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PREDICTORS OF ACTION NAMING ACCURACY IN RUSSIAN HEALTHY SPEAKERS

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INTRODUCTION

In action naming, name agreement and age of acquisition (AoA) are among the most stable predictors of RTs in healthy speakers (Shao et al., 2014; and many others), while frequency and familiarity effects are not common. Frequency doesn't contribute to naming accuracy in aphasia either when AoA is controlled for (Bastiaanse et al., 2015).
However, most of the action naming studies employ pictures that were preselected using a name agreement threshold. This reduces the possibility of accuracy rate analysis in healthy speakers. Our study investigates the variables that affect action naming accuracy in healthy Russian speakers using a large stimuli database.

TO SMELL

TO INFLATE

METHOD

Materials

375 action pictures from "Verbs and actions" database (Akinina et al., 2015). Parameters taken into account:

- Name agreement;
  - H-statistic (Snodgrass and Vanderwart, 1980)
- Subjective visual complexity (SVC);
  - Rated from 1 "simple picture" to 5 "complex picture"
- Action familiarity (Fam);
  - Rated from 1 "barely familiar" to 5 "very familiar"
- Subjective age of acquisition (AoA);
  - Rated from 1 "0-3 years" to 5 "later than 12 years"
- Imageability (Imag);
  - Rated from 1 "easy to imagine" to 5 "hard to imagine"
- Image agreement (IA);
  - Rated from 1 "bad agreement" to 5 "good agreement"
- Log transformed lemma frequency (LogFreq);
- Length in phonemes (Length);
- Instrumentality (Instr);
- Reflexivity (Refl);
- Name relation (NameRel)
- Number of arguments (Args);
- Presence of a prefix (prefix)

Table 1 – Descriptive statistics for 375 stimuli

	H	SVC	Fam	AoA	Imag	IA	LogFreq	Length
Mean	1,20	2,69	3,69	1,87	1,29	3,96	1,12	7,81
SD	0,76	0,43	0,71	0,47	0,23	0,71	0,64	2,52
Min	0,00	1,69	1,90	1,07	1,00	1,89	0,00	4,00
Max	3,66	3,83	4,97	3,35	2,57	4,96	2,98	14,00
Median	1,07	2,70	3,70	1,81	1,23	4,15	0,99	7,00
Percentile 25	0,59	2,38	3,13	1,50	1,13	3,41	0,63	6,00
Percentile 75	1,70	2,98	4,26	2,20	1,39	4,55	1,52	10,00
Skew	0,63	0,03	-0,14	0,58	1,70	-0,77	0,67	0,48

Participants

Sixty-two neurologically healthy Russian speakers: 42 females; mean age = 26.87, SD = 12.71, range 17 – 65 years

Procedure

Oral confrontation naming task; 375 stimuli presented on a laptop via DMDX paradigm in a randomized order; next item triggered by experimenter or after 10 sec

Analysis

Response coding: dominant = the name is the same as in (Akinina et al., 2015) norming study; non-dominant = all other names.
The logistic mixed-effects linear regressions with the dominant-non-dominant name as outcome and random intercepts for subjects and items were performed.
Predictors (all verbs): H-statistic, SVC, Fam, AoA, Imag, LogFreq, IA, Args, Refl, Instr, Length, prefix
Predictors (instrumental verbs): H-statistic, SVC, Fam, AoA, Imag, LogFreq, IA, Args, Refl, NameRel, Length, prefix

RESULTS

Table 2 - Correlations between the parameters (*p < 0,002, Bonferroni corrected)

	H	SVC	Fam	AoA	Imag	IA	LogFreq
SVC	,26*						
Fam	-,13	-,32*					
AoA	,00	,16	-,34*				
Imag	,28*	,29*	-,25*	,43*			
IA	-,23*	-,16	,12	,15	-,29*		
LogFreq	,00	-,07	,42*	-,40*	,07	,25*	
Length	-,01	,10	-,00	,19*	-,04	,04	-,37*

Table 3 - Fixed effects for all verbs

	Estimate	Std. Error	Pr(>|z|)	Sign.
(Intercept)	4,42	0,61	0,00	***
prefix	-0,10	0,13	0,44	
H	-1,16	0,06	0,00	***
SVC	-0,49	0,11	0,00	***
Fam	-0,14	0,07	0,05	*
AoA	-0,14	0,11	0,22	
Imag	-0,33	0,23	0,16	
LnFreq	0,23	0,04	0,00	***
IA	-0,06	0,07	0,34	
Args	-0,06	0,09	0,49	
Refl	-0,07	0,13	0,61	
Instr	0,15	0,09	0,09	.
Length	0,00	0,03	0,91	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 4 - Fixed effects for instrumental verbs

	Estimate	Std. Error	Pr(>|z|)	Sign.
(Intercept)	4,41	0,60	0,00	***
prefix	-0,07	0,13	0,56	
H	-1,15	0,06	0,00	***
SVC	-0,49	0,11	0,00	***
Fam	-0,14	0,07	0,05	.
AoA	-0,13	0,11	0,25	
Imag	-0,36	0,23	0,12	
LnFreq	0,24	0,04	0,00	***
IA	-0,07	0,07	0,29	
Args	-0,04	0,09	0,63	
Refl	-0,07	0,13	0,59	
NameRel	0,33	0,14	0,02	*
Length	0,00	0,03	0,86	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

- When all the verbs are analyzed, high name agreement (H-statistic), low subjective visual complexity, low familiarity, and high frequency are significant predictors of good naming accuracy;
- Instrumentality approaches significance. To study this marginal effect of instrumentality, the same regression analysis on a subset of instrumental verbs and name relation as a predictor was performed;
- When instrumental verbs are analyzed (N = 145), high name agreement (H-statistic), low subjective visual complexity, and high frequency are significant predictors of naming accuracy;
- Name relation was also a significant predictor of naming accuracy;
- Significance of familiarity was reduced.

DISCUSSION

- Factors corresponding to conceptual preparation and lexical selection (visual complexity, familiarity and frequency) influenced action naming accuracy (see Shao et al., 2014);
- The contribution of visual complexity could reflect the existence of a prototypical action image;.
- The elicitation of the dominant names for low-familiarity items could be explained by lack of competitor names for actions;
- The effect of frequency is present albeit the AoA is controlled for: the more frequent the dominant name is, the higher is the probability that it will be chosen among alternatives. Frequency could affect the action naming process at the stage of lexical selection;
- For instrumental verbs, the presence of a name related to the verb lemma helps retrieve this lemma.

References: Akinina, Y., Malyutina, S., Ivanova, M., Iskra, E., Mannova, E., & Dragoy, O. (2015). Russian normative data for 375 action pictures and verbs. Behavior Research Methods, 47(3), 691–707.
Bastiaanse, R., Wieling, M., & Wolthuis, N. (2015). The role of frequency in the retrieval of nouns and verbs in aphasia. Aphasiology, 7038(October), 1–18.
Shao, Z., Roelofs, A., & Meyer, A. S. (2014). Predicting naming latencies for action pictures: Dutch norms. Behavior Research Methods, 46(1), 274–283.

The extended stimulus database (including Nouns and Objects):

http://en.stimdb.ru/

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