CHAPTER IV

FINDING AND DISCUSSION

4.1 Discussion

The correlation between the first formant (F1) and second formant (F2) values is vowel height and frontness and backness. It means that F1 have effect on the opening of jaw, and F2 have effect on the tongue body shape.

In this research, the writer concern with the formant values in the front vowels /ac/ in word "cat" and /e/ in word "ten". So, it has big deal with the formant values and the position of those vowels like in the following figure.



Figure. 4 Formant value

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Figure. 5 The tongue shape of front vowel



Based on those figure, it is already known that the higher the F2 value is the more front the tongue position and F1 affects the jaw opening. Basically, $/\alpha$ and /e can be differentiated based on the F1 value like in the following figure.



It happened because we know that F2 value of vowel /æ/ and /e/ is almost same. Both of them are mid front vowel. So, it means that the F2 value in this vowel is accepted as long as they have f2 value not too far from 1770 Hz and too less from 1660 Hz. It is a must because when it increase until around 2250 Hz , it will change its tongue body shape like /i/ and will change its body shape like /a/ when decrease until around 1660 Hz.

4.1.1 Participant 1



Based on the spectrograms above, it is known that the first participant produced 681 Hz for formant one and 1846 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 close on 700 Hz. It means that the height of the participant is deservedly. The opening of jaw is enough. Next, F2 value of the participant is enough. It is around 1660-1770 Hz. It means that the position of this vowel already in the mid-front vowel. So, it can be concluded that the articulation of this vowel is good.

- 1. Sound Participant_1 Pulses Formant Help File Edit Quen Select Spectrum Pitch Intensity 3.797212 4.098363 0.9944 -0.9943 5000 Hz 663 0 Hz078145 797212 6.176508 Visible part 6.176508 seconds Total duration 6.176508 seconds ▶ 🔽 Group all in out sel bak 🔒
- 2. Ten (F1 and F2)



Based on the spectrograms above, it is known that the first participant produced 663 Hz for formant one and 1716 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the participant produced F1 relatively high. It means that the opening of the jaw is too large. It is almost same with the height of vowel /æ/. Next, F2 value of the participant is deservedly. It is around 1660-1770 Hz. It means that this vowel already in the mid front position. So, based on the explanation above, it can be concluded that the articulation of this vowel is not good enough because the opening of the jaw is too large. It is like /æ/.

4.1.2 Participant 2



Based on the spectrograms above, it is known that the second participant produced 721 Hz for formant one and 1805 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 close on 700 Hz. It means that the height of the participant is deservedly. The opening of jaw is enough. Next, F2 value of the participant is also enough. It is around 1660-1770 Hz. It means that the position of this vowel already in the mid-front vowel position. So, it can be concluded that the articulation of this vowel is good.





Based on the spectrograms above, it is known that the second participant produced 602 Hz for formant one and 1686 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the participant produced F1 deservedly, it close to 530 Hz. It means that the opening of the jaw is enough although the jaw opening is somewhat large. Next, F2 value of the participant is also deservedly. It is around 1660-1770 Hz. It means that this vowel already in the mid frond position. So, it can be concluded that the articulation of this vowel is good enough.

4.1.3 Participant 3





Based on the spectrograms above, it is known that the third participant produced 854 Hz for formant one and 1621 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 close on 700 Hz. It means that the height of the participant is deservedly although the jaw opening is somewhat large. Next, F2 value of the participant is enough. It is around 1660-1770 Hz. It means that the position of this vowel is already in the mid-front vowel. So, it can be concluded that the articulation of this vowel is good enough.





Based on the spectrograms above, it is known that the third participant produced 752 Hz for formant one and 1612 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the participant produced F1 relatively high. It means that the opening of the jaw is too large. It is almost same with the height of vowel /æ/. Next, F2 value of the participant is deservedly. It is around 1660-1770 Hz. It means that the position of this vowel is already in the mid-front vowel. Based on the explanation above, it means that the articulation of this vowel is not good enough because the opening of the jaw is too large. It is like /æ/.

4.1.4 Participant 4





Based on the spectrograms above, it is known that the fourth participant produced 695 Hz for formant one and 1633 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 close on 700 Hz. It means that the height of the participant is deservedly. The opening of jaw is enough. Next, F2 value of the participant is enough. It is around 1660-1770 Hz. It means that the position of this vowel already in the mid-front vowel. So, it can be concluded that the articulation of this vowel is good enough.

- 4. Sound participan 4 Intensity Formant File Edit Query Select Spectrum Pitch Pulses Help 3.893896 4.192782 0.9944 -0.9944 5000 Hz 703 H 0 Hz 2.494565 .893896 Visible part 6.687347 seconds 6.687347 Total duration 6.687347 seconds all in out sel bak ┥ 🖌 🔽 Group
- 2. Ten (F1 and F2)



Based on the spectrograms above, it is known that the fourth participant produced 703 Hz for formant one and 1814 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the participant produced F1 relatively high. It means that the opening of the jaw is too large. It is almost same with the height of vowel /æ/. Next, F2 value of the participant is deservedly. It is around 1660-1770 Hz. So, it was already in the mid front position. Based on the explanation above, it can be concluded that the articulation of this vowel is not good enough because the opening of the jaw is too large. It is like /æ/.

4.1.5 Participant 5



Based on the spectrograms above, it is known that the fifth participant produced 835 Hz for formant one and 1954 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 close on 700 Hz. It means that the height of the participant is deservedly although the jaw opening is somewhat large. Next, F2 value of the participant is deservedly although this frequency is somewhat high. It is around 1660-1770 Hz. It means that the position of this vowel is still in the mid-front vowel position. So, it can be concluded that the articulation of this vowel is good enough.





Based on the spectrograms above, it is known that the fifth participant produced 722 Hz for formant one and 1810 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the participant produced F1 relatively high. It means that the opening of the jaw is too large. It is almost same with the height of vowel /æ/. Next, F2 value of the participant is deservedly. It is around 1660-1770 Hz. So, it was already in the mid low position. Based on the explanation above, it can be concluded that the articulation of this vowel is not good enough because the opening of the jaw is too large. It is like /æ/.

4.1.6 Participant 6



Based on the spectrograms above, it is known that the sixth participant produced 743 Hz for formant one and 1956 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 close on 700 Hz. It means that the height of the participant is deservedly .The opening of jaw is enough. Next, F2 value of the participant is also deservedly although this frequency is somewhat high. It is around 1660-1770 Hz. It means that the position of this vowel is still in the mid-front vowel position. So, it can be concluded that the articulation of this vowel is good enough.





Based on the spectrograms above, it is known that the sixth participant produced 635 Hz for formant one and 1774 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the participant produced F1 too high. It means that the opening of the jaw is large. Next, F2 value of the participant is deservedly. It is around 1660-1770 Hz. It means that this vowel already in the mid frond position. Based on the explanation above, it can be concluded that the articulation of this vowel is not good enough because the opening of the jaw is large. It is like /æ/.

4.1.7 Participant 7



Based on the spectrograms above, it is known that the seventh participant produced 805 Hz for formant one and 1851 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 close on 700 Hz. It means that the height of the participant is deservedly although the jaw opening is somewhat large. Next, F2 value of the participant is enough. It is around 1660-1770 Hz. It means that the position of this vowel already in the mid-front vowel position. So, it can be concluded that the articulation of this vowel is good enough.





Based on the spectrograms above, it is known that the seventh participant produced 700 Hz for formant one and 1823 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the participant produced F1 relatively high. It means that the opening of the jaw is too large. It is almost same with the height of vowel /æ/. Next, F2 value of the participant is deservedly. It is around 1660-1770 Hz. So, it is already in the mid front position. Based on the explanation above, it can be concluded that the articulation of this vowel is not good enough because the opening of the jaw is too large. It is like /æ/.

4.1.8 Participant 8



Based on the spectrograms above, it is known that the eight participant produced 795 Hz for formant one and 1420 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 close on 700 Hz. It means that the height of the participant is deservedly although the jaw opening is somewhat large. Next, F2 value of the participant is enough. It means that the position of this vowel is still in the mid-front vowel position. So, it can be concluded that the articulation of this vowel is good enough.





Based on the spectrograms above, it is known that the eight participant produced 694 Hz for formant one and 1578 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the participant produced F1 relatively high. It means that the opening of the jaw is too large. It is almost same with the height of vowel /æ/. Next, F2 value of the participant is deservedly. It is around 1660-1770 Hz. It means that the position of this vowel is already in the mid-front vowel. Based on the explanation above, it means that the articulation of this vowel is not good enough because the opening of the jaw is too large. It is like /æ/.

4.1.9 Participant 9



Based on the spectrograms above, it is known that the ninth participant produced 858 Hz for formant one and 1741 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 close on 700 Hz. It means that the height of the participant is deservedly although the jaw opening is somewhat large. Next, F2 value of the participant is enough. It is around 1660-1770 Hz. It means that the position of this vowel is already in the mid-front vowel. So, it can be concluded that the articulation of this vowel is good enough.





Based on the spectrograms above, it is known that the ninth participant produced 897 Hz for formant one and 1793 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the participant produced F1 relatively high. It means that the opening of the jaw is too large. It is almost same with the height of vowel /æ/. Next, F2 value of the participant is deservedly. It is around 1660-1770 Hz. So, it was already in the mid front position. Based on the explanation above, it can be concluded that the articulation of this vowel is not good enough because the opening of the jaw is too large. It is like /æ/.

4.1.10 Participant 10



Based on the spectrograms above, it is known that the tenth participant produced 599 Hz for formant one and 1699 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 relatively low. It means that the height of the participant is not deservedly. The jaw opening is not enough. Next, F2 value of the participant is enough. It is around 1660-1770 Hz. It means that the position of this vowel is already in the mid-front vowel. Based on the explanation above, it can be concluded that the articulation of this vowel is not good enough because the jaw opening is not enough. It is like vowel /e/.





Based on the spectrograms above, it is known that the tenth participant produced 609 Hz for formant one and 1621 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the F1 of the participant is deservedly, it close to 530 Hz. It means that the opening of the jaw is enough although the jaw opening is somewhat large. Next, F2 value of the participant is also deservedly. It is around 1660-1770 Hz. It means that this vowel already in the mid frond position. So, it can be concluded that the articulation of this vowel is good enough.

4.1.11 Participant 11



Based on the spectrograms above, it is known that the eleventh participant produced 609 Hz for formant one and 1796 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 relatively low. It means that the height of the participant is not deservedly. The jaw opening is not enough. Next, F2 value of the participant is enough. It is around 1660-1770 Hz. It means that the position of this vowel is already in the mid-front vowel. Based on the explanation above, it can be concluded that the articulation of this vowel is not good enough because the jaw opening is not enough. It is like vowel /e/.





Based on the spectrograms above, it is known that the eleventh participant produced 628 Hz for formant one and 1687 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the participant produced F1 too high, it close to $/\alpha$ / frequency. It means that the opening of the jaw is too large for /e/. Next, F2 value of the participant is deservedly. It is around 1660-1770 Hz. It means that this vowel already in the mid frond position. Based on the explanation above, it can be concluded that the articulation of this vowel is not good enough because the opening of the jaw is too large. It is like $/\alpha$ /.

4.1.12 Participant 12



Based on the spectrograms above, it is known that the twelfth participant produced 686 Hz for formant one and 1833 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 close on 700 Hz. It means that the height of the participant is deservedly. The jaw opening is enough .Next, F2 value of the participant is enough. It is around 1660-1770 Hz. It means that the position of this vowel already in the mid-front vowel. So, it can be concluded that the articulation of this vowel is good enough.

- 12. Sound Participant_12 File Pitch Intensity Formant Pulses Help Edit Query Select Spectrum 2.970128 2.760681 0.9943 -0.9942 5000 Hz 681 Hz 0 Hz 760681 184702 5.154830 Visible part 5.154830 seconds Total duration 5.154830 seconds Group all in out sel bak 🖌
- 2. Ten (F1 and F2)



Based on the spectrograms above, it is known that the twelfth participant produced 681 Hz for formant one and 1737 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the participant produced F1 relatively high. It means that the opening of the jaw is too large. It is almost same with the height of vowel $/\alpha$ /. Next, F2 value of the participant is deservedly. It is around 1660-1770 Hz. So, it was already in the mid front position. Based on the explanation above, it can be concluded that the articulation of this vowel is not good enough because the opening of the jaw is too large. It is like $/\alpha$ /.

4.1.13 Participant 13



Based on the spectrograms above, it is known that the thirteenth participant produced 766 Hz for formant one and 1729 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 close on 700 Hz. It means that the height of the participant is deservedly although the jaw opening is somewhat large. Next, F2 value of the participant is enough. It is around 1660-1770 Hz. It means that the position of this vowel is already in the mid-front vowel. So, it can be concluded that the articulation of this vowel is good enough.





Based on the spectrograms above, it is known that the thirteenth participant produced 630 Hz for formant one and 1787 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the participant produced F1 too high, it close to $/\alpha$ / frequency. It means that the opening of the jaw is too large for /e/. Next, F2 value of the participant is deservedly. It is around 1660-1770 Hz. It means that this vowel already in the mid frond position. Based on the explanation above, it can be concluded that the articulation of this vowel is not good enough because the opening of the jaw is too large. It is like $/\alpha$ /.

4.1.14 Participant 14



Based on the spectrograms above, it is known that the fourteenth participant produced 693 Hz for formant one and 1858 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 close on 700 Hz. It means that the height of the participant is deservedly. The jaw opening is enough. Next, F2 value of the participant is enough. It is around 1660-1770 Hz. It means that the position of this vowel already in the mid-front vowel. So, it can be concluded that the articulation of this vowel is good enough.





Based on the spectrograms above, it is known that the fourteenth participant produced 594 Hz for formant one and 1687 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the participant produced F1 deservedly, it close to 530 Hz. It means that the opening of the jaw is enough. Next, F2 value of the participant is also deservedly. It is around 1660-1770 Hz. It means that this vowel already in the mid frond position. It can be concluded that the articulation of this vowel is good enough.

4.1.15 Participant 15



Based on the spectrograms above, it is known that the fifteenth participant produced 512 Hz for formant one and 1727 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 relatively low. It means that the height of the participant is not deservedly. The jaw opening is not enough. Next, F2 value of the participant is enough. It is around 1660-1770 Hz. It means that the position of this vowel is already in the mid-front vowel. Based on the explanation above, it can be concluded that the articulation of this vowel is not good enough because the jaw opening is not enough. It is like vowel /e/.





Based on the spectrograms above, it is known that the fifteenth participant produced 578 Hz for formant one and 1584 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the participant produced F1 deservedly, it close to 530 Hz. It means that the opening of the jaw is enough. Next, F2 value of the participant is also deservedly. It is around 1660-1770 Hz. It means that this vowel already in the mid frond position. So, it can be concluded that the articulation of this vowel is good enough.

4.1.16 Participant 16



Based on the spectrograms above, it is known that the sixteenth participant produced 734 Hz for formant one and 1806 Hz for formant two in word Cat. Based on those frequencies, it can be concluded that the participant produced F1 close on 700 Hz. It means that the height of the participant is deservedly. The jaw opening is enough. Next, F2 value of the participant is also enough. It is around 1660-1770 Hz. It means that the position of this vowel already in the mid-front vowel. So, it can be concluded that the articulation of this vowel is good enough.





Based on the spectrograms above, it is known that the sixteenth participant produced 738 Hz for formant one and 1685 Hz for formant two in word ten. Based on those frequencies, it can be concluded that the participant produced F1 relatively high. It means that the opening of the jaw is too large. It is almost same with the height of vowel /æ/. Next, F2 value of the participant is deservedly. It is around 1660-1770 Hz. It means that the position of this vowel is already in the mid-front vowel. Based on the explanation above, it means that the articulation of this vowel is not good enough because the opening of the jaw is too large. It is like /æ/.

4.2 Finding

VOWEL	PARTICIPANTS	QUALITY		PERCENTAGE			
		Correct	Incorrect	Correct	Incorrect		
Cat /æ/	Participant 1	✓ ✓		81,25 %	18,75 %		
	Participant 2	V					
	Participant 3	V	S				
	Participant 4	\checkmark					
	Participant 5	×					
	Participant 6	×					
	Participant 7	~					
	Participant 8	✓					
	Participant 9	√					
	Participant 10		 ✓ 				
	Participant 11		✓				
	Participant 12	✓					
	Participant 13	✓					
	Participant 14	✓					
	Participant 15		✓				
	Participant 16	\checkmark					
100%							

✓ : Correct

✓ : Like /e/

This figure shows sixteen participants who pronounce /ac/. There are thirteen participants who pronounce /ac/ correctly and there are three participants who pronounce it incorrectly. Four of them are pronounce it like /c/. It is incorrect because the height of those four participants is not enough. It means that the jaw opening is not enough.

VOWEL	PARTICIPANTS	QUALITY		PERCENTAGE		
		TICIPANTS	Correct	Incorrect	Correct	Incorrect
Ten /e/	PAR Parti Parti Parti Parti Parti Parti Parti Parti Parti	TICIPANTS icipant 1 icipant 2 icipant 3 icipant 4 icipant 5 icipant 6 icipant 7 icipant 8 icipant 9 icipant 10 icipant 11	Correct ✓	Incorrect	Correct	75%
	Part	icipant 12		~		
	Part	icipant 13		✓		
	Parti	icipant 14	✓			
	Parti	icipant 15	✓			
	Participant 16			 ✓ 		
					100 %	
L	_		1	1		

✓ : Correct

✓ : Like /æ/

This figure shows sixteen participants who pronounce /e/. There are four participants who pronounce /e/ correctly and there are 12 participants who pronounce it incorrectly. Twelve of them are pronounce it like $/\alpha$ /. It is incorrect because the height of those twelve participants is high. The jaw opening is too large. It happens because their F1 is high like F1 of $/\alpha$ /.