Retention and Retrieval: Second Language Gestural Learning

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Introduction

When learning a second language in order to succeed you need to acquire knowledge of grammar, vocabulary, and phrases. What if we could teach robots second language the way we learn second language by using gestures in combination with words or phrases? Using the Lancaster Sensorimotor Norms we wanted to test if the presence of canonical gestures alongside and L2 word representing the sensorimotor valence of that word improve L2 word retention/retrieval?

The Lancaster Sensorimotor Norms

The Lancaster Sensorimotor Norms: multidimensional measures of perceptual and action strength for 40,000 English words paper currates norms of sensorimotor strengths for 40,000 concepts across six perceptual modalities(touch, hearing, smell, taste, vision, and interoception) and five action effectors (mouth/throat hand/arm, foot/leg, head excluding mouth/throat, and torso), data gathered by 3,500 participants using Amazon's Mechanical Turk platform. Overall this paper tests to see if the sensorimotor basis of word meanings and concepts are present (Lynott et al., 2019).

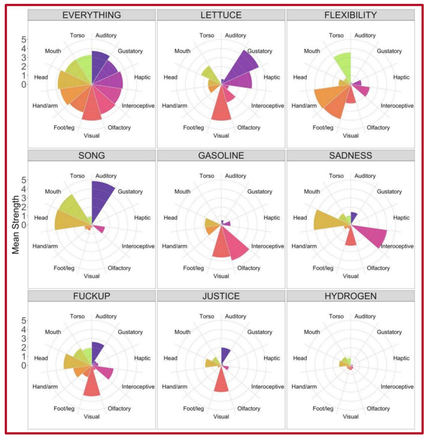
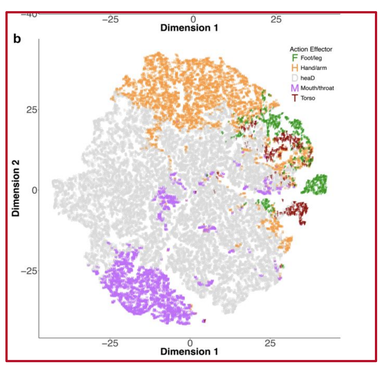
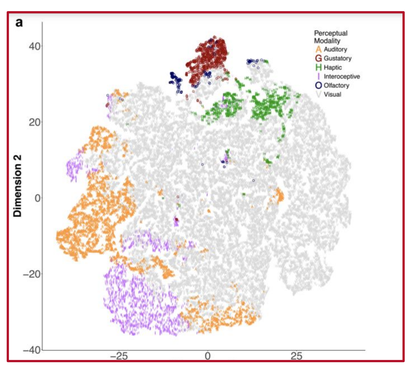


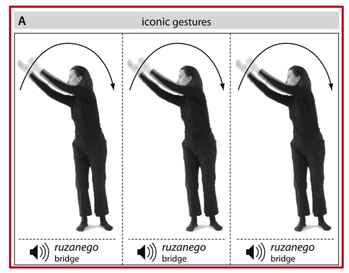
Figure 1: Polar plots for 9 individual concepts. It shows the mean sensorimotor strength on each of the 11 dimensions.

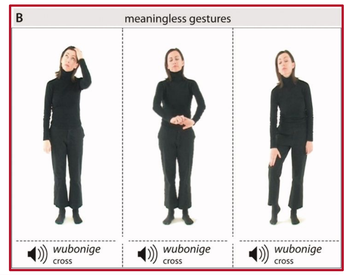




Second-Language Gestural Approach

In combination with The Lancaster Sensorimotor Norms database a python program was created to find the highest, lowest, and mean valances by word. This was done to choose a small set of words to conduct tests. The experiment to be conduct would be given to participants with english being their first language and not knowing another language and english being their second language. To conduct the experiment, words from the language of choice would need to be recorded simultaneously with the common gesture and given to the participant 6-10 mins after the English word and gesture have been given.





Sensorimotor Context:	Auditory.mean	Gustatory.mean	Haptic.mean	Interoceptive.mean	Olfactory.mean	Visual.mean	Foot_leg.mean
Max Score:	5.000	5.000	4.944	4.900	5.000	5.000	4.955
Words:	AUDIBLY	CREME CARAMEL	HANDSHAKE	HEADACHE	INCENSE	BAR CODE	RUN
	BARKING	PASTA			PERFUME	BRIGHTNESS	
	FOLK SONG	PINA COLADA				COLORS	
	LOUDNESS	PIZZA				IN SIGHT	
	NOISE					PRETTY	

Hand_arm.mean	Head.mean	Mouth.mean	Torso.mean	Max_strength.perceptual	Exclusivity.perceptual	Max_strength.action	Exclusivity.action
4.950	5.000	5.000	4.611	5.000	1.000	5.000	1.000
POINTING	EYE	FRENCH KISS	DIGESTION	AUDIBLY	HYPERTEXT	EYE	BLINK
	VISION	TALK		BAR CODE	ISOTOPE	FRENCH KISS	FEDERATE
		TASTE		BARKING	RAINBOW	TALK	GENUS
				BRIGHTNESS	TEAL	TASTE	INCORPOREAL
				COLORS	UNBUDGETED	VISION	INF

Max_strength.sensorimotor	Exclusivity.sensorimotor	Minkowski3.perceptual	Minkowski3.action	Minkowski3.sensorimotor	N_known.perceptual	Percent_known.perceptual
5	0.629	7.211	7.518	8.589	16028.000	1.000
AUDIBLY	MONOCHROMATICALLY	STRING CHEESE	BODY PART	BODY PART	HUNGRY	VACUOUSLY
BAR CODE						
BARKING						
BRIGHTNESS						
COLORS						

N_known.action	Percent_known.action
16758.000	1.000
ACETYLENE	INF
ACROPHOBIA	
AIRBASE	

Future Directions

In the future, conducting experiments where participants will be given a second language word in conjunction with a gesture to see if they are able to remember said word. In Addition, to use this research to determine if robots can be able to learn and respond in a second language using gesture.