the target speakers. For voice identification, phonetic habits are important since that is a part of a speaker’s individual style. To succeed with voice imitation it is necessary for the impersonator to be aware of the target voices and know how to change his own vocal tract in order to get close to the target voice. To strengthen the perceptual impression in voice imitations, the impersonator may use characteristic words and phrases of the target speakers. The results in this study indicate, however, that even a neutral word *mobilsvar* appears to be successfully imitated for most of the target speakers.

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