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Lexical competition between words, the body, and in social interaction



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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.

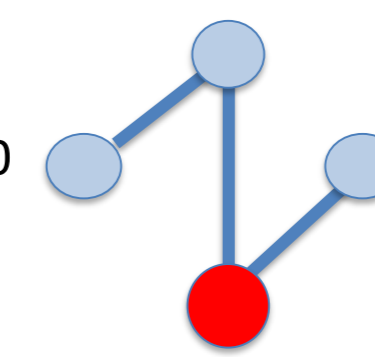
Speech production

Naming agreement: Words used to name a given picture

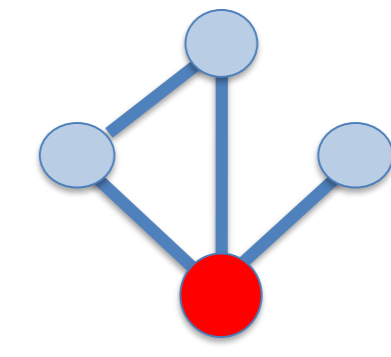
Phonological similarity: Two words are similar through addition, deletion, or substitution of phonemes

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 5¹: Nervousness, Conscientiousness, Openness, Agreeableness, Extraversion
2. Interpersonal Reactivity Index²: Personal Distress, Fantasy, Perspective Taking, Empathic Concern
3. Revised Self-Monitoring Scale³: Expressivity of Others, Modification of Self-Presentation
4. Concern for Appropriateness³: Cross-Situational Variability, Social Comparison

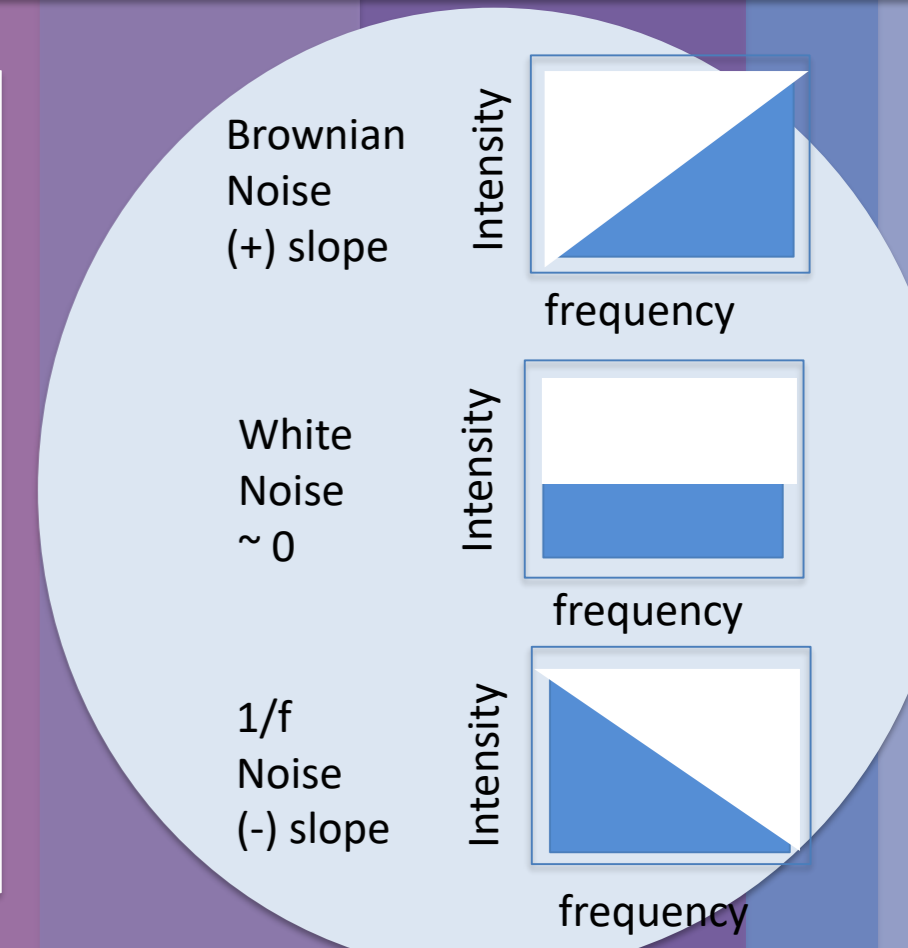
Noise Ratios

1/f RT: taken from the reaction times (515 trials)

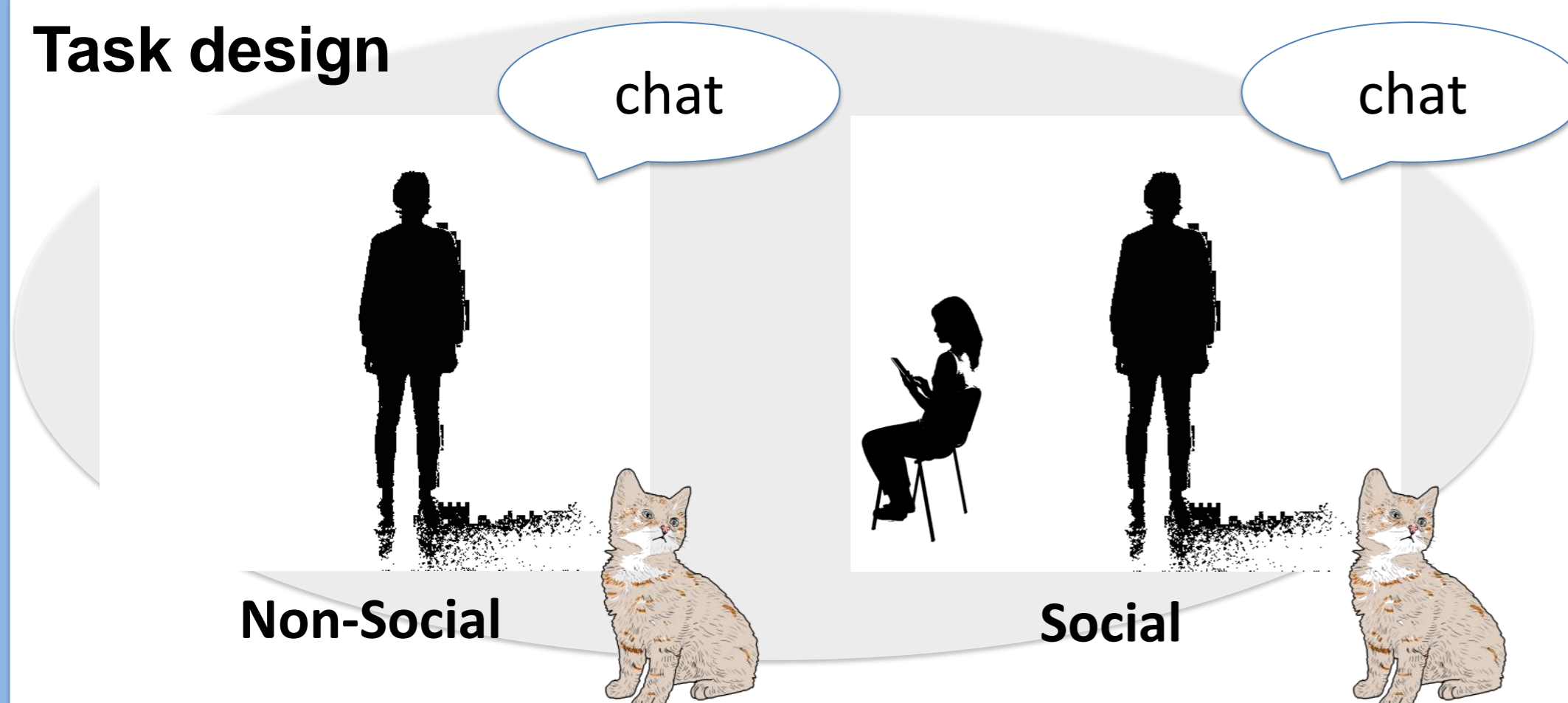
1/f Body: taken from intensity change of Kinect joints

Task performance

Spoken Error Rate
Average RT



Task design

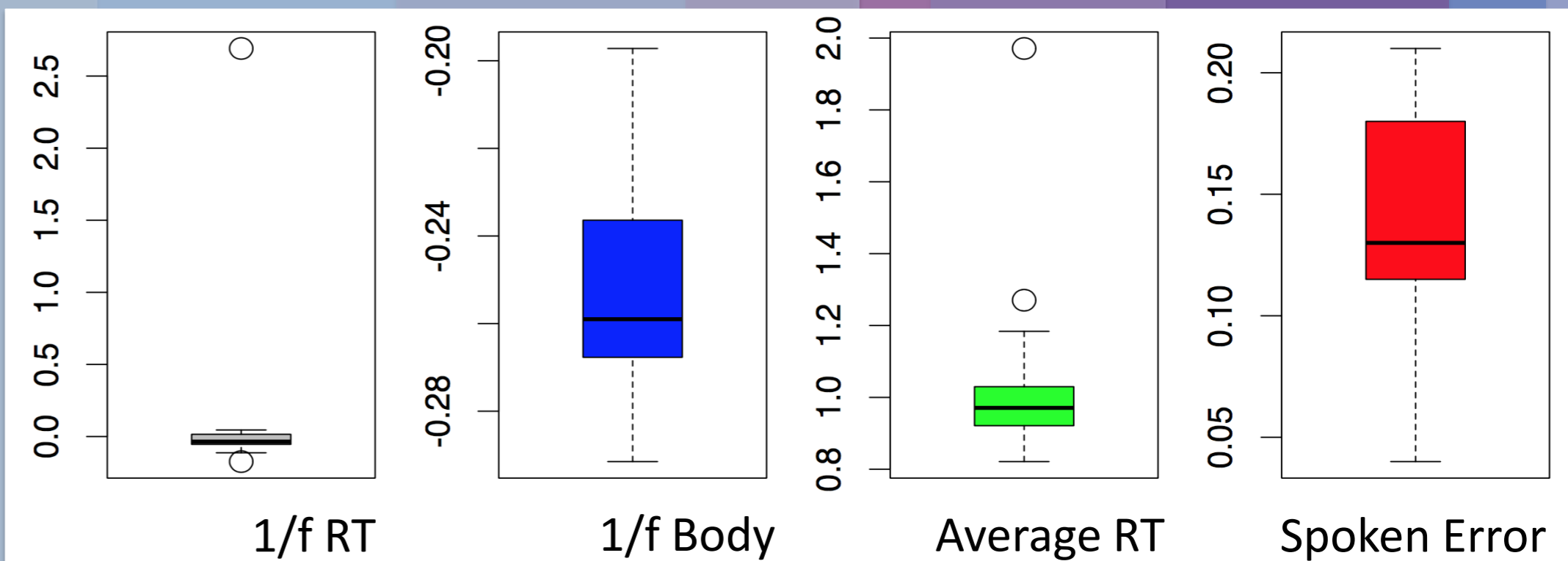


Dependent Variables

1. Spoken reaction time: RT
2. Body intensity: BI

Absolute difference between each time step per trial
75 3D Kinect joints

	Neo Extraversion	Neo Nervousness	Neo Conscientiousness	Neo Agreeableness	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

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 and social interaction plays a large role.

References
 1. Lignier, B., Petot, J.-M., Plaisant, O., Zebdi, R. (2016) Validation du Big Five Inventory (BFI-Fr) dans un contexte d'hétéro-évaluation. *Annales Médico-Psychologiques* (174), 436-441.
 2. Gillet, 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.
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