



民航局航空医学中心 *Civil Aviation Medicine Center, CAAC*



Development of Mandarin Speech Test Materials for Chinese Civilian Pilots

Mosheng Hu

Civil Aviation Medical Center

Beijing, China

2018.11.12





Background--Motivation and Problem Statement

- Communication is crucial for aircraft safety
- Hearing loss will bring risks to pilots
- Current audiological test method of CAAC has faults
- Experience can make up the effect of hearing loss
- Using occupational stimuli is a meaningful effort
- Directly relate to the “real world” job performance





Methods

Select language database

Edit sentence lists

Record stimuli audio

Equivalence verification

Formalize pass/fail criteria

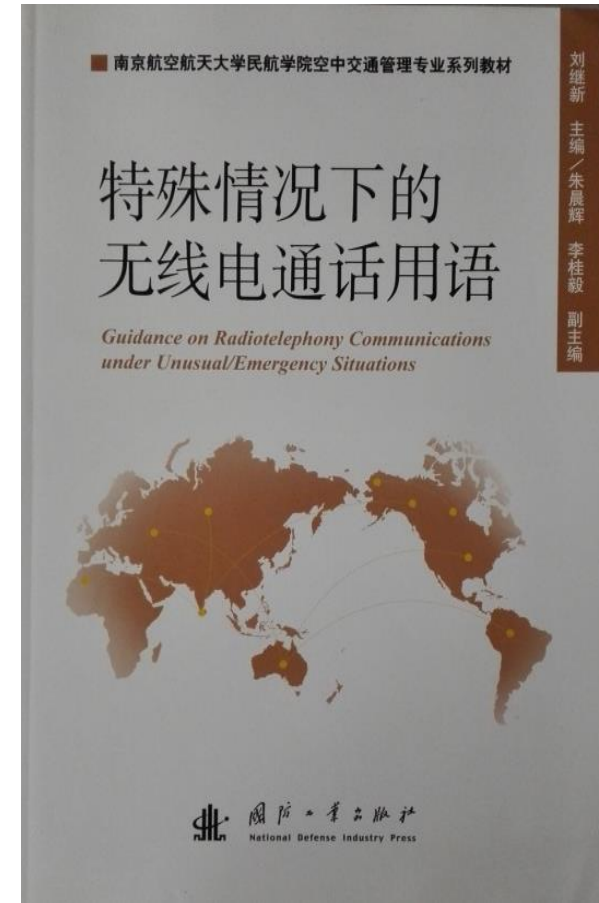
short-term goal

long-term goal



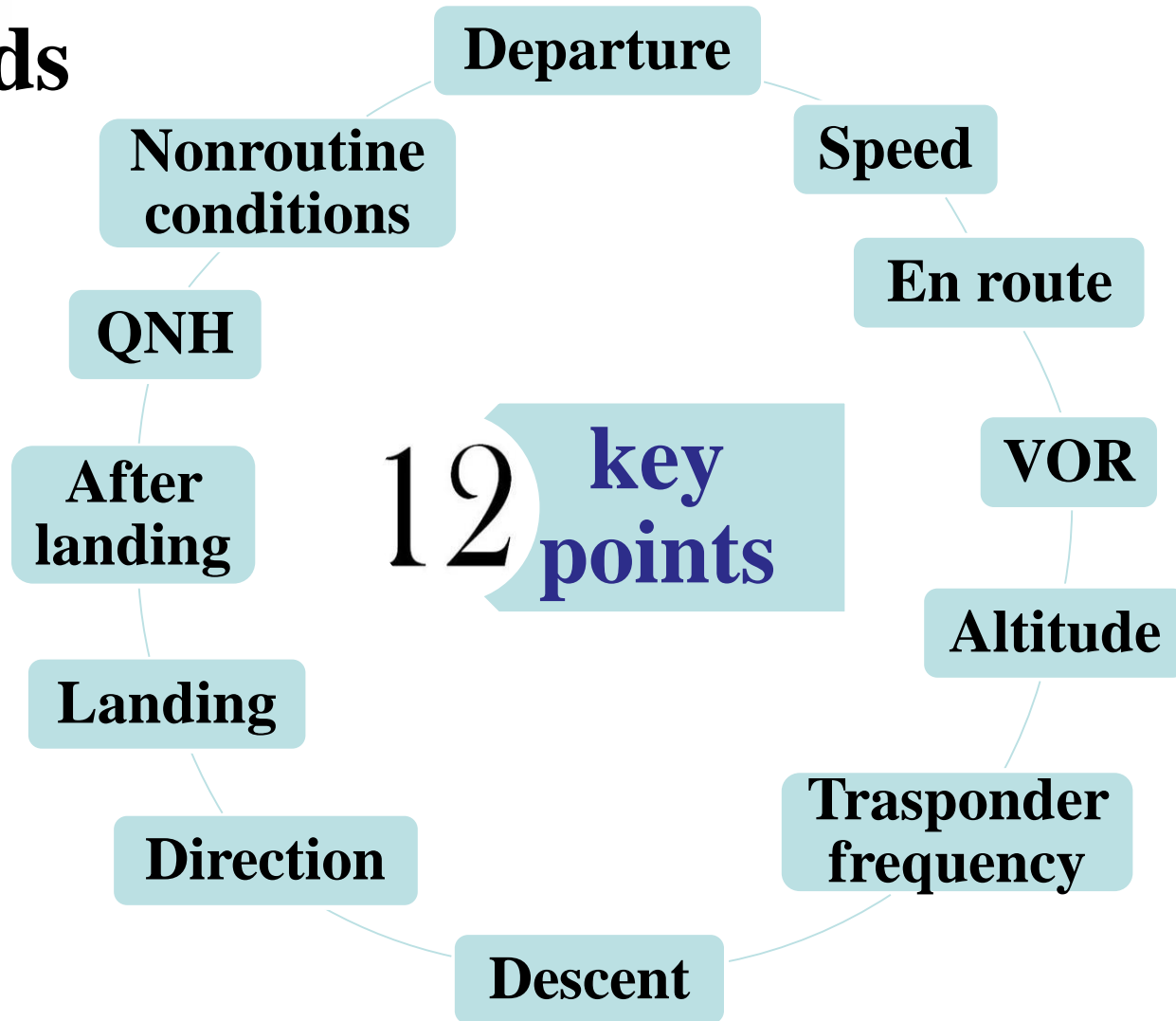


Methods—The potential speech corpus





Methods



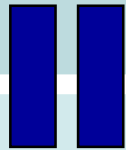


Results--Preliminary sentence list size

20



20



400

- lists have been edited

- sentences for each list

- sentences in total





Results--Basic characteristics of 40 subjects

n=40	M	Minimum	Maximum	SD
Age (years)	23.7	21	26	1.4
Total flight hours (h)	229.6	205	279	27.3
PTA (dB HL)	10.6	6.3	16.3	2.5





Results--Mean word recognition score(WRS)

List	5 dB HL	7 dB HL	9 dB HL	11 dB HL	13 dB HL	15 dB HL
1	10.67±11.27	24.67±13.41	60.33±22.13	80.00±11.97	86.00±12.08	92.00±6.72
2	11.17±11.69	39.50±26.17	46.17±27.56	84.33±9.33	91.83±6.85	93.50±2.66
3	18.83±24.69	28.33±29.89	65.33±19.82	79.83±17.97	91.50±4.42	93.00±6.82
...
19	24.67±16.69	47.00±19.15	49.33±25.67	69.33±13.34	85.33±8.78	89.83±6.15
20	36.00±17.78	30.83±21.10	54.67±23.66	87.00±8.49	90.50±6.89	97.00±2.68
M	19.17±18.68	36.14±23.32	58.79±22.77	78.53±15.07	88.49±9.28	93.25±5.46





Results -- Equivalence verification

Presentation Level (dB HL)	Type III Sum of Squares	df	Mean Square	<i>F</i>	<i>p</i>
5	5607.333	19	295.123	0.822	0.677
7	6149.425	19	323.654	0.553	0.930
9	7112.958	19	374.366	0.686	0.825
11	4542.758	19	239.093	1.063	0.400
13	1040.825	19	54.780	0.595	0.902
15	490.167	19	25.798	0.845	0.649





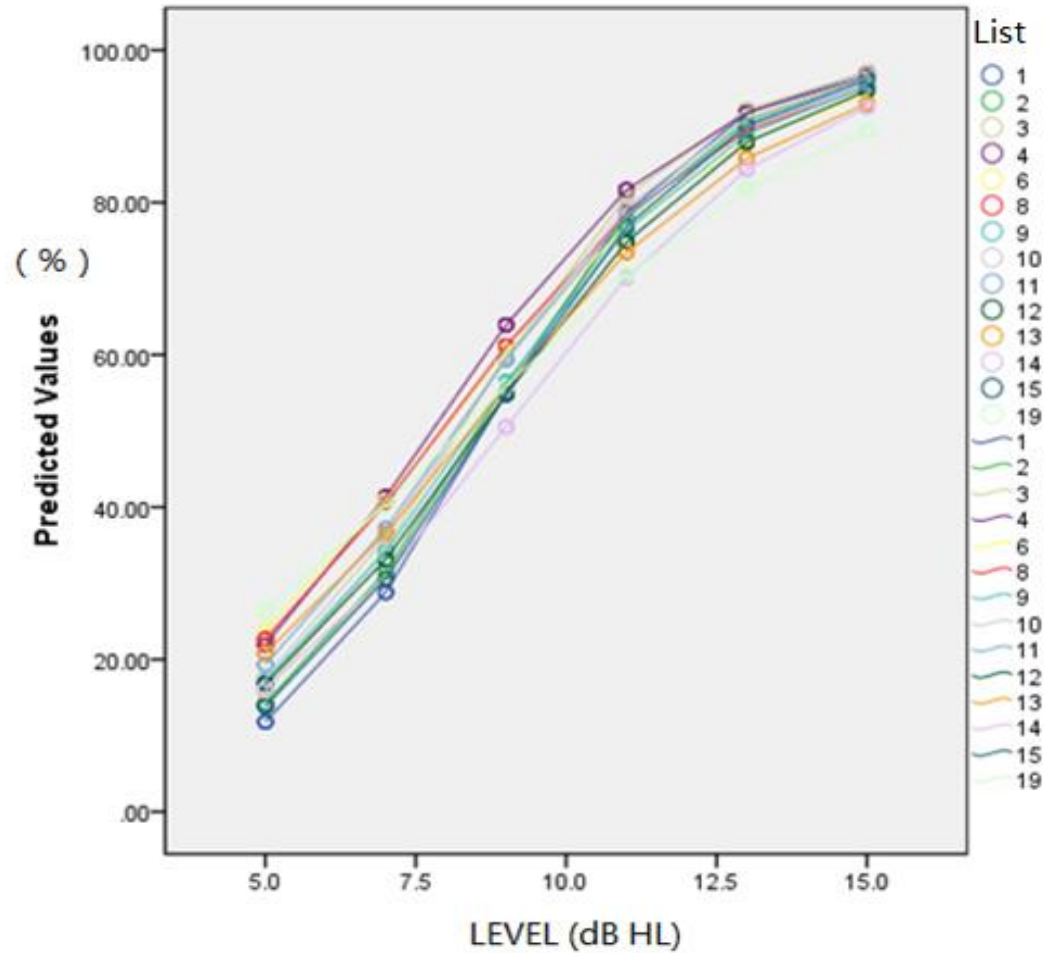
Results--Mean performance of sentence lists

List	a	B	Slope at 50%	Slope From 20 to 80%	Threshold
1	-4.78	0.55	13.83	5.94	8.64
2	-4.35	0.51	12.75	6.14	8.52
...
20	-3.24	0.41	10.28	4.64	7.89
M	-3.73	0.45	11.34	4.50	8.22
Min	-4.87	0.32	7.90	2.66	7.69
Max	-2.61	0.60	14.88	7.74	8.95
Range	2.26	0.28	6.98	5.08	1.26
SD	0.67	0.07	1.84	1.29	0.35





Results -- Logistic Regression and P-I Functions





Conclusion

- 14 sentence lists left
- The difficulty level is equivalent
- Can be used for further research





民航局航空医学中心 *Civil Aviation Medicine Center, CAAC*

THANK YOU FOR YOUR ATTENTION

