

RESEARCH REPORT

# Linguistic marker of schizotypy: a study on nominal reference

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Conceptualization, formal analysis, financial resource, project supervision, final draft.

DATES

- Recebido: 04/10/2022

- Aceito: 30/12/2022

- Publicado: 30/12/2022

HOW TO CITE

Sobrenome, Nome; Sobrenome, Nome; Sobrenome. Nome. (2022). Linguistic marker of schizotypy: a study on nominal reference. *Revista da Abralín*, v. 21, n. 1, p.1-26, 2022.

ABSTRACT

Semantic impairments are considered linguistic identifiers of schizotypal personality disorder. Particularly, failures in building reference of nominal expressions have been said to distinguish schizophrenia, high-schizotypy and control groups, and these failures reflect difficulties in using linguistic contextual cues. Our experimental study investigated covariances between schizotypal traits, in a nonclinical population, and interpretations of definite singular nominal expressions as referring either to kinds of objects (generic reading) or to specific objects (specific reading). The experiment was conducted in Brazilian Portuguese, where specific reading is the non-marked, default meaning of definite singular nominals, while generic reading depends on contextual information. Results indicate associations between interpretation of definite singular nominals and two schizotypal traits: *constricted affect* (a negative trait) and *unusual perceptual experiences* (a positive trait). Speakers in general had preference for assigning specific interpretations to definite singular nominals. However, when participants were distinguished based on schizotypal factors, those with higher loads of traits of *constricted affect* as well as those with lower loads of traits of *unusual perceptual experiences*, showed significant higher preference for the default reading, particularly in discourse-contexts containing cues for specificity. Our results are in line with previous studies, showing that the specific reading is the *default* meaning of definite singular nominals, but suggests that a higher preference for this reading might be indicative of issues related to *constricted affect* and *unusual perceptual experiences*. In regard to language, this suggests that schizotypal traits

might manifest themselves semantically as a tendency to hold onto the non-marked meaning.

RESUMO

Comprometimentos semânticos são considerados identificadores linguísticos de transtorno de personalidade esquizotípica. Falhas na construção da referência de expressões nominais têm sido, especialmente, capazes de distinguir entre grupos de indivíduos com esquizofrenia, com alta-esquizotipia e grupo controle, e refletem dificuldades no uso de informação linguística contextual. Nosso estudo experimental investigou covariâncias entre traços de personalidade esquizotípica, em população não-clínica, e interpretação de expressão nominal definida no singular com referência à espécie de objetos (leitura genérica) ou a objetos específicos (leitura específica). O experimento foi conduzido em português brasileiro, onde a leitura específica é a leitura não marcada, *default* de nominais definidos no singular, enquanto a leitura genérica depende de pistas contextuais. Os resultados indicam associações entre a interpretação de expressões nominais definidas no singular e dois traços de personalidade esquizotípica: *afeto constrito* (negativo) e *experiências perceptuais incomuns* (positivo). Observou-se uma preferência geral pela interpretação específica. Entretanto, quando os participantes foram identificados com base nos fatores da esquizotipia, tanto aqueles com maior pontuação em *afeto constrito* quanto aqueles com menor pontuação em *experiências perceptuais incomuns* apresentaram preferência significativamente maior pela leitura específica, particularmente em contextos discursivos com pistas para especificidade. Esses resultados estão de acordo com estudos anteriores, apontando que a interpretação específica é a interpretação *default* de sintagmas nominais definidos no singular, mas sugere que uma preferência muito acentuada por essa leitura pode indicar questões relativas a *afeto constrito* e *experiências perceptuais incomuns*. Sobre a linguagem, conclui-se que traços esquizotípicos podem se manifestar semanticamente, como preferência acentuada pelo significado não marcado.

KEYWORDS

Language. Definite nominal reference. Schizotypal personality traits.

PALAVRAS-CHAVE

Linguagem. Referência nominal definida. Traços de personalidade esquizotípica.

## Introduction

From an internalist perspective, meaning is understood as mental representations built by recursive linguistic combinatorial procedures (Chomsky, 1993, 2000, 2012, Pietroski, 2003, Stainton, 2006). The ability of using meaningful expressions in acts of reference is, however, a more global cognitive process that recruits different components of language, from syntax to pragmatics. First, the meaning of any given linguistic expression is compositional, being dependent on the structural context in which the expression occurs. The lexical root [apple], for instance, might be unspecified for meaning (Borer, 2003), but the determiner phrase (DP) [the apple] is interpreted as denoting either kinds of individuals as in (1a) or specific individuals as in (1b) (Carlson, 1977). In addition, the type of predicate a definite singular DP combines with contributes to its denotation (generic predicate in (1a) *vs.* episodic predicate in (1b)). Therefore, meaning, and reference in consequence, is assigned not to lexical items in isolation, but to structures formed by lexical items combined with functional elements,

- (1) a. The apple is very rich in antioxidants.  
 b. The apple is already in your lunch bag.

Notwithstanding the role played by syntax, referring requires specific semantic abilities. For instance, understanding speakers' communicative intentions requires integrating information from grammar with information pertaining to discourse context and to world knowledge (Carlson, 1977, Krifka et al., 1995, Chierchia, 2000, Gelman; Raman, 2003, Dayal, 2004). To exemplify this, consider the data in (2). The singular DP [the apple], subject of the second sentence, is interpreted as referring to the kind APPLE in (2a), but to a specific apple in (2b). Although the predicate [is rich in antioxidants] favors a generic reading, as it describes a nomic property, the interpretation of the subject [the apple] in (2) varies as a function of the referent of its antecedent in the first clause, *apples* in (2a), *an apple* in (2b).

- (2) a. I am studying apples in a course on botany and today I found out that the apple is very rich in antioxidants.  
 b. I got an apple from Joe's farm yesterday and today I find out that the apple is very rich in antioxidants.

In this article, we add to the discussion on nominal reference evidence that variations in meaning might occur as a function of variations in schizotypal personality traits found within nonclinical samples of speakers. These traits are related to the schizophrenia-spectrum disorder and, according to previous studies, they can interfere with linguistic processes, specially at the semantic level.

There is growing evidence that schizophrenia leads to semantic and pragmatic impairments. It has been reported, for instance, that schizophrenic patients overuse expressions with implicit, generic or ambiguous reference (Harvey; Weintraub; Neale, 1982, Rodriguez-Ferrera; McCarthy;

McKenna, 2001, Hinzen; Sheehan, 2015), have difficulties with definiteness, ineffectively using indefinite DPs for new information and definite DPs for old information, as well as difficulties with third person pronominal coreference (Rochester; Martin 1979, Harvey; Weintraub; Neale, 1982, Chaika; Lambe, 1989, Çokal et al., 2018, Sevilla et al., 2018, Tovar et al., 2019). It has also been shown that these speakers have difficulties integrating contextual information (Kuperberg; McGuire; David, 1998, Kuperberg et al., 2006), being more influenced by lexical meaning (Chapman; Chapman; Miller, 1964), in addition to difficulties using information shared with the interlocutor (Champagne-Lavau; Stip; Joannette, 2006).

From an etiological perspective, researchers have suggested that schizophrenia shares genetic factors with schizotypy (Rado, 1953). In a quasi-dimensional approach, schizotypy is a set of psychological and behavioral traits found in populations with schizotaxia, a subtle neural integration deficit (Meehl, 1962, 1990, Lenzenweger, 2006). In a full-dimensional approach, it is taken to be a broad continuum of multidimensional personality traits that ranges from 'normal' personality variation to schizophrenia-spectrum symptoms (Eysenck, 1967, Claridge, 1997, Debbané; Barrantes-Vidal, 2015). Both approaches predict similarities in phenotype between schizophrenia and schizotypy and similarities have been found. High schizotypal individuals can experience psychotic symptoms (Johns; van Os, 2001) and have mild cognitive impairments similar to those found in schizophrenia (e.g., reduced cognitive empathy (Henry; Bailey; Rendell, 2008, Wang et al., 2013, Wang et al., 2015) and Theory of Mind (ToM) impairment (Bora, 2020)). With respect to language, studies have reported that speakers with high traits of schizotypy exhibit poor semantic processing (Morgan; Bedford; Rossell, 2006, Kimble et al., 2000, Wang et al., 2013, Wang et al., 2015), inability to decode irony, metaphors, and proverbs (Langdon; Coltheart, 2004, Humphrey; Bryson; Grimshaw, 2010, Rapp et al., 2014), increase of lexical networks and decrease of contextual information (Kiang, 2010).

In the face of a (partially) shared genetic factor and extant phenotypical similarities between schizophrenia and schizotypy, studies on language impairments in schizophrenia are far more advanced and numerous than studies on language and schizotypy. In addition, the few investigations conducted so far on interactions between schizotypal traits and language processes target mostly populations of individuals diagnosed with SPD - schizotypal personality disorder, leaving nonclinical populations out of purview (Nunn; Peters, 2001). Still, assuming a full-dimensional approach to schizotypy, studies considering variations of schizotypal traits in the general population can be revealing about different levels of mental fragmentation within the schizophrenia-spectrum disorder.

We present an experimental study on language and schizotypy, focusing on the reference of definite singular DPs in Brazilian Portuguese. Definite singular DPs were presented as part of a discourse fragment with linguistic explicit cues strengthening either a kind (generic reading) or an individual (specific reading) denotation. Assuming the full-dimensional approach to schizotypy, in which it is understood as a set of personality traits with variations across and within nonclinical populations, our study was conducted on a general, nonclinical adult population of university students, all native speakers of Brazilian Portuguese, investigating possible covariances between

preferences for generic or specific readings and variations on measurements of schizotypal traits found among the participants.

The experimental task consisted of four written questionnaires: two psychometric scales used to measure schizotypal traits; one language test and 1 background questionnaire used to capture participants' descriptive information. Our main goals are providing answers to the following questions: (a) Do adults native speakers of Brazilian Portuguese, in general, take into consideration discourse contextual information in attributing kind reference to DSs? (b) Do schizotypal personality traits interfere in this linguistic process of referring?

## 2. Definite singular DPs in Brazilian Portuguese

In Brazilian Portuguese, DPs carry contrastive morphological markers for definiteness (definite vs. indefinite) and number (singular vs. plural)

- (3) a. O prisioneiro escapou.  
*the-Sg prisoner-Sg escaped-3Sg*  
 b. Os prisioneiros escaparam.  
*the-Pl prisoner-Pl escaped-3Pl*

- (4) a. Um prisioneiro escapou.  
*a-Sg prisoner-Sg escaped-3Sg*  
 b. Uns prisioneiros escaparam.  
*a-Pl prisoner-Pl escaped-3Pl*

In addition, bare nouns (i.e., nouns without a determiner) are allowed in singular and plural forms:

- (5) a. Mulheres odeiam futebol.  
*women hate-3Pl soccer*  
 b. Mulher odeia futebol.  
*woman hate-3Sg soccer*

Both definite DPs and bare nouns can occur as subjects of generic predicates, receiving kind readings (Munn; Schmitt, 1999, 2005, Dobrovie-Sorin; Pires de Oliveira, 2008).

- (6) a. Os pagagaios falam.  
*the-Pl parrot-Pl speak-3Pl*  
 b. O papagaio fala.  
*the-Sg parrot-Sg speak-3Sg*

- c. Papagaios falam.  
*parrot-Pl speak-3Pl*
- d. Papagaio fala.  
*parrot-Sg speak-3Sg*

As we are particularly interested in definite singular DPs (DSs, henceforth), we will set plural DPs aside, and proceed by showing the syntactic distribution and the semantic interpretation of DSs in comparison with bare singulars.

First, Brazilian Portuguese DSs, similarly to their English counterpart, are not specified for reference to kinds. As (3a) illustrates, when combined with episodic predicates, DSs are readily interpreted as specific, referring to entities. In addition, even in sentences like (6b), which contain a generic predicate, the DSs [o papagaio] can refer either to the kind PARROT or to a token of this kind. Contrastively, bare singulars are specified for kind-reference, as such they do not trigger specific readings. [papagaio] in (6d), for example, does not allow a specific reading, not even if this reading is contextually favored. Also, it does not occur with episodic predicates, as the unacceptability of (7) shows.

- (7) \*Papagaio falou.  
*parrot-Sg spoke-3Sg*

Another difference between DSs and bare singulars is that only bare singulars can be individuated, being, thus, compatible with reciprocal predicates (Munn; Schmitt, 1999).

- (8) a. Homem se beija na França.  
*man-Sg Reciprocal kiss-3Sg in.the France*  
 ‘Men kiss each other in France’
- b. \*O homem se beija na França.  
*the-Sg man-Sg Reciprocal kiss-3Sg in.the France*

In addition, it has been shown that DSs and bare singulars also differ with respect to the type of kinds they refer to. While bare singulars refer to a broad class of kinds, DSs are more restrictive. Whenever contrastive contexts are excluded, DSs, contrary to bare singulars, refer only to canonical, well-established kinds (Munn; Schmitt, 1999, Müller, 2002; Dobrovie-Sorin; Pires de Oliveira, 2008). Dobrovie-Sorin and Pires de Oliveira (2008) discuss sentences (9) and (10), observing that *garrafa de coca-cola* is a well-established kind while *garrafa azul* is not, arguably because we do not cognitively classify bottles by color.

- (9) a. A garrafa de coca-cola tem gargalo estreito. ( $\sqrt{\text{Generic}}/\sqrt{\text{Specific}}$ )  
*the-Sg bottle-Sg of coke-Sg has-3Sg neck narrow*
- b. Garrafa de coca-cola tem gargalo estreito. ( $\sqrt{\text{Generic}}/*\text{Specific}$ )

*bottle-Sg of coke-Sg has-3Sg neck narrow*

- (10) a. A garrafa azul tem gargalo estreito. (\*Generic/ $\sqrt$ Specific)  
*the-Sg bottle-Sg blue-Sg has-3Sg neck narrow*  
 b. Garrafa azul tem gargalo estreito. ( $\sqrt$ Generic/\*Specific)  
*bottle-Sg blue-Sg has-3Sg neck narrow*

This observation was originally made by Carlson (1977) with respect to the English contrast in (11), but it seems to be valid in many other languages as well (Krifka et al., 1995, Dayal, 2004, Borik; Espinal, 2015).

- (11) a. The coke bottle has a narrow neck. ( $\sqrt$ Generic/ $\sqrt$ Specific)  
 b. The blue bottle has a narrow neck. (\*Generic/ $\sqrt$ Specific)

Many authors have pointed out that this is not a semantic restriction per se, but an issue related to common ground knowledge and encyclopedic information (Carlson, 1977, Krifka et al., 1995, Dayal, 2004, Borik; Espinal, 2015).

The semantics of generic and specific DPs has been tested experimentally in children and adults (Gelman; Raman, 2003, Cimpian; Markman 2008, Augusto, 2007, Lopes, 2006). Cimpian and Markman (2008) results indicate that preschool children, native speakers of English, use contextual cues, such as number of objects available in the scene, in attributing generic and specific readings to nominal expressions. Augusto (2007) tested children and adults, native speakers of Brazilian Portuguese, concluding that 3-year-old children do not use contextual cues to disambiguate the meaning of DSs. Adults, on the other hand, do. Adults interpret DSs as specific in situational contexts in which only one object is visibly available.

In short, specific meaning is the non-marked, default meaning of DSs in Brazilian Portuguese. The generic reading is more restricted in its distribution, being triggered by independent factors, such as type of predicate, possible types of kinds (knowledge of the world), situational context and type of antecedent available in the discourse context. We will, thus, take specific readings to be the default meaning of DSs, whereas generic meaning is marked interpretation, resulting from addition of information from different sources, including linguistic and non-linguistic knowledge.

### 3. The present study

In this experimental study, we addressed the following issues:

- (a) whether adult native speakers of Brazilian Portuguese, in general, take into consideration discourse contextual information in attributing kind reference to DSs, and

(b) whether the results for (a) correlate with measurements of schizotypal personality traits found within our sample of speakers.

Building on results of previous studies on the semantics of DSs in Brazilian Portuguese and on the impact of schizotypal traits on language, we predict that:

Hypothesis 1 (H1): Brazilian Portuguese adult speakers prefer interpreting DSs as specific, but a generic interpretation emerges whenever it is strengthened by discourse prompts towards kind reference.

Hypothesis 2 (H2): Preference for strong meaning divorced from contextual information is a linguistic marker of schizotypal personality disorder. Thus, speakers with significant loads of schizotypal personality traits should have a significant preference for assigning specific readings to DSs.

### 3.1. Method

#### 3.1.1. Participants

The final sample was composed by 46 participants (20 males and 26 females), mean age of 25.5±4.4, who voluntarily took part in the experiment. Table 1 shows participants' background descriptive information.

Background information			
<i>Age</i>	Range	Mean	
	19-35	23.5 ± 4.4	
<i>Sex</i>	Male	Female	
	20	26	
	43.5%	56.5%	
<i>Level of education</i>	Undergraduate	Graduate	
	26	20	
	56.5%	43.5%	
<i>Family history of mental illness</i>	No	Yes	
	25	21	
	54.3%	45.7%	
<i>Knowledge of other languages</i>	No	Yes	
	3	43	
	6.5%	93.5%	
<i>Handedness</i>	right-handed	left-handed	Ambidextrous
	38	6	2
	82.6%	13%	4.3%

TABLE 1 – Participants' background descriptive information.

Source: produced by authors



## 3.1.2. Material

The experimental task consisted of four written questionnaires: two psychometric scales used to measure schizotypal traits; one language test and 1 background questionnaire used to capture the participants' descriptive information (Table 1).

### 3.1.2.1. Psychometric scales

Individual differences in the schizotypal personality profile within general adult populations are frequently assessed by means of psychometric scales, which can be self-report questionnaires specifically designed to assess schizotypal traits. Literature reports that these questionnaires tap an underlying risk to psychotic illness, particularly schizophrenia. Individuals with high scores on schizotypy psychometric scales have been reported to meet, or partially fulfill, diagnostic criteria for SPD (Raine, 1991, Fonseca-Pedrero et al., 2014). Also, studies focusing on patients with schizophrenia and their healthy relatives show that relatives of patients with schizophrenia score high on schizotypy self-report questionnaires (Docherty et al., 2003), and longitudinal studies show that high schizotypy scores are predictors of psychotic breakdowns (Claridge; Beech, 1995). In addition, schizotypy psychometric scales show a 3-dimension structure that mirrors the three clinical schizophrenia syndromes: *positive*, *negative*, and *disorganized* (Fonseca-Pedrero et al., 2014). The 9 signs and symptoms of schizotypal personality, which are based on the 9 diagnostic criteria of SPD (APA, 2013), can be organized in 3 subgroups of factors (3-dimension model) (see table 2 below) : (i) *positive* (perceptual and thinking dysfunction), (ii) *negative* (social and affective difficulties) and (iii) *disorganized* (cognitive impairments) (Raine, 1991, Reynolds et al., 2000).

The two psychometric scales used in the present study were Schizotypal Personality Questionnaire (SPQ – Raine, 1991) and Formal Thought Disorder-Self (FTD-S – Barrera et al., 2005).

SPQ is a validated scale used to measure variability and abnormal levels of schizotypal traits within the general population. It captures all schizotypal factors, organizing them in accordance with the 3-dimension model, as described in Table 2.

Schizotypal Personality Questionnaire			
9 factors	3 dimensions		
	Range	Range	
1. Ideas of reference	(0-9)	Positive	(0-33)
2. Magical thinking	(0-7)		
3. Unusual perceptual experiences	(0-9)		
4. Suspiciousness (or paranoia)	(0-8)		
5. Social anxiety	(0-8)	Negative	(0-33)
6. No close friends	(0-9)		
7. Constricted affect	(0-8)		
8. Odd speech	(0-9)	Disorganized	(0-16)
9. Odd behavior	(0-7)		

TABLE 2 – SPQ organization in a 9-factor and 3-dimension structure  
Source: produced by authors

The SPQ questionnaire contains 74 yes-or-no questions (yes = 1 and no = 0), reaching, thus, a total score ranging from 0 to 74. As shown in Table 2, the factor *suspiciousness/paranoia* is loaded on both positive and negative dimensions. Thus, its final score is based on the sum of the scores it receives in each of these dimensions.

*Odd speech* features are the schizotypal analog of *formal thought disorder*, one of the main factors of schizophrenia related to impairments in the structure of thought and language (Raine et al., 1995, Çokal et al., 2018). Therefore, given the importance of this factor to language, we also adopted the *Formal Thought Disorder-self (FTD-S)* questionnaire.

The FTD-S covers all classical language symptoms found in both SPD and Schizophrenia (APA, 2013) and is also organized in a 3-dimension model: *odd speech* (positive), *conversational ability or alogia* (negative) and *working memory deficit* (disorganized).

It consists of 29 items to be answered in a 4-point Likert scale, where 1 = “almost never”, 2 = “sometimes”, 3 = “often” and 4 = “almost always”. The global measure (Total FTD-S) is derived by the sum of all the items. Table 3 presents FTD-S organization as well as its scores range.

Formal Thought Disorder-self		
3-factors	3-dimensions	Range
1. <i>Odd Speech</i>	Positive	(15-60)
2. <i>Conversation ability</i>	Negative	(8-28)
3. <i>Working Memory deficits</i>	Disorganized	(8-28)

TABLE 3 – FTD-s in a 3-factor and 3-dimension structure.

Source: produced by authors

To verify associations between schizotypal traits and assignment of meaning to DSs (H2 - hypothesis 2), we conducted correlation analyses between scores on the language-test and scores on SPQ and FTD-S.

### 3.1.2.2. Language test

Speakers' interpretation of DSs was assessed via an offline acceptability judgment task, elaborated for the purpose of the present investigation. We manipulated the following factors: (a) type of discourse antecedent (specific indefinite DP vs. bare singular DP), and (b) size of discourse fragment (long (a three-sentence text) vs. short (a two-sentence text)). Factor (a) was manipulated to test H1 (hypothesis 1), whereas factor (b) was manipulated to verify whether the linear distance between the target DSs and its discourse antecedent would reduce or increase the effect of factor (a).

All linguistic items had the same format: a discourse fragment (short or long), followed by a prompting-an-answer question, followed by a multiple-choice answer table, as illustrated in Figures 1-4. The discourse antecedent was a nominal phrase (specific indefinite or bare singular) placed in the object position of the first sentence of the discourse fragment. The last sentence of the discourse fragment contained a *verbum discendi* (i.e., verb of utterance) followed by an embedded sentence composed by the target DS, in subject position, and a generic predicate. Long discourse fragments, differently from short ones, contained an extra intermediate sentence composed by a predicate marked with past tense and a pronominal subject, as illustrated in Figures 1 and 3 below.

The prompting-an-answer question was always a question started with a *wh*-phrase (see Figures 1-4). The multiple-choice answer table offered three possible answers, corresponding to the two possible referential readings of the target DS (specific or generic) and a no-reference reading (control item). This control item was included to facilitate exclusion of outliers. Participants that assigned a no-reference reading more than once were excluded from the final sample.<sup>1</sup>

<sup>1</sup> For didactic reason, in Figures 1-4, we colored specificity in red and genericity in blue. Also, the target DSs are underlined. The actual experimental items were presented in a neutral way. They did not have any highlight.

**O João comprou uma vassoura de piaçava importada. Ele estava no mercado ontem. Ele me disse que a vassoura é indiana.**

*John bought an imported piassava broom. He was at the market yesterday. He said that the broom is Indian.*

- O que é indiana?  
- What is Indian?

	1	2	3	4
<b>Qualquer vassoura</b> <i>Any broom</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Nenhuma vassoura</b> <i>No broom</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>A vassoura importada que o João comprou</b> <i>The imported broom that John bought</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

FIGURE 1 – Example of an experimental item, condition 1 (discourse fragment: long; antecedent: specific indefinite).  
Source: produced by authors

**O Pedro achou uma bola de couro usada. Ele me falou que a bola é ótima pra jogar altinha na praia.**

*Peter found a used leather ball. He told me that the ball is great to play altinha with at the beach.*

- O que é ótima para jogar altinha?  
- What is great to play altinha with?

	1	2	3	4
<b>Qualquer bola</b> <i>Any ball</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Nenhuma bola</b> <i>No ball</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>A bola usada que o Pedro achou</b> <i>The used ball that Peter found</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

FIGURE 2 – Example of experimental item, condition 2 (discourse fragment: short; antecedent: specific indefinite).  
Source: produced by authors

**O Luís estudou baleia no mestrado. Ele fez faculdade no Canadá. Ele me contou que a baleia dorme na vertical.**

*Louis studied whales for his master. He did his college in Canada. He told me that the whale sleeps vertically.*

- Quem dorme na vertical?  
- Who sleeps vertically?

	1	2	3	4
<b>Qualquer baleia</b> <i>Any whale</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Nenhuma baleia</b> <i>No whale</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>A baleia que o Luís estudou no mestrado</b> <i>The whale that Louis studied for his master</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

FIGURE 3 – Example of an experimental item, condition 3 (discourse fragment: long; antecedent: bare singular).  
Source: produced by authors

**O Renato vendeu faca na juventude. Ele me contou que a faca é da Ásia.**

*Renato sold knives in his youth. He told me that the knife is from Asia.*

- Que faca é da Ásia?  
- What knife is from Asia?

	1	2	3	4
<b>Qualquer faca</b> <i>Any knife</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Nenhuma faca</b> <i>No knife</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>A faca que o Renato vendeu na juventude</b> <i>The knife that Renato sold in his youth</i>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

FIGURE 4 – Example of an experimental item, condition 4 (discourse fragment: short; antecedent: bare singular).  
Source: produced by authors

A total of 20 experimental items (5 per condition) and 30 fillers (10 involving VP ellipsis and 20 involving inalienable possession) were randomized per participant. In addition, a training phase containing 3 items (1 VP ellipsis, 1 inalienable possession, and 1 quantification) were included at the beginning of the experiment.

As exemplified in Figures 1-4, participants saw all the answer choices at once in a randomized order, and a 4-point Likert scale was used to evaluate each answer option. Therefore, each answer choice received a numerical grade from 1 to 4. A single meaningful score per experimental item was

obtained by inverting the score attributed to the generic reading and adding it up to the score attributed to the specific reading. Thus, if a participant assigned 2 to the specific reading and 1 to the generic reading in the experimental item presented in Figure 1, the total score for this experimental item was 4 (2 was inverted to 3 and added to 1). This inversion method allowed us to create an 8-point scale of specificity, where lower scores indicate a tendency towards genericity. Accordingly, the highest value in the scale of specificity per condition was 40 (8 per item) and the lowest was 10 (2 per item).

Thus, in line with our H1 and with the factors manipulated by us, we predict that scores close to 40 should be attributed to the experimental items of condition 2, illustrated in Figure 2, where the given antecedents were specific indefinite DPs and its distance from the target DSs was short. Contrastively, the experimental items of condition 4 (Figure 4) should get scores close to 10, as the given antecedents were bare singulars (kind-reference, see section 2 above) and their distance from the target DSs was short. In conditions 1 and 3, the long distance between the antecedent and the target DSs should reduce the effect of type of antecedent (specific indefinite in condition 1 and bare singular in condition 3), and, as a result, the experimental items of these conditions should get scores between 20 and 30 in our scale of specificity.

### 3.1.3. Background questionnaire

As described in section 4.1.1, speakers also completed a background questionnaire.

### 3.1.4. Research proposal

The totality of the present investigation was presented to and approved by the Ethics Committee of Pontifical Catholic University of Rio de Janeiro (PUC-Rio). Participants provided an informed consent in accordance with the Brazilian CNS-CONEP resolution N°196/96 version 2012.

### 3.1.5. Procedure

The questionnaires were presented in a written format, and the tasks were completed in the following order: (i) FTD-S questionnaire; (ii) Language test; (iii) SPQ questionnaire; and (iv) Background questionnaire. The experiment was presented on a computer (MacBook Pro, or Dell PC). Both psychometric scales were presented in their original format: in a single page, with participants seeing all items at once. The background questionnaire was also presented in a single page format. The experimental items of the language-test were presented separately, one per slide, being randomized per participant. Completion of the task involved answering all the items of all 4 questionnaires.

3.2. Statistical analysis

The final scores of the language test were normalized (z-scored) and all 4 conditions were compared within participants. A within-subject ANOVA was conducted. After that, Pearson correlation analyses were conducted between scores on the language test and scores on the psychometric scales. Spearman correlations were also conducted between the data from the language test and the background variables, except for the age variable, for which Pearson correlation was applied.

Whenever significant correlations were found, quartiles were used to group participants based on their final scores in each condition of the language test: Group A (lower quartile): group of participants whose final scores indicated preference for generic interpretations; Group B (interquartile): group of participants whose final scores indicated no interpretative preference; Group C (upper quartile): group of participants whose final scores indicated preference for specific interpretations. Independent-samples t-tests were conducted between these groups.

3.3. Results

Language test

A significant main effect of type of antecedent ( $F(1,45) = 470.90; p = .001$ ) and a significant interaction between type of antecedent and type of discourse fragment ( $F(1,45) = 13.77; p = .001$ ) were found. The factor type of discourse fragment had no significant effect, but a pairwise comparison between conditions 3 and 4 reached significance after Bonferroni correction (see Figure 5).

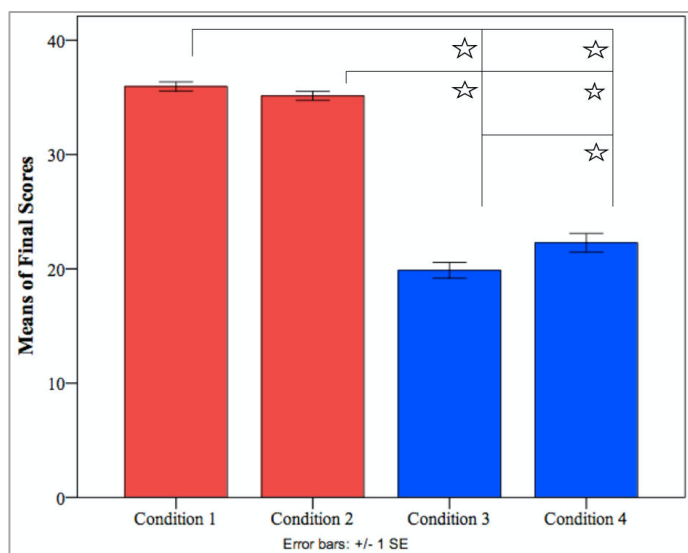


FIGURE 5 – Means of final scores per conditions. Condition 1: long discourse-fragment, specific-indefinite antecedent; Condition 2: short discourse fragment, specific-indefinite antecedent; Condition 3: long discourse-fragment, bare-singular antecedent; Condition 4: short discourse-fragment, bare-singular antecedent. \* Indicates significant effect.

Source: produced by authors

The means of final scores in condition 1 ( $36.0 \pm 2.7$ ) and condition 2 ( $35.1 \pm 2.7$ ) were close to 40, which indicates a general preference for specific readings in these conditions. The means of final scores in condition 3 ( $19.9 \pm 4.7$ ) and condition 4 ( $22.3 \pm 5.5$ ) were close to 25, suggesting no preference for either reading in these conditions.

Psychometric scales and correlations with the language-test data

The SPQ total scores of our sample ranged from 5 to 54, mean of  $29.3 \pm 12.8$  (Table 4), and the FTD-S total score ranged from 32 to 79, mean of  $52.0 \pm 10.0$  (Table 5)

Schizotypal Personality Questionnaire			
9-factors	Mean	3-dimensions	Mean
1. Ideas of reference	$4.2 \pm 2.0$	Positive	$13.0 \pm 6.5$
2. Magical thinking	$2.0 \pm 2.1$		
3. Unusual perceptual experiences	$3.1 \pm 2.5$		
4. Suspiciousness (or paranoia)	$3.7 \pm 2.4$	Negative	$13.6 \pm 6.7$
5. Social anxiety	$4.5 \pm 2.5$		
6. No close friends	$2.8 \pm 2.3$		
7. Constricted affect	$2.6 \pm 1.6$		
8. Odd speech	$3.8 \pm 2.4$	Disorganized	$6.4 \pm 4.5$
9. Odd behavior	$2.6 \pm 2.5$		

TABLE 4 — Means of the SPQ total scores.  
Source: produced by authors

Formal Thought Disorder-self			
3-factors	3-dimensions		Mean
1. Odd Speech	Positive		$25.5 \pm 5.0$
2. Conversation ability	Negative		$13.2 \pm 3.5$
3. Working Memory deficits	Disorganized		$13.4 \pm 3.8$

TABLE 5 — Means of the FTD-S total scores.  
Source: produced by authors

Only SPQ scores showed significant associations with observations from the language test. Particularly, observations from conditions 1 correlated positively with the negative dimension of SPQ and with factor 3 (unusual perceptual experiences), while observations from condition 2 correlated negatively with factor 7 (constricted affect).



Pearson Correlations (n=46)		SPQ factor 3	SPQ factor 7	SPQ negative
Condition 1 (long, indefinite-specific)	Pearson Corr.	-.043	<b>.386</b>	<b>.317</b>
	Sig. (2-tailed)	.779	<b>.008</b>	<b>.032</b>
Condition 2 (short, indefinite-specific)	Pearson Corr.	<b>-.325</b>	.147	.083
	Sig. (2-tailed)	<b>.027</b>	.329	.584

TABLE 6 – Pearson correlations between three SPQ subscales scores (unusual perceptual experiences [factor 3] and constrict affect [factor 7] factors and negative dimension) and data from conditions 1 and 2 of the language test. Significant correlations are in bold. Source: produced by authors.

Also, T-tests comparisons reached significance between scores on SPQ factor 7 (constricted affect) and scores on condition 1 of the language test ( $t(33) = -2.68; p = .011$ ), teasing apart the language groups A (preference for generic reading), group C (preference for specific readings), as shown in Figure 6. Multiple linear regression showed that the constricted affect factor differentiates all language groups based on their scores on condition 1 ( $F(1,44) = 7.19; p = .01; R^2 = .14$ ). That is, participants of group C had the highest score on SPQ factor 7.

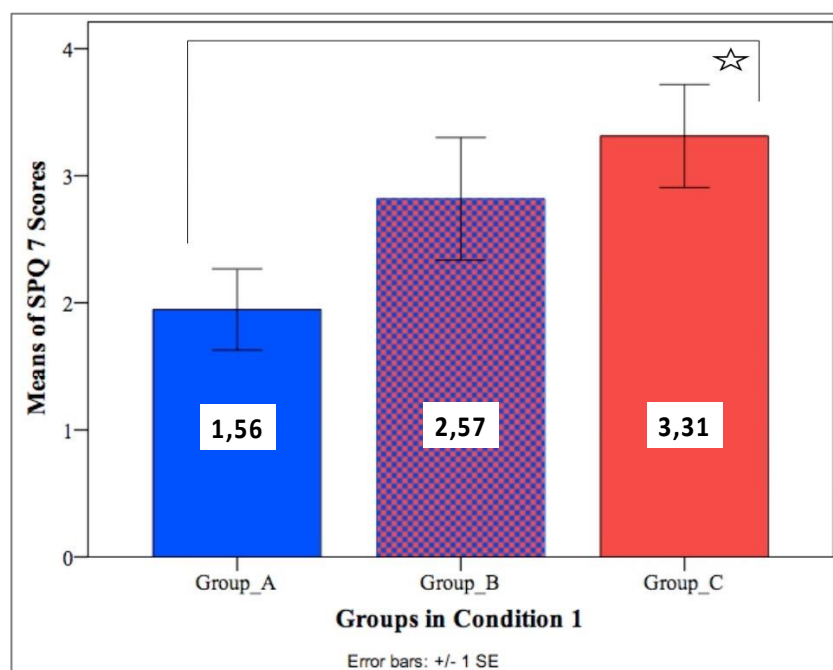


FIGURE 6 – Means of SPQ factor 7 (*constricted affect*) scores per group. Groups reflect participants final scores in condition 1 of the language test. Group A (preference for generic reading) consisted of 20% of the participants, Group B: (no preferential reading) consisted of 45% of the participants, and Group C (preference for specific reading) consisted of 35% of the participants. \*T-test comparisons significant. Source: produced by authors.

On the other hand, in condition 2, T-tests comparisons reached significance in SPQ factor 3 (unusual perceptual experiences) scores between groups A (preference for generic reading) and C

(preference for specific reading) ( $t(13.99) = 2.91; p = .011$ ), and between groups C and B (no preference) ( $t(32.88) = 3.49; p = .002$ ). Figure 7 shows that participants of groups A and B, in contrast to participants of group C, had the highest scores on factor 3. Multiple linear regression showed that the unusual perceptual experiences trait differentiates all language groups based on their scores on condition 2 ( $F(1,44) = 5.39; p = .025; R^2 = 0.11$ ).

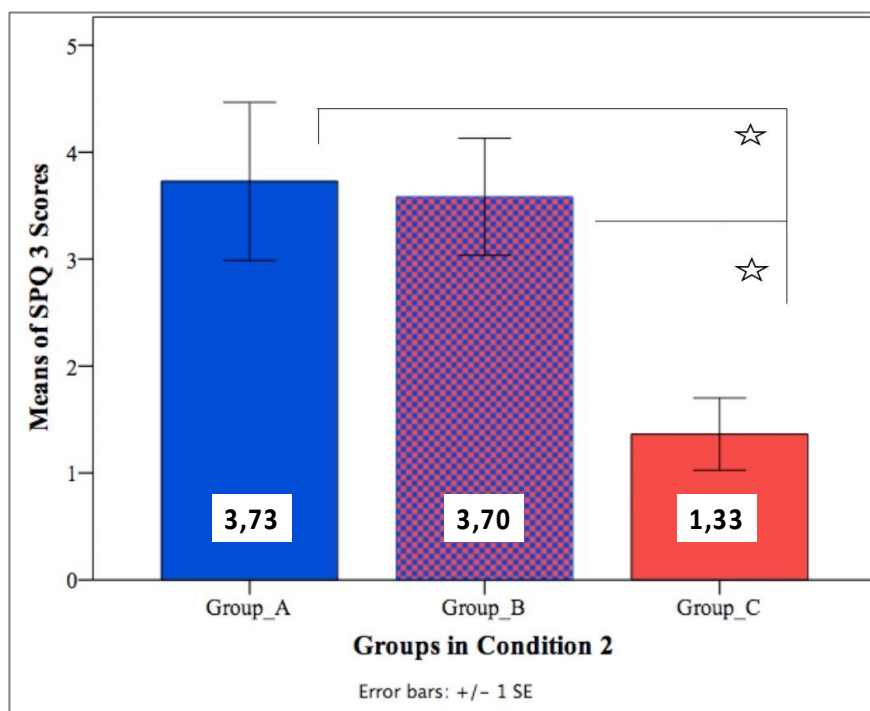


FIGURA 7 – Means of SPQ factor 3 (unusual perceptual experiences) scores per group. Groups reflect participants final scores in condition 2 of the language test. Group A (preference for generic reading) consisted of 24% of the participants, Group B (no preferential reading) consisted of 50% of the participants, and Group C (preference for specific reading) consisted of 26% of the participants. \*T-test comparisons significant.

Source: produced by authors

In short, the following associations were found between factors of SPQ scale and conditions of the language test: (a) the higher the score on negative factors of SPQ, particularly on factor 7 (*constricted affect*, a negative trait), the higher the preference for a specific reading on condition 1, and (b) the lower the score on SPQ factor 3 (*unusual perceptual experiences*, a positive trait), the higher the preference for a specific reading on condition 2. The scores on SPQ factors 3 and 7, respectively, were predictors of the groups' performances on conditions 2 and 1 of the language test.

## Background variable and correlations with the language-test data

No correlation was found between variables of the background questionnaire and observations of the language test.

### 3.4 Discussion

As aforementioned, the present study aimed at verifying:

- (a) whether adult native speakers of Brazilian Portuguese have a general preference for interpreting DSs as specific, attributing generic readings only if the target DS is linked to kind reference (H1); and
- (b) possible correlations between schizotypal personality traits and linguistic variations at the reference level, predicting that individuals with significant loads of schizotypal traits have a significant preference for attributing specific readings to DSs, at the expense of contextual information towards kind reference (H2).

The results obtained are partially in accordance with H1 and H2. The primary findings indicate a general preference for specific interpretation, which is in conformity with H1.

Scores on conditions 1 and 2 were close to 40 on the adopted specificity scale, showing that a DS, in the presence of an entity-referring antecedent, is readily interpreted as specific. Contrary to our predictions, however, the distance between the DS and the antecedent had no significant effect on either condition 1 (long distance) or 2 (short distance). Thus, specific interpretations seem not to be subject to constraints on inter-sentential distance between the target DS and its discourse antecedent.

As for conditions 3 and 4, the obtained scores indicate significant increase in the acceptability of generic reading. Also, type of discourse-fragment distinguished condition 3 (long) from condition 4 (short), with condition 3 receiving significantly lower scores than condition 4. Altogether these partial results suggest that the presence of a kind-referring antecedent does indeed strengthen generic readings. In this regard, our observations from conditions 3 and 4 are also aligned with H1 and support the formal analyses of DSs discussed in section 2.

There are two remarks to be made, however. First, the presence of a kind-referring antecedent (a bare singular), on conditions 3 and 4, did not fully override a specific reading. Final scores were close to 25 on the specificity scale, indicating that speakers had no preference for either specific or generic reading on these conditions. We did not foresee this outcome, as we predicted that scores for condition 4 would center around the lower end of the specificity scale (10 points). Since condition 4 was designed to favor generic readings the most, we expected a well-defined preference for generic readings in this condition. Second, the greater preference for generic readings in condition 3 than in condition 4 is not in accordance with our predications either.

The literature on reference dependencies involving anaphors, pronouns and DPs has suggested that a reference dependency between an antecedent and its dependent is subject to factors related to

accessibility, including the distance between the antecedent and its dependent: remote mentioned antecedents are less accessible than most recent mentioned ones (Givón, 1983, Ariel, 1988, 1990, 1994, La Fuente, 2015). Guided by this, we expected that the presence of an intervening sentence in condition 3 would decrease the acceptability of generic readings in this condition, by reducing the availability of the bare singular as an antecedent. The result we obtained points towards the opposite: the further the bare singular antecedent is, the more acceptable the generic reading is. In view of this observation, we reason that full definite singular DPs (DSs), pronouns and anaphors are not subject to the same interpretative conditions. Indeed, in Ariel's accessibility marking scale (Ariel, 1990, 1994), full definite descriptions are used to retrieve referents that are less accessible. Contrastively, when the referent is highly accessible, pronouns and anaphors are used. This provides a rationale for our results: since our target DSs were all full DPs, the participants' grammar had a preference for linking them to less accessible antecedents (condition 3). High accessible antecedents (condition 4) increase preference for disjointness in reference. Consequently, scores were higher in the specific scale in condition 4 than in condition 3.<sup>2</sup>

Overall, our results are in accordance with the literature on the semantics of Brazilian Portuguese DSs, showing that specific readings are the default meaning of DSs, whereas generic reading is non default, emerging when coerced by discourse and contextual information (Munn; Schmitt, 1999, Müller, 2002; Dobrovie-Sorin; Pires de Oliveira, 2008). Also, in line with Augusto's (2007) results, our experimental observations indicate that adult native speakers of Brazilian Portuguese do use discourse information in attributing reference to DSs. Also, our findings deepen our understanding about the semantics of DSs, showing that a generic interpretation is controlled by factors such as accessibility of the antecedent.

As for the correlations found between observations from the language task and scores on SPQ negative dimension and factors 3 and 7, they indicate that the meaning attributed to DSs might vary among speakers as a function of variation in schizotypal personality traits, in conformity with H2.

Higher scores on *constricted affect* and lower scores on *unusual perceptual experiences* were predictors of preference for specific reading in conditions 1 and 2, although showing a dissociative pattern.

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<sup>2</sup> After assessing the examples given in figure 3 and 4 (experimental items of conditions 3 e 4 respectively), two reviewers considered that the results obtained on these specific conditions might reflect other factors, such as plausibility of the target reading due to world knowledge. According to their intuition, attribution of generic reading seems to be more plausible in example 3 than in example 4. While we acknowledge this possibility, let us inform that we verified the score means of all experimental items, and there was no outstanding difference among items within each condition. Also, let us add that condition 3 contained the experimental item in (i), which is similar to the item given in figure 4 in terms plausibility of generic reading due to world knowledge, while condition (4) contained the experimental item in (ii), which is rather similar to the item given in figure 3.

(i) O meu primo criou abelha na infância. Ele viveu um sítio em Minas. Ele me falou que a abelha é muito pouco estudada.  
'My cousin grew bees during his childhood. He lived in a ranch in Minas. He told me the bee é understudied.'

(ii) A Dona Maria fez pão a vida inteira. Ela falou que o pão leva muito fermento.  
'Mrs. Maria baked bread her whole life. She told me the bread takes a lot of baking soda.'

Thus, we may say that these traits manifest themselves linguistically as a hypersensitivity to specificity, the default meaning the DSs.

The literature aforementioned (section 1) present evidence that speakers with schizophrenia and high schizotypy have difficulties integrating information from different sources to build linguistic reference. Studies focusing on discourse processing, for instance, have reported that these speakers tend to be more influenced by the strong lexical meaning of words than by the context in which they appear (Chapman; Chapman; Miller, 1964, Ditman; Kuperberg, 2007, Kiang, 2010). In view of that, our findings can be interpreted as substantiating the conclusion that schizotypy is associated with a significantly stronger attachment to strong/default readings. However, it is to be noticed that speakers with high scores on *constricted affect* and speakers with low scores on *unusual perceptual experiences* did not present a contrastive interpretative pattern in conditions 3 and 4. This is not explained by an analysis in terms of inability to use contextual or discursive cues. The results of conditions 3 and 4 suggest that speakers with high personality traits of *constricted affect* and low of *unusual perceptual experiences* were fully able to interpret the target DSs in tandem with the antecedent's reference.<sup>3</sup>

We speculate that the correlations found might also be suggestive of a diminishment of cognitive empathy, the ability to perceive, understand and accommodate others' cognitive states and thinking, being, thus, related to perspective-taking (Rueckert; Naybar, 2008). As mentioned in section 1, low cognitive and affective empathy has been reported in schizophrenia and schizotypy, particularly in connection with negative traits (Henry; Bailey; Rendell, 2008, Wang et al., 2013, Wang et al., 2015). Our experimental observations might be associated with this. Speakers with high scores on negative traits, *constrict affect* in particular, and low scores on *unusual perceptual experiences*, are too faithful to the default meaning of definite DPs because they have difficulties accommodating different interpretative options. In contrast, speakers with regular loads of schizotypal traits are more likely to negotiate meaning, being more open to others' perspective. We believe this interesting line of reasoning contributes to a better understanding of cognitive abilities involved in building linguistic reference, although we cannot push it any further here, as it would require analyzing cognitive empathy measures in association with the results of our present study.

To conclude, let us add that our findings show that schizotypal traits interfere with semantics, especially with the interpretations of definite DPs. Thus, while building samples for linguistic analyses, particularly for those involving semantic interpretations, researchers should control for the presence of schizotypal traits within the speaking population under consideration.

Some limitations of the present study need to be acknowledged. First, it had a small sample size. Future research should increase the sample to include a demographically more diverse set of participants, especially with respect to educational level. Second, although our results point towards an

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<sup>3</sup> A reviewer suggested that the correlations we found equally support the conclusion that the schizotypal traits at hand decrease the speaker's ability to process discourse cues. First, let us observe that it is not the case that our sample of speakers with the traits at issue was unable to process the cues contained in the discourse fragments we provided, they were rather more sensitive to cues towards specify, as compared to the other speakers (control sample). Second, the literature on schizotypy, schizophrenia and language indicate that difficulties in contextualizing the reference of definite noun phrases is also observed in production.

association between language and schizotypal personality traits, indicating a promising line of research in the intersection between linguistics and neuroscience, further investigations are necessary, making use of other instruments to measure schizotypy traits, such as third-person informants, structured interviews, and other measures of cognitive abilities, including measures of cognitive empathy as suggested above.

## Additional information

Evaluation: <https://doi.org/10.25189/rabralin.v21i1.2092.R>

Data availability:

Supplementary material available at: <https://www.dropbox.com/scl/fo/zfsljj6y4rwdh18mwqqjs/h?dl=0&rlkey=qq3gapoud25gyhw9rf77czo8j>

Ethics: The protocol was approved by the Ethical Committee of Pontifícia Universidade Católica do Rio de Janeiro, PUC-Rio, and followed the principals of Plataforma Brasil. Participants read and signed a consent form, informing details of the experiment, in accordance with the Brazilian CNS-CONEP resolution No. 196/96 version 2012.

Conflict of Interest

All authors declare that they have no conflicts of interest.

Acknowledgements

First author: Daniel Mograbi, Neuropsychology / PUC-Rio, Sidarta Ribeiro, Neuroscience / UFRN for important feedback. Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) and Fundação Carlos Chagas Filho Fundação de Amparo à Pesquisa do Estado do Rio de Janeiro (FAPERJ) for financial support.

Second author: Conselho Nacional de Pesquisa (CNPq) (Edital Humanidades, processo número 439434/2018-1) for financial support.

## REFERENCES

AMERICAN PSYCHIATRIC ASSOCIATION (APA). *Diagnostic and statistical manual of mental disorders*. 5th ed. Washington, DC: The Association, 2013. <https://doi.org/10.1176/appi.books.9780890425596>.

ARIEL, M. Referring and accessibility. *Journal of Linguistics*, 24, 65-87, 1988. DOI: <https://doi.org/10.1017/S0022226700011567>.

- ARIEL, M. *Accessing noun phrase antecedents*. London: Routledge, 1990. <https://doi.org/10.4324/9781315857473>.
- ARIEL, M. Interpreting anaphoric expressions: a cognitive versus a pragmatic approach. *Journal of Linguistics*, 30, 3-42, 1994. DOI: <https://doi.org/10.1017/S0022226700016170>.
- AUGUSTO, M. Marcação de número e genericidade: interpretação genérica na aquisição do PB. *Letras de Hoje*, 42, 35-51, 2007.
- BARRERA, A.; HANDEL, A.; KONDEL, T.K.; LAWS, K.R. Formal Thought Disorder: self-report in non-clinical populations. *International Journal of Psychology and Psychological Therapy*, 15(1), 155-167, 2017.
- BORA, E. Theory of mind and schizotypy: a meta-analysis. *Schizophrenia Research*, 222, 97-103, 2020. <https://doi.org/10.1016/j.schres.2020.04.024>.
- BORER, H. Exo-skeletal vs. endo-skeletal explanations: syntactic projections and the lexicon. In MOORE, J.; POLINSKY, M. *The nature of explanation in linguistic theory*. Chicago: Chicago University Press. 31-67, 2003.
- BORIK, O.; ESPINAL, M.T. Reference to kinds and to other generic expressions in Spanish: definiteness and number. *The Linguistic Review*, 32, 167-225, 2015. <https://doi.org/10.1515/tlr-2014-0023>.
- CARLSON, G.M. Reference to kinds in English. PhD thesis, University of Massachusetts, Amherst, 1977.
- CHAIKA, E., LAMBE, R. Cohesion in schizophrenic narratives, revisited. *Journal of Communication Disorders*, 22, 407-421, 1989. [https://doi.org/10.1016/0021-9924\(89\)90034-8](https://doi.org/10.1016/0021-9924(89)90034-8).
- CHAPMAN, L.J., CHAPMAN, J.P., & MILLER, G.A. A theory verbal behavior in schizophrenia. In MAHER, B.A. *Progress in experimental personality research*. New York: Academic Press. 49-77, 1964.
- CHAMPAGNE-LAVAU, M.; STIP, E.; JOANETTE Y. Social cognition deficit in schizophrenia: accounting for pragmatic deficits in communication abilities? *Current Psychiatry Reviews*, 2, 309-315, 2006. <https://doi.org/10.2174/157340006778018184>.
- CHIERCHIA, G.; MCCONNELL-GINET, S. *Meaning and Grammar*. Cambridge, MA: The MIT Press, 2000.
- CHOMSKY, N. *Language and thought*. London: Moyer Bell, 1993.
- CHOMSKY, N. *New horizons in the study of language and mind*. Cambridge: Cambridge University Press, 2000. <https://doi.org/10.1017/CBO9780511811937>.
- CHOMSKY, N. *The science of language: interviews with James McGilvray*. Cambridge: Cambridge University Press, 2012. <https://doi.org/10.1017/CBO9781139061018>.
- CIMPIAN, A.; MARKMAN, E.M. Preschool children's use of cues to generic meaning. *Cognition*, 107, 19-53, 2008. <https://doi.org/10.1016/j.cognition.2007.07.008>.
- CLARIDGE, G. Theoretical background and issues. In CLARIDGE, G. *Schizotypy: Implications for Illness and Health*. Oxford: Oxford University Press. 3-18, 1997. <https://doi.org/10.1093/med:psych/9780198523536.001.0001>.
- CLARIDGE, G.; BEECH, T. Fully and quasi-dimensional constructions of schizotypy. In Raine, A.; Lencz, T.; Mednick, S. A. *Schizotypal Personality*. Cambridge: Cambridge University Press. 192-216, 1995. <https://doi.org/10.1017/CBO9780511759031.010>.



ÇOKAL, D.; SEVILLA, G.; JONES, W.S.; ZIMMERER, V.; DEAMER, F.; DOUGLAS, M.; SPENCER, H.; TURKINGTON, D.; FERRIER, N.; VARLEY, R.; WATSON, S.; HINZEN, W. *The language profile of formal thought disorder*. NPJ Schizophrenia, 4, 18, 2018. DOI: <https://doi.org/10.1038/s41537-018-0061-9>.

DAYAL, V. Number marking and (in)definiteness in kind terms. *Linguistics and Philosophy*, 27, 393–450, 2004. DOI: <https://doi.org/10.1023/B:LING.0000024420.80324.67>.

DEBBANÉ, M.; BARRANTES-VIDAL, N. Schizotypy from a developmental perspective. *Schizophrenia Bulletin*, 41(2), 386–395, 2015. Doi: <https://doi.org/10.1093/schbul/sbu175>.

DITMAN, T.; KUPERBERG, G.R. The time course of building discourse coherence in schizophrenia: an ERP investigation. *Psychophysiology*, 44, 991–1001, 2007. <https://doi.org/10.1111/j.1469-8986.2007.00565.x>.

DOBROVIE-SORIN, C.; OLIVEIRA, R.P. Reference to kinds in Brazilian Portuguese: the definite singular vs. bare singulars. In Grønn, Atle *Proceedings of SuB12*, Oslo: ILOS. 107–121, 2008. ISBN 978-82-92800-00-3.

DOCHERTY, N.M.; COHEN, A.S.; NIENOW, T.M.; DINZEO, T.J.; DANGELMAIER, R.E. Stability of formal thought disorder and referential communication disturbances in schizophrenia. *Journal of Abnormal Psychology*, 112(3), 469–475, 2003. DOI: <https://psycnet.apa.org/doi/10.1037/0021-843X.112.3.469>.

EYSENCK, H.J. *The biological basis of personality*. (1st ed.). Routledge. 2006  
<https://doi.org/10.4324/9781351305280>.

FONSECA-PEDRERO, E.; FUMERO, A.; PAINO, M.; DE MIGUEL, A.; C, J.; LEMO-GIRÁLDEZ, S.; MUÑIZ, J. Schizotypal Personality Questionnaire: new sources of validity evidence in college students. *Psychiatric Research*, 219, 214–220, 2014. Doi: <http://dx.doi.org/10.1016/j.psychres.2014.04.054>.

GELMAN, S.A.; RAMAN, L. Preschool Children Use Linguistic Form Class and Pragmatic Cues to Interpret Generics. *Child Development*, 74, 308–325, 2003. <https://doi.org/10.1111/1467-8624.00537>.

GIVÓN, T. *Topic Continuity in Discourse*. Amsterdam: John Benjamins, 1983. <https://doi.org/10.1075/tsl.3>.

HARVEY, P.D.; WEINTRAUB, S.; NEALE, J.M. Speech competence of children vulnerable to psychopathology. *Journal of Abnormal Child Psychology*, 10(3), 373–387, 1982. PMID:7175044. <https://doi.org/10.1007/BF00912328>.

HENRY, J.D.; BAILEY, P.E.; RENDELL P.G. Empathy, social functioning and schizotypy. *Psychiatry Research*, 160, 15–22, 2008. <https://doi.org/10.1016/j.psychres.2007.04.014>.

HINZEN, W.; SHEEHAN, M. *The philosophy of universal grammar*. Oxford: Oxford University Press, 2015.  
<https://doi.org/10.1093/acprof:oso/9780199654833.001.0001>.

HUMPHREY, M.K.; BRYSON, M.F.; GRIMSHAW, M. Metaphor processing in high and low schizotypal individuals. *Psychiatry Research*, 178, 290–294, 2010. <https://doi.org/10.1016/j.psychres.2009.06.002>.

JOHNS, L.C.; VAN OS, J. The continuity of psychotic experience in the general population. *Clinical Psychology Review*, 21, 1125–1141, 2001. [https://doi.org/10.1016/s0272-7358\(01\)00103-9](https://doi.org/10.1016/s0272-7358(01)00103-9).

KIANG, M. Schizotypy and language: a review. *Journal of Neurolinguistics*, 23(3), 193–203, 2010. DOI: <https://doi.org/10.1016/j.jneuroling.2009.03.002>.

KIMBLE, M.; LYONS, M.; O'DONNELL, B.; NESTOR, P.; NIZNIKIEWICZ, M.; TOOMEY, R. The effect of family status and schizotypy on electrophysiologic measures of attention and semantic processing. *Biological Psychiatry*, 47, 402–412, 2000. [https://doi.org/10.1016/S0006-3223\(99\)00184-5](https://doi.org/10.1016/S0006-3223(99)00184-5).



- KRIFKA, M.; PELLETIER, F.J.; CARLSON, G.; TER MEULEN, A.; CHIERCHIA, G.; LINK G. *Genericity: an introduction*. In Carlson, G.N.; Pelletier, F. J. (Eds.) *The generic book*. Chicago: Chicago University Press. 1-24, 1995.
- KUPERBERG, G.R.; MCGUIRE, P.K.; DAVID, A.S. Reduced sensitivity to linguistic context in schizophrenic thought disorder: evidence from online monitoring for words in linguistically-anomalous sentences. *Journal of Abnormal Psychology*, 107, 423-434, 1998. <https://doi.org/10.1037//0021-843x.107.3.423>.
- KUPERBERG, G.R.; KREHER, D.A.; GOFF, D.; MCGUIRE, P.K.; DAVID A.S. Building up linguistic context in schizophrenia: evidence from self-paced reading. *Neuropsychology*, 20, 442-452, 2006. <https://doi.org/10.1037/0894-4105.20.4.442>.
- LANGDON, R.; COLTHEART, M. Recognition of metaphor and irony in young adults: the impact of schizotypal personality traits. *Psychiatry Research*, 125 (1), 9-20, 2004. <https://doi.org/10.1016/j.psychres.2003.10.005>.
- LENZENWEGER, M.F. Schizotaxia, schizotypy, and schizophrenia: Paul E. Meehl's blueprint for the experimental psychopathology and genetics of schizophrenia. *Journal of Abnormal Psychology*, 115, 195-200, 2006. <https://doi.org/10.1037/0021-843X.115.2.195>.
- LA FUENTE, I. Putting pronoun resolution in context: the role of syntax, semantics, and pragmatics in pronoun interpretation. PhD thesis, Université Paris Diderot, 2015.
- LOPES, R. Bare Nouns and DP number agreement in the acquisition of Brazilian Portuguese. In Sagarra, N.; Toribio, A.J. *Selected Proceedings of the 9th Hispanic Linguistics Symposium*. Cambridge, MA: Cascadilla Press, 2006.
- MARATSOS, M.P. *The use of definite and indefinite reference in young children: an experimental study in language acquisition*. Cambridge: Cambridge University Press, 2009 (1976).
- MEEHL, P. E. Schizotaxia, Schizotypy, Schizophrenia. *American Psychologist*, 17(12), 827-838, 1962. <https://psycnet.apa.org/doi/10.1037/h0041029>.
- MEEHL, P.E. Toward an Integrated Theory of Schizotaxia, Schizotypy and Schizophrenia. *Journal of Personality Disorders*, 4,(1) 1-99, 1990. <https://doi.org/10.1521/pedi.1990.4.1.1>.
- MORGAN, C.; BEDFORD, N.; ROSSELL, S.L. Evidence of semantic disorganization using semantic priming in individuals with high schizotypy. *Schizophrenia Research*, 84(2-3), 272-80, 2006. <https://doi.org/10.1016/j.schres.2006.01.020>.
- MUNN, A.; SCHMITT, C. Bare nominals and the morpho-syntax of number. In Cresti, D.; Satterfield, T.; Tortora, C. *Current issues in romance linguistics. Selected papers from the XXIX Linguistic Symposium on Romance Languages (LSRL)*. Amsterdam: John Benjamin. 217-231, 1999.
- MUNN, A.; SCHMITT, C. Number and indefinites. *Lingua*, 115, 821-855, 2005. <https://doi.org/10.1016/j.lingua.2004.01.007>.
- MÜLLER, A. Genericity and the Denotation of Common Nouns in Brazilian Portuguese. *D.E.L.T.A.*, 18, 287-308, 2002. <https://doi.org/10.1590/S0102-44502002000200005>.
- NUNN, J.; PETERS, E. Schizotypy and patterns of lateral asymmetry on hemisphere- specific language tasks. *Psychiatry Research*, 103, 179-192, 2001. [https://doi.org/10.1016/S0165-1781\(01\)00273-6](https://doi.org/10.1016/S0165-1781(01)00273-6).

PIETROSKI, P. The character of natural language semantics. In Barber, A. *The epistemology of language*. Oxford: Oxford University Press. 217–256, 2003.

RADO, S. Dynamics and classification of disordered behavior. *American Journal of Psychiatry*, 110, 406–416, 1953. <https://doi.org/10.1176/ajp.110.6.406>.

RAINE, A. The SPQ: A scale for the assessment of schizotypal personality based on DSM-III-R criteria. *Schizophrenia Bulletin*, 17(4), 555–564, 1991. DOI: <https://doi.org/10.1093/schbul/17.4.555>.

RAINE, A.; LENCZ, T.; MEDNICK, S.A.; SARNOFF, A. *Schizotypal personality*. New York: Cambridge University Press, 1995.

RAPP, A.; LANGOHR, K.; MUTSCHLER, D.; WILD, B. Irony and Proverb Comprehension in Schizophrenia: Do Female Patients “Dislike” Ironic Remarks? *Schizophrenia Research and Treatment*, 2014, 1–10, 2014. <http://dx.doi.org/10.1155/2014/841086>.

REYNOLDS, C.A.; RAINE, A.; MELLINGEN, K.; VENABLES, P.H.; MEDNICK, S.A. Three-factor model of schizotypal personality: invariance across culture, gender, religious affiliation, family adversity, and psychopathology. *Schizophrenia Bulletin*, 26(3), 603–18, 2000. <https://doi.org/10.1093/oxfordjournals.schbul.a033481>.

ROCHESTER, S.; MARTIN, J.R. *Crazy Talk: A Study of the Discourse of Schizophrenic Speakers*. New York: Plenum Press, 1979.

RODRIGUEZ-FERRERA, S.; MCCARTHY, R.A.; MCKENNA, P.J. Language in schizophrenia and its relationship to formal thought disorder. *Psychological Medicine*, 31(2), 197–205, 2001. <https://doi.org/10.1017/s003329170100321x>.

RUECKERT, L.; NAYBAR, N. Gender differences in empathy: the role of the right hemisphere. *Brain and Cognition*, 67, 162–167, 2008. <https://doi.org/10.1016/j.bandc.2008.01.002>.

SEVILLA, G.; ROSSELLÓ, J.; SALVADOR, R.; SARRÓ, S.; LÓPEZ-ARAQUISTAIN, L.; POMAROL-CLOTET, E.; HINZEN, W. Deficits in nominal reference identify thought disordered speech in a narrative production task. *PLoS ONE*, 13, 2018. e0201545. <https://doi.org/10.1371/journal.pone.0201545>.

STANTON, R. *Meaning and reference: some chomskynian themes*. In Lepore, E.; Smith, B. *Handbook of philosophy of language*. Oxford: Oxford University Press. 913–940, 2006.

TOVAR, A.T.; SCHMEISSER, N.W.; GARÍ, S.A.; MOREY, M.C.; HINZEN, W. Language disintegration under conditions of severe formal thought disorder. *Glossa: a journal of general linguistics*, 134, 1–24, 2019. <https://doi.org/10.5334/gjgl.720>.

WANG, Y.; NEUMANN, D.; SHUM, D.; LIU, W.-H.; SHI, H.; YAN, C.; LUI, S.; ZHANG, Q.; LI, Z.; CHEUNG, E.; CHAN, R. Cognitive empathy partially mediates the association between negative schizotypy traits and social functioning. *Psychiatry Research*, 210(1), 62–68, 2013. <https://doi.org/10.1016/j.psychres.2013.03.015>.

WANG, Y.; LUI, W.-H.; LI, Z.; WEI, X.-H.; JIANG, X.-Q.; NEUMANN, D.L.; SHUM, D.H.; CHEUNG E.F.; CHAN, R.C. Dimensional schizotypy and social cognition: an fMRI imaging study. *Frontiers in Behavioral Neuroscience*, 9, 133, 2015. <https://doi.org/10.3389/fnbeh.2015.00133>.