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Expression and recognition of emotion in native and foreign speech : the case of Mandarin and Dutch

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Citation

Zhu, Y. (2013, December 12). *Expression and recognition of emotion in native and foreign speech : the case of Mandarin and Dutch*. LOT dissertation series. Retrieved from <https://hdl.handle.net/1887/22850>

Version: Corrected Publisher's Version

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Cover Page



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Issue Date: 2013-12-12

Appendices

Appendix 1 (a). Instruction and answering card for the perception experiment of the Chinese emotional prosody by native Chinese listeners (instructed in Chinese).²⁰

中文情感语句听力感知测试

请您如实填写下列内容。

姓别:

年龄:

母语:

解释说明: 此次试验中, 您将听到 144 个中文情感语句, 共包括 6 种情感: 中性 (无情感的陈述句), 高兴, 生气, 吃惊, 伤心和讽刺。请您在听到一个情感语句后马上从所给选项中做出选择, 并且对所听到的情感句子做出可信度评分。可信度分值为: 3—2—1。每题只有一个正确答案, 所以不可多选或不选。但可信度分值请仅凭您的感觉评断, 其没有正确答案。句与句之间间隔时间为 6 秒。

可信度评分: 3: 说话人非常好地表达了情感, 我很肯定我的答案
2: 说话人一般地表达了情感, 我不太肯定我的答案
1: 说话人完全没有适当地表达情感, 我完全凭猜测来辨别

²⁰ This answering card was used for the perception experiment of the Chinese emotional prosody produced by both Chinese native and Dutch L2 speakers of Chinese. In the perception of L2-produced Chinese emotional prosody there were only 96 choices, since two sentences were discarded. It was also re-used by the Chinese novice listeners in the third judgment study with another title (in Chinese): Perception experiment of emotional prosody in an unknown language.

例子:

	中性	高兴	生气	吃惊	伤心	讽刺	可信度?
1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3
2.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2

中文情感语句听力感知测试答题卡

	中性	高兴	生气	吃惊	伤心	讽刺	可信度?
1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	中性	高兴	生气	吃惊	伤心	讽刺	可信度?
...							
143.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
144.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

感谢您的参与!

Appendix 1 (b). Instruction and answering card for the perception experiment of the Chinese emotional prosody produced by native Chinese (instructed in listeners' native language - Dutch).²¹

Waarnemingsexperiment:

Vocale emotie in een vreemde taal

Uw geslacht: man vrouw

Uw leeftijd: _____

Uw moedertaal: _____

Instructie

U hoort aanstonds 144 korte zinnen in het Chinees die een emotie of attitude (standpunt van de spreker ten opzichte van de verbale inhoud van de boodschap) uitdrukken. Er zijn zes beoogde emoties/attitudes: *neutraal* (geen emotie of attitude), *blij*, *boos*, *verbaasd*, *verdrietig* en *sarcastisch*. Direct nadat u een zin heeft gehoord, maakt u een keuze welke emotie u denkt dat de spreker probeerde uit te drukken. U moet hierbij kiezen uit een van de zes gegeven mogelijkheden. U mag niet twee of meer emoties kiezen of een regel blanco laten. De zes mogelijkheden worden op het antwoordvel steeds duidelijk aangeven

Tevens vragen wij u in de meest rechtse kolom op het antwoordblad steeds met een cijfer aan te geven hoe zeker u bent van uw keuze:

²¹ This answering card was used by both the naïve Dutch listeners and advanced Dutch learners of Chinese for the perception experiment of the Chinese emotional prosody produced by Dutch L2 speakers of Chinese, but only with 96 choices, since two sentences were discarded in this experiment. It was also re-used by the Dutch native listeners in the third judgment study with another title: Waarnemingsexperiment: Vocale emotie in Nederlandse taal.

Cijfer 3: De spreker heeft de emotie zeer sterk uitgedrukt; ik ben heel zeker van mijn antwoord.

Cijfer 2: De spreker heeft de emotie matig duidelijk uitgedrukt; ik ben matig zeker van mijn antwoord.

Cijfer 1: De spreker heeft de emotie zwak uitgedrukt; ik kon eigenlijk slechts gissen.

U heeft per zin zes seconde de tijd om uw keuze te maken en een cijfer in te vullen.

Voorbeelden:

	Neutraal	Blij	Boos	Verbaasd	Verdrietig	Sarcastisch	Zekerheid?
1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3
2.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2

Antwoordblad in het Nederlands

	Neutraal	Blij	Boos	Verbaasd	Verdrietig	Sarcastisch	Zekerheid?
1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Neutraal	Blij	Boos	Verbaasd	Verdrietig	Sarcastisch	Zekerheid?
11.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
14.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
...							
143.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
144.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Einde van het experiment. Dank u wel voor uw medewerking.

Appendix 1 (c). Instruction and answering card for the perception experiment of the Chinese emotional prosody by native Chinese listeners (English translation).

Perception Experiment of Chinese Emotional Prosody²²

Your sex: male female

Your age:

Your mother tongue:

Instruction

You will hear 144 short sentences expressed in different emotions in this perception experiment. There will be six emotions in the experiment: neutral (no emotion), happy, angry, surprised, sad and sarcastic. Please choose the intended emotion of the speaker from the six given emotions immediately after you hear a stimulus. There will be only one correct answer for each sentence, so you are not allowed to choose more than one emotion or leave an answer empty. Meanwhile, you are asked to give your confidence rating for your answer for each sentence. The confidence rating is a 3-2-1 scale. There is no correct answer for the confidence rating. There will be six seconds pause between the stimuli for you to choose a correct answer.

Confidence rating:

Confident (3): The speaker expressed the intended emotion well. I am very confident in my answer'

Middle confident (2): The speaker reasonably expressed the intended emotion. But I am not so sure about my answer.

Not confident (1): The speaker did not express the intended emotion very well. I made the choice only by guessing.

²² The English title for Appendix 1(b) is *Perception Experiment of Emotional Prosody in a Foreign Language*. Since the answering sheet was originally designed for both native and non-native listeners of Chinese, the titles were slightly different.

Examples:

	Neutral	Happy	Angry	Surprised	Sad	Sarcastic	Confidence?
1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3
2.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2

Answering sheet in English

	Neutral	Happy	Angry	Surprised	Sad	Sarcastic	Confidence?
1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Neutral	Happy	Angry	Surprised	Sad	Sarcastic	Confidence?
11.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
...							
143.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
144.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Thank you for your participation!

Appendix 2. Subgroups differentiated by the eight acoustic parameters: tempo, F0_mean, SD_ F0, slope of F0, compactness, SD_intensity, jitter and HNR (Bonferroni post-hoc procedure).

Appendix 2.1 Subgroups differentiated by tempo.

Zscore: Tempo Language = Dutch				
Emot	N	Subset for alpha =.05		
		1	2	
Neutral	16	-.358		
Surprised	16	-.293		
Sad	16	-.261		
Happy	16	-.202		
Angry	16	.378		.378
Sarcastic	16			.736
p =		.165		.273
Zscore: Tempo Language = L2_Mand				
Emot	N	Subset for alpha =.05		
		1		
Surprised	16			-.287
Happy	16			-.242
Neutral	16			-.144
Angry	16			.107
Sarcastic	16			.253
Sad	16			.313
p =				.517
Zscore: Tempo Language = Mandarin				
Emot	N	Subset for alpha =.05		
		1	2	3
Surprised	16	-.711		
Happy	16	-.512		
Neutral	16	-.214	-.214	
Angry	16	.013	.013	
Sarcastic	16		.399	
Sad	16			1.025
p =		.064	.089	1.000

Appendix 2.2 Subgroups differentiated by F0_mean.

Zscore: F0_mean Language = Dutch						
Emot	N	Subset for alpha = .05				
		1	2			
Neutral	16	-.699				
Surprised	16	-.513				
Sad	16	-.502				
Happy	16	-.050				
Angry	16				.856	
Sarcastic	16				.909	
p =		.077			.841	
Zscore: F0_mean Language = L2_Mand						
Emot	N	Subset for alpha = .05				
		1	2	3	4	
Surprised	16	-.750				
Happy	16	-.520	-.520			
Neutral	16	-.374	-.374			
Angry	16		.122	.122		
Sarcastic	16			.473		
Sad	16				1.050	
p =		.366	.058	.207	1.000	
Zscore: F0_mean Language = Mandarin						
Emot	N	Subset for alpha = .05				
		1	2	3	4	5
Surprised	16	-1.20				
Happy	16		-.811			
Neutral	16			-.184		
Angry	16				.356	
Sarcastic	16					.769
Sad	16					1.070
p =		1.00	1.00	1.00	1.00	.123

Appendix 2.3 Subgroups differentiated by SD_F0.

Zscore: SD_F0 Language = Dutch					
Emot	N	Subset for alpha = .05			
		1	2	3	
Neutral	16	-.815			
Surprised	16	-.772			
Sad	16		-.206		
Happy	16		.021		
Angry	16			.714	
Sarcastic	16			1.06	
p =		.862	.369	.172	
Zscore: SD_F0 Language = L2_Mand					
Emot	N	Subset for alpha = .05			
		1	2	3	4
Surprised	16	-.985			
Happy	16	-.468	-.468		
Neutral	16		-.159	-.159	
Angry	16			.243	.243
Sarcastic	16			.636	
Sad	16			.734	
p =		.069	.273	.156	.192
Zscore: SD_F0 Language = Mandarin					
Emot	N	Subset for alpha = .05			
		1	2	3	
Surprised	16	-.887			
Happy	16	-.444	-.444		
Neutral	16		.132	.132	
Angry	16		.170	.170	
Sarcastic	16		.276	.276	
Sad	16			.754	
p =		.144	.086	.171	

Appendix 2.4 Subgroups differentiated by slope of F0.

Zscore: Slope of F0 Language = Dutch				
		Subset for alpha = .05		
Emot	N	1		
Neutral	16	-.348		
Surprised	16	-.335		
Sad	16	-.155		
Happy	16	-.027		
Angry	16	.276		
Sarcastic	16	.632		
p =		.061		
Zscore: Slope of F0 Language = L2_Mand				
		Subset for alpha = .05		
Emot	N	1		
Surprised	16	-.564		
Happy	16	-.089		
Neutral	16	.115		
Angry	16	.161		
Sarcastic	16	.192		
Sad	16	.219		
p =		.296		
Zscore: Slope of F0 Language = Mandarin				
		Subset for alpha = .05		
Emot	N	1	2	3
Surprised	16	-.962		
Happy	16		-.251	
Neutral	16		-.142	-.142
Angry	16		.257	.257
Sarcastic	16		.462	.462
Sad	16			.646
p =		1.000	.104	.059

Appendix 2.5 Subgroups differentiated by compactness.

Zscore: Compactness Language = Dutch				
Emot	N	Subset for alpha = .05		
		1	2	
Neutral	16	-.535		
Surprised	16	-.288		-.288
Sad	16	-.045		-.045
Happy	16	-.018		-.018
Angry	16			.412
Sarcastic	16			.474
p =		.411		.158
Zscore: Compactness Language = L2 Mand				
Emot	N	Subset for alpha = .05		
		1	2	
Surprised	16	-.789		
Happy	16	-.203		-.203
Neutral	16			.080
Angry	16			.168
Sarcastic	16			.260
Sad	16			.485
p =		.075		.222
Zscore: Compactness Language = Mandarin				
Emot	N	Subset for alpha = .05		
		1	2	3
Surprised	16	-.721		
Happy	16	-.453	-.453	
Neutral	16		.122	.122
Angry	16		.252	.252
Sarcastic	16		.310	.310
Sad	16			.489
p =		.405	.088	.663

Appendix 2.6 Subgroups differentiated by SD_intensity.

Zscore: SD_intensity Language = Dutch			
Emot	N	Subset for alpha = .05	
		1	2
Neutral	16	-.620	
Surprised	16	-.247	
Sad	16	-.168	
Happy	16	.119	.119
Angry	16	.185	.185
Sarcastic	16		.731
p =		.101	.146
Zscore: SD_intensity Language = L2 Mand			
Emot	N	Subset for alpha = .05	
		1	2
Surprised	16	-.571	
Happy	16	-.212	-.212
Neutral	16	-.193	-.193
Angry	16	-.086	-.086
Sarcastic	16		.501
Sad	16		.561
p =		.449	.132
Zscore: SD_intensity Language = Mandarin			
Emot	N	Subset for alpha = .05	
		1	
Surprised	16		-.357
Happy	16		-.046
Neutral	16		-.036
Angry	16		.058
Sarcastic	16		.143
Sad	16		.239
p =			.536

Appendix 2.7 Subgroups differentiated by jitter.

Zscore: Jitter Language = Dutch				
Emot	N	Subset for alpha = .05		
		1	2	
Neutral	16	-.493		
Surprised	16	-.210		
Sad	16	-.184		
Happy	16	-.129		
Angry	16	.113		
Sarcastic	16			.902
p =		.325		1.00
Zscore: Jitter Language = L2_Mand				
Emot	N	Subset for alpha = .05		
		1		
Surprised	16			-.367
Happy	16			-.193
Neutral	16			.028
Angry	16			.079
Sarcastic	16			.125
Sad	16			.328
p =				.351
Zscore: Jitter Language = Mandarin				
Emot	N	Subset for alpha = .05		
		1	2	3
Surprised	16	-.768		
Happy	16	-.204	-.204	
Neutral	16	-.181	-.181	
Angry	16		.102	
Sarcastic	16		.196	
Sad	16			.854
p =		.146	.570	1.000

Appendix 2.8 Subgroups differentiated by HNR.

Zscore: HNR Language = Dutch				
Emot	N	Subset for alpha = .05		
		1	2	
Neutral	16	-.475		
Surprised	16	-.372		
Sad	16	-.200		
Happy	16	.084		.084
Angry	16	.303		.303
Sarcastic	16			.659
p =		.130		.190
Zscore: HNR Language = L2_Mand				
Emot	N	Subset for alpha = .05		
		1	2	3
Surprised	16	-.869		
Happy	16	-.271	-.271	
Neutral	16		-.120	-.120
Angry	16		.187	.187
Sarcastic	16		.455	.455
Sad	16			.619
p =		.056	.093	.085
Zscore: HNR Language = Mandarin				
Emot	N	Subset for alpha = .05		
		1	2	3
Surprised	16	-.539		
Happy	16	-.488		
Neutral	16	-.414		
Angry	16	.073	.073	
Sarcastic	16		.464	.464
Sad	16			.904
p =		.177	.194	.144

Curriculum Vitae

Yinyin Zhu was born on January 3rd, 1981, in Beijing, the People's Republic of China. In 2000, she was admitted to the Beijing Language and Culture University as a bachelor student, majoring in Teaching Chinese as a Second Language. She started teaching Chinese as a second language part-timely during her college, working in the international training department of Beijing Foreign Enterprise Human Resources Service Co. Ltd. After her graduation in 2004, she was employed as a full-time Chinese instructor by the same company, being responsible for teaching Chinese to foreign employees from multinational companies and embassies in Beijing, Chinese-English interpretation and Chinese culture lecture organization. From 2006 to 2008, she was pursuing her research master (M.Phil) at Leiden University in the Netherlands, specializing in phonetics and second language acquisition. In 2010, she worked as a Chinese language instructor in the Chinese Department of the Leiden University Institute for Area Studies (LIAS). In September of the same year, she was employed by the Faculty of Oriental Studies, University of Oxford, as a Chinese language instructor. During her employment in Oxford (October, 2010), she was accepted as a PhD candidate by Leiden University Centre for Linguistics, working on the perception and production of Chinese emotional prosody by Dutch L2 speakers of Chinese (long-distance). In July 2011, she came back to Leiden University to continue her PhD research on a full-time basis. This dissertation is the results of this research.