Lexical competition between words, the body, and in social interaction Noise Ratios Task design Dependent Variables

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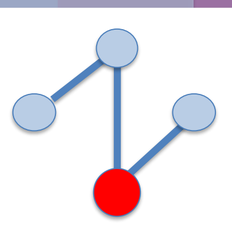
Overview

Does social monitoring affect speech monitoring? We sought to differentiate the effect of compounding demands, both corporal and social, on a cognitive task requiring the retrieval of competing lexical items in speech production. The literature has long showed that greater competition during lexical selection slows reaction times, which we modeled as lexical networks. To model corporal fluctuation during speech production, participants stood during the task while being recorded with a Microsoft Kinect. To evaluate long-scale periodicity in speech and bodily movement we create 1/f noise ratios. To evaluate social interaction we tested participants in non-social and social conditions. Lastly, participants completed questionnaires that categorize either personality traits or self-monitoring in the presence of others.

Speech production

Naming agreement: Words used to name a given picture
Phonological similarity: Two words are similar through addition, deletion, or substitution of phonemes
Orthographic similarity: Two words are similar through addition, deletion, or substitution of letters

Degree = 2
Clustering coefficient = 0



Degree = 3
Clustering coefficient = .33

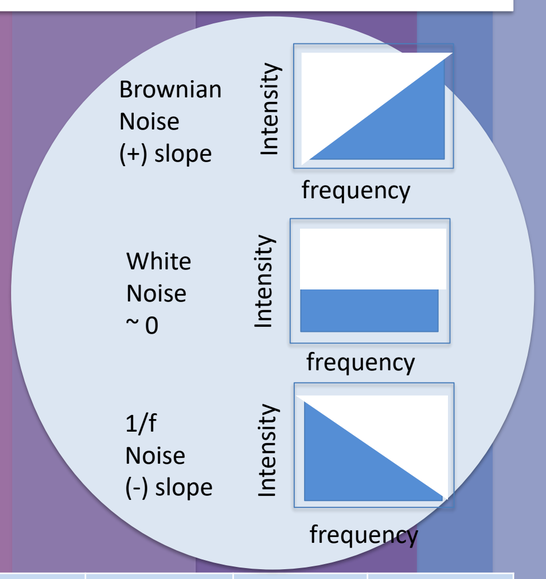
Questionnaires

1. Neo, Big 5[1]: Nervousness, Conscientiousness, Openness, Agreeableness, Extraversion
2. Interpersonal Reactivity Index[2]: Personal Distress, Fantasy, Perspective Taking, Empathic Concern
3. Revised Self-Monitoring Scale[3]: Expressivity of Others, Modification of Self-Presentation
4. Concern for Appropriateness[3]: Cross-Situational Variability, Social Comparison

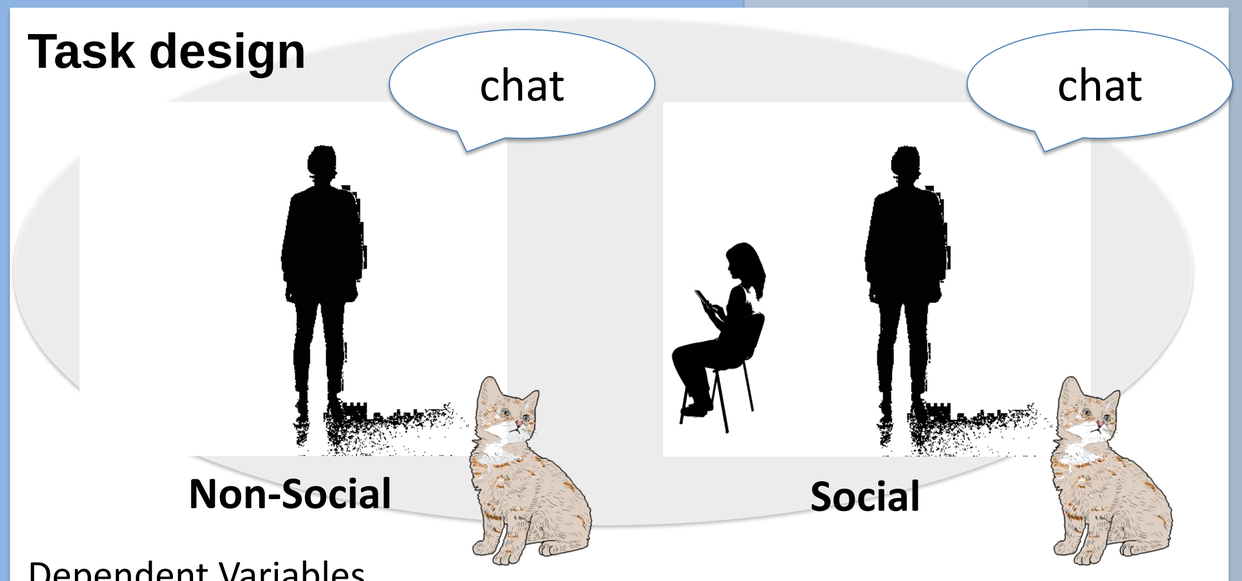
Noise Ratios

1/f RT: taken from the reaction times (515 trials)
1/f Body: taken from intensity change of Kinect joints

<u>Task performance</u>
Spoken Error Rate
Average RT



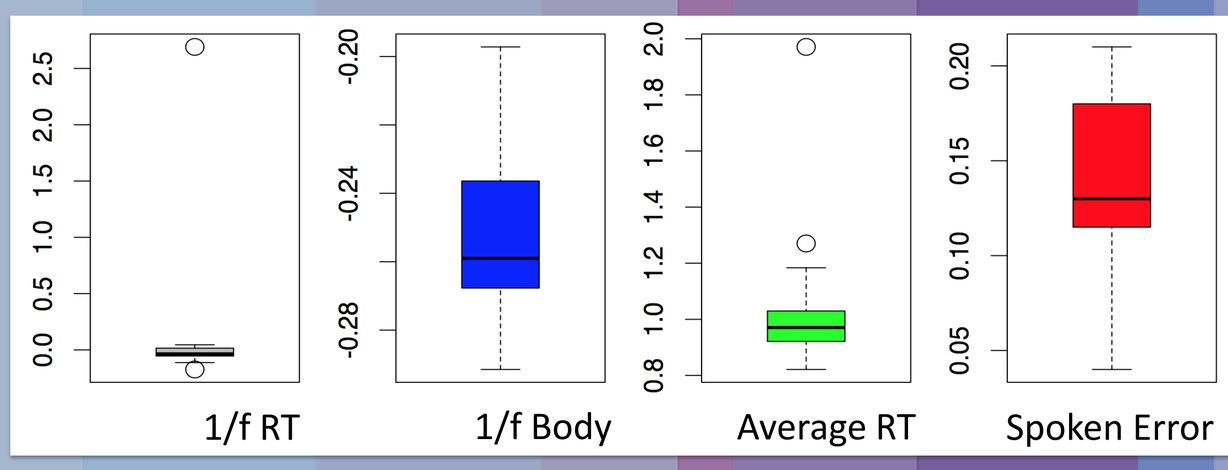
Task design



<u>Dependent Variables</u>

1. Spoken reaction time: RT
2. Body intensity: BI
   Absolute difference between each time step per trial
   75 3D Kinect joints

	Neo Extraver-sion	Neo Nervous-ness	Neo Conscien-tiousness	Neo Agreeable-ness	IRI Perspective Taking	IRI Empathic Concern	Cross Situational Variability
1/f RT	0.32	0.49	-	-	-0.3	-	-
1/f Body	-	-	0.57	-	-	-0.45	-0.66
Average RT	0.32	-	-	-	-	-	-
Spoken Error	-	-0.32	-	0.3	0.43	-	-



RT Analysis (excluding errors)

BI	t = 14.84	p < 0.001
Group (Social)	t = -2.53	p = 0.021
Naming agreement, Clustering coefficient	t = 14.68	p < 0.001
Naming agreement, Degree	t = 3.11	p = 0.002

* Greater bodily movement (BI) leads to slower RTs
* Participants in the social condition produced faster RTs
* Greater number (degree) and connectivity (clustering coefficient) of confusable items leads to slower RTs

BI : Group (Non-Social)	t = 11.71	p < 0.001
BI : Group (Social)	t = 10.33	p < 0.001
BI : Naming agreement, Degree	t = 3.28	p = 0.010
Group (Non-Social) : Naming agreement, Degree	t = 8.15	p < 0.001
Group (Social) : Naming agreement, Degree	t = 6.66	p < 0.001

BI Analysis (including errors)

Accuracy	t = 3.22	p = 0.001
Group (Social)	t = 3.23	p = 0.005
Naming agreement, Clustering coefficient	t = 2.47	p = 0.014
Naming agreement, Degree	t = 5.72	p < 0.001

* Spoken errors lead to greater movement
* Participants in the social condition move more
* Greater number (degree) and connectivity (clustering coefficient) of confusable items leads to more movement

RT : Accuracy	t = 7.39	p < 0.001
Accuracy : Group (Social)	t = -2.63	p = 0.009
Accuracy : Naming agreement, Degree	t = -2.04	p = 0.041
Group (Non-Social) : Naming agreement, Degree	t = 2.48	p = 0.013
Group (Social) : Naming agreement, Degree	t = 5.13	p < 0.001

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2. Gilet, A-L., Studer, J., Mella, N., Gruhn, D., Labouvie-Vief, G., (2013) Assessing Dispositional Empathy in Adults: A French Validation of the Interpersonal Reactivity Index (IRI). *Canadian Journal of Behavioral Science / Revue canadienne des sciences du comportement. 45(1), 42-48.*
3. Myskowski, N., Storme, M., Zenasni, F., & Lubart, T. (2014). Appraising the Duality of Self-Monitoring: Psychometric Qualities of the Revised Self-Monitoring Scale and the Concern for Appropriateness Scale in French. *Canadian Journal of Behavioral Science / Revue canadienne des sciences du comportement.*

Conclusion

Analysis shows that RT tells only part of the story of speech production and is limited in its analysis of only correct items. Through the addition of bodily movement we can capture the effect of accuracy on production, as it regards RTs, interaction, and lexical variables responsible for competition. Bodily movement gives us a broader understanding of cognitive control, one in which task performance, personality and social interaction plays a large role.