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Support for a novel, simple method for calculating word frequency of output on language production tasks

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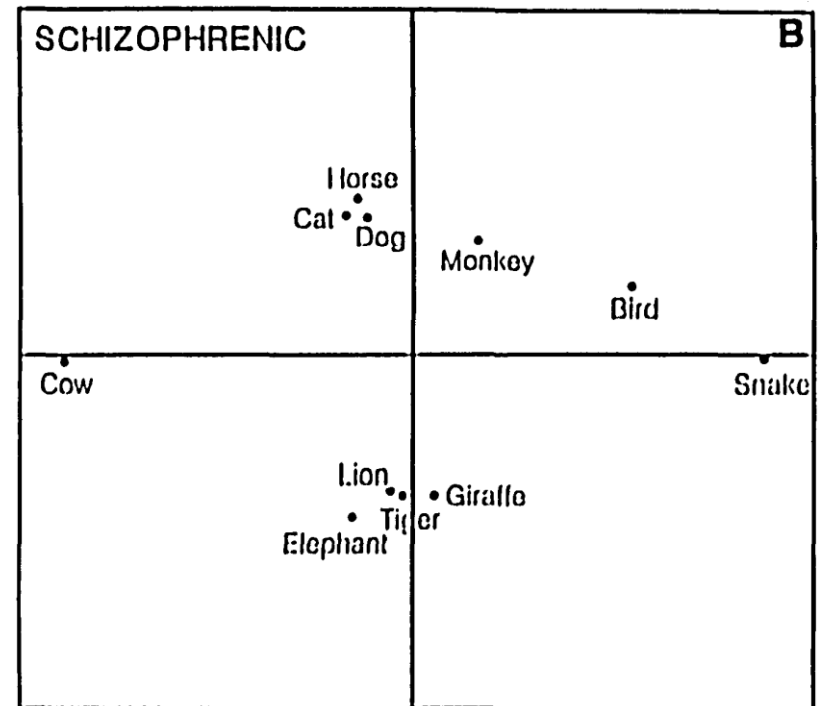
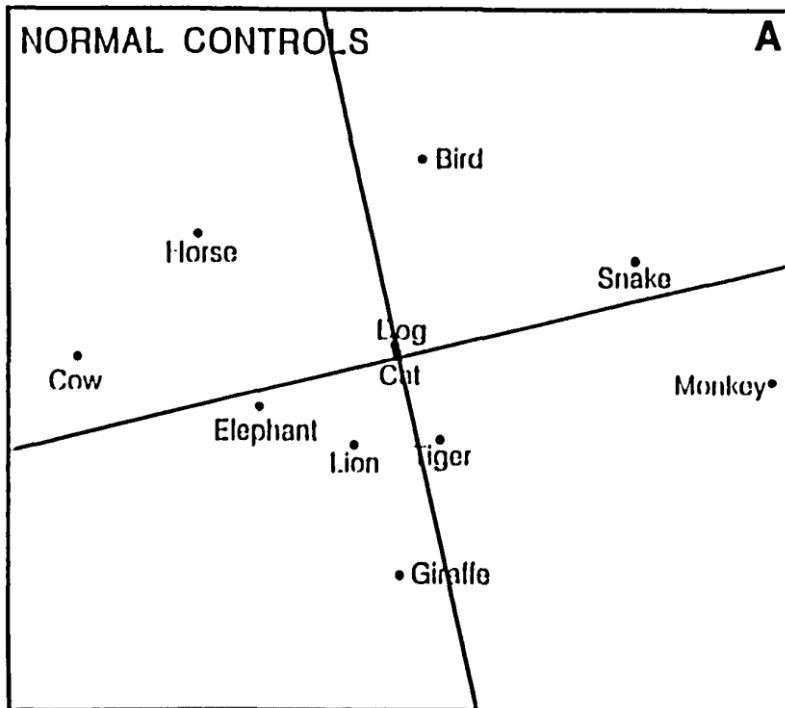
BACKGROUND

Language in schizophrenia

- Patients with schizophrenia (SCH) display diverse abnormalities in linguistic and specifically lexical processing
- Research using verbal fluency:
 - Reduced productivity
 - Atypical word clustering
 - Associations with psychotic symptoms

BACKGROUND

Language in schizophrenia



Aloia et al. (1996). *J. Int. Neuropsychol. Soc.* 2(4), 267–273. <https://doi.org/10.1017/S1355617700001272>

BACKGROUND

Word frequency (WF) effect in schizophrenia

- Patients with schizophrenia exhibit similar WF effects on lexical tasks compared to healthy subjects (Brébion et al., 2005; Rossell & Batty, 2008; Tan et al., 2016)
- Some obtained different results (Condray et al., 2010; Huron et al., 1995; Maher et al., 1983; Rossell & David, 2006)
- One study on word frequency on verbal fluency (Juhasz et al., 2012)

BACKGROUND

Corpus-based WF

- Corpora:
 - Usually constructed from written language data
 - Natural WF is non-normally distributed
 - Not all word forms, meanings, and uses can be documented in a single corpus
 - Corpora are not typically updated at (linguistically) short intervals
 - Adequately equipped corpora are not available for all languages of the world

AIMS OF THE STUDY

Corpus-based vs. within-sample word frequency

- We tested whether there is a relationship between the severity of positive and negative symptoms in patients with SCH and the frequencies of the words produced on two verbal fluency tasks
- Within-sample WF:
 - Representative of language use in the given sample on the given task
 - Distribution should be normal or closer to normal
 - Zero frequency words are avoided
 - Synchronicity is ensured
 - Dependence on annotated corpora is abolished

METHODS

Patients

- 36 German-speaking in- and outpatients diagnosed with schizophrenia (F20.x) according to ICD-10 criteria
- Symptom assessments: SAPS and SANS

Table 1. Sociodemographic and clinical data for the patients ($n = 36$)

	Mean	SD	Range
Age (years)	37.89	11.32	21–65
Education (years)	10.14	1.64	8–13
Sex	9/36 females (25.0 %)		
SAPS	27.19	24.08	0–91
SANS	31.19	18.85	2–72

METHODS

Verbal fluency

- Semantic fluency (SF): *animals*
- Letter fluency (LF): <p>
- 60 seconds
- Output was audio-recorded, transcribed (ELAN, 2019; Wittenburg et al., 2006), and assessed according to Aschenbrenner et al. (2001)
- Output was assigned: 1) a corpus-based WF (from dlexDB; Heister et al., 2011) and 2) a within-sample WF value

RESULTS & DISCUSSION

Descriptive data

Table 2. Descriptive data for the two word frequency variables

	Mean (SD)	Range	W	Skewness	Kurtosis
corpus-based WF SF	753.000 (389.940)	164.5–1293	.005	-0.040	-1.416
within-sample WF SF	10.681 (2.274)	5.667–15.545	.479	0.283	0.081
corpus-based WF LF	483.667 (471.999)	17–2411	< .001	2.301	7.175
within sample WF LF	2.202 (0.634)	1–3.417	.587	-0.123	-0.750

RESULTS & DISCUSSION

Descriptive data

- Different methodological frameworks may have better use of one or the other variable type
- Without data transformation, parametric tests may be unsuitable for the analyses of corpus-based WF on VF

RESULTS & DISCUSSION

Correlational analyses

Table 3. Correlations between the global score and the four subscale scores of the SAPS, and the two word frequency variables

	SAPS	Hallucinations	Delusions	Bizarre behavior	positive FTD
corpus-based WF SF	$r_s = -.134$ $p = .435$	$r_s = -.249$ $p = .142$	$r_s = -.189$ $p = .270$	$r_s = -.137$ $p = .425$	$r_s = -.003$ $p = .985$
within-sample WF SF	$r_s = -.348$ $p = .038^*$	$r_s = -.190$ $p = .268$	$r_s = -.391$ $p = .018^*$	$r_s = -.332$ $p = .048^*$	$r_s = -.221$ $p = .194$
corpus-based WF LF	$r_s = .257$ $p = .131$	$r_s = .017$ $p = .922$	$r_s = .302$ $p = .073$	$r_s = -.015$ $p = .932$	$r_s = .174$ $p = .309$
within-sample WF LF	$r_s = .184$ $p = .284$	$r_s = -.207$ $p = .225$	$r_s = .032$ $p = .854$	$r_s = .339$ $p = .043^*$	$r_s = .215$ $p = .209$

RESULTS & DISCUSSION

Correlational analyses

- Significant correlations were observed only with the two within-sample WF variables
- Previous research has only found that disorganization symptoms are associated with VF performance (Robert et al., 1998; Veleva et al., 2019)
- Disproportionate correlational directions across the SF and LF within-sample WFs
 - A distinct pattern of word frequency effects on SF and LF in patients with schizophrenia in association with bizarre behavior

LIMITATIONS

- We had no group of healthy subjects for comparison
- Corpus-based and within-sample WFs differ in the sense that corpus-based WF is extracted from data on real language use in a presumably representative sample of speakers of a given language, while within-sample WF was calculated in our study from data of a behavior (i.e., VF) that is typically not observed during natural communication and using an unrepresentative sample of speakers of the given language
- We did not control for multiple comparisons in our correlational analyses

THANK YOU FOR YOUR ATTENTION

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