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ON THE COGNITIVE ORGANIZATION OF THE PHONOLOGICAL VARIATION

SOBRE A ORGANIZAÇÃO COGNITIVA DA VARIAÇÃO FONOLÓGICA*

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ABSTRACT: In this article, we address the issue of the cognitive organization of linguistic variation based on the assumptions of Usage-Based Models using data from the controlled production of word-final coda (r) variants, in nouns and verbs, by speakers of the Carioca Portuguese. The hypothesis is that the detailed representation of the phonetic forms of items with final coda (r) contains all the phonetic possibilities of the coda in the Carioca variety ([χ, ɣ, h, ɦ] and others from experience with different varieties of BP), in addition to the absence of the coda, and that the exemplar representation is organized around a dominant variant. Data were obtained through the controlled production of infinitives and nouns, using the priming technique, defined as a cognitive phenomenon detected in linguistic and non-linguistic behavior, which concerns the effect that a prior exposure to a given stimulus (prime) can generate on the response to a subsequent stimulus (target). Stimuli were created from 16 lexical items selected for each grammatical class, inserted into a carrier sentence, followed by a question to elicit the production of the target item, already produced in the stimulus with one of two variants (prime), presence or absence of a coda. The experiment was applied to 34 participants: 20 undergraduates and 14 non-university students. No effect of the stimulus variant, with or without a coda, was observed on the production of lexical items in either grammatical category. The results indicate that the absence of the coda is the dominant variant for infinitives, regardless of the participants' education level. Regarding stimuli with nouns, coda production prevailed only in the university group, which was taken as an indication that, in this case, the dominant variant may differ depending on the speakers' social characteristics.

KEYWORDS: Variation. Exemplar representation. Coda (r).

RESUMO: Nesse artigo, abordamos a questão da organização cognitiva da variação linguística com base nos pressupostos dos Modelos Baseados no Uso a partir de dados de produção controlada das variantes da coda (r) por falantes do português carioca em final de nomes e infinitivos. Parte-se da hipótese de que a representação detalhada das formas fonéticas dos itens com coda (r) em final de palavra contêm todas as possibilidades fonéticas da variedade carioca ([χ, ɣ, h, ɦ] e outras de sua experiência com diferentes variedades do PB), além da ausência da coda, e de que a representação em exemplares está organizada em torno de uma variante dominante. Os dados foram obtidos através da produção controlada de infinitivos e nomes, utilizando a técnica de *priming*, definido como um fenômeno cognitivo detectado em comportamento linguístico e não linguístico, que diz respeito ao efeito que a exposição prévia a um determinado estímulo (*prime*) pode gerar na resposta a um estímulo subsequente (*alvo*). Foram elaborados estímulos a partir de 16 itens lexicais selecionados de cada classe gramatical, inseridos em uma sentença veículo, seguida de uma pergunta para elicitar a produção do item alvo, já produzido no estímulo com uma das duas variantes (*prime*), presença ou ausência da coda. O experimento foi aplicado a 34 participantes, 20 universitários e 14 não universitários. Não foi observado efeito da variante do estímulo, com coda ou sem coda, na produção dos itens lexicais das duas categorias gramaticais. Os resultados obtidos são indicativos de que a ausência da coda é a variante dominante nos infinitivos, independentemente da escolaridade dos participantes. Já em relação aos estímulos com nomes, houve predomínio da produção da coda somente no grupo dos universitários, o que foi tomado como indicativo de que a variante dominante, neste caso, pode diferir em função de características sociais dos falantes.

PALAVRAS-CHAVE: variação. representação em exemplares. coda (r)

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1 Introduction

The postulate by Weinreich, Labov, and Herzog (1968), henceforth WLH (1968), according to which the linguistic system or speaker's grammar contains heterogeneity – that is, it is neither invariant nor homogeneous, as in Structuralism and Generative Linguistics – leads to the issue of the cognitive organization of variation. Although originally conceived, in the early 1960s, as a rule (variable rule), as substitute to the notion of optional rule in the generativist model of that period, the proposition of variation as part of individuals' linguistic competence, according to Bybee (2023, p. 12), is equivalent to the notion in the Usage-Based Models (UBM), according to which variation is reflected in cognitive representations. In this article, we address the issue of the cognitive organization of linguistic variation based on the theoretical assumptions of Usage-Based Models, in a study involving controlled production data of coda (r) variants in word-final position in nominals and verbs by speakers of Carioca Portuguese. The hypothesis is that the mental representation of words with coda (r) in the lexicon is phonetically detailed; that is, it encompasses all phonetic possibilities of the coda in the Carioca variety ([χ, ɣ, h, ɦ]) as well as others resulting from speakers' experience with different varieties of Brazilian Portuguese (BP), in addition to the absence of the coda.

The observation of this variable in these two grammatical categories may provide evidence about the consequences of language change for the mental representation of words with word-final coda (r), especially in the case of infinitives. The study adopts the UBM hypotheses for addressing variation, as defined within Sociolinguistics, given the set of convergences in the postulates of both approaches, such as: the non-autonomy of grammar with respect to usage and users, the presence of variability in all linguistic levels, the gradual nature of language change, and the importance of communicative context, among others. Within the UBM framework, mental representations of word forms in the lexicon are assumed to contain phonetic detail — not only contrastive information, as in structuralism and generativism. This framework not only accommodates the variants as part of speaker's knowledge but also integrates the socially indexical properties of variation.

The data collected to support the discussion on the cognitive organization of variation were obtained through a controlled production experiment involving lexical items with word-final coda (r), using the priming technique. Priming is a cognitive phenomenon, detectable in linguistic and non-linguistic behavior, that refers to the effect that prior exposure to a given stimulus (*prime*) generates on the response to a subsequent stimulus (*target*), without the individual being consciously aware of a possible relationship between the two stimuli (BARGH; CHARTRAND, 2000). However, the priming effect can also be observed in spontaneous speech, such as in linguistic variation, first mentioned by Sankoff and Laberge (1978). The authors showed that the probability of alternation between the variants of a pronominal variable in Montreal French increases due to the greater distance of one of the variants from its previous occurrence in the discourse, temporally or syntagmatically. The variables *discourse-level parallelism* and *phrase-level parallelism* in conditioning variation in noun and verbal agreement, respectively, by Scherre (1988) and Scherre and Naro (1993), also show the effect of priming in spontaneous speech. Thus, the priming technique in the controlled production of coda (r) made it possible to examine the extent to which the production of the experimental items would be influenced by the variant previously presented – that is, by the *prime* stimulus with or without a coda. This issue is anchored in the hypothesis that the representation of each lexical item encompasses the phonetic possibilities of words experienced by the individual, grouped together, as in the exemplar cloud metaphor, from which a category emerges based on phonetic similarity.

Connine et al. (2008) provided evidence that exemplars are organized around a dominant variant relative to the others, which plays a role in word processing, as observed in experiments on lexical access and on the identification of properties of the variants, such as number of syllables. According to the authors, the dominant variant is the one most frequently used in the production of lexical items. Thus, given the high frequency of spontaneous production of infinitives without the final coda in the Carioca variety (CALLOU et al., 1998; MOLLICA, 2003), which actually represents an advanced stage of change towards the absence of the final coda in infinitives, according to Oliveira (1983), the hypothesis regarding verbs is that, even if the *prime* stimulus contains the realization of the coda, it will not influence the participants' production of the *target* form, since the absence of the coda is the dominant variant in the Carioca variety, regardless the speakers' social characteristics. With regard to the final coda in nouns, as there is evidence that, in the Carioca variety, the absence of the coda is not predominant (CALLOU et al., 1998; MOLLICA, 2003) and that its realization is not nearly categorical, as is the case with its absence in verbs, it is possible that the variant presented in the prime stimulus exerts an effect on participants' production.

This article is organized as follows: section 2 presents the key assumptions of Sociolinguistics and that of UBM on the modeling of linguistic variation; section 3 presents the contributions of different studies on the coda (r) to describe the current stage of BP concerning the variation of the word-final coda (r) in infinitives and nouns; section 4 presents the methodology used to obtain the controlled production data, followed by the sections with the results and the final remarks.

2 Theoretical Background

The conception of language – or grammar, or speaker competence – introduced with the Sociolinguistic proposition, according to which speakers' linguistic knowledge includes the systematic heterogeneity observed in speech, was primarily aimed at explaining language change. This postulate puts forward a hypothesis about the linguistic system, indicating that the variation observed in speech – that is, the alternation, in the same context, of linguistic forms expressing the same meaning – cannot be understood as a mere characteristic of language use, since it is neither random nor idiosyncratic, that is, it does not occur differently in each individual nor it is absent in all individuals speaking the same language variety. Moreover, the proposal of the apparent time construct (Labov, 1963), together with methodologies for studying change in real time, both in the speech community and in the individual, has made it possible to capture linguistic change in progress within the researcher's synchronic perspective, as well as to demonstrate the gradual nature of change and its different directionalities (Sankoff, 2019).

Although initially conceived as a rule ("variable rule") formulated on the basis of the discrete nature of the linguistic units to which it applies, Labov's study on the variation of vowels across different varieties of American English (LABOV, 1994, p. 113-390) captured the gradualness involved in variation and change by treating variation as a continuous variable, based on the formants F1 and F2 formants of vowels in speakers' productions. More recently, since the beginning of the 21st century, unlike the discrete nature of variants implied in the conception of variation as a rule, many researchers have sought to circumscribe the variation studied in Sociolinguistics as having a representational status, as in the proposal of UBM (GOMES; CRISTÓFARO, 2004; CRISTÓFARO; GOMES, 2007; FOULKES; DOCHERTY, 2006; HAY et al., 2006; BYBEE, CACOULLOS, 2008; SQUIRES, 2011; LOUDERMILK, 2013). However, the representational character of the variability observed in speech, according to UBM, is not restricted to variation as defined in Sociolinguistics. It also includes other types

of variability, such as the difference in duration between vowels in stressed and unstressed syllables (CRISTÓFARO SILVA; GOMES, 2017), vowel formant measurements, which constitute systematic differences between languages that have the same types of vowels, difference in VOT (voice onset time) in the production of stops, as, for example, in English, whose voiced stops tend to be produced as unaspirated voiceless stops, differently from how they are produced in Brazilian Portuguese. Also worth mentioning is the difference in duration of voiceless and voiced alveolar fricatives in English and French, which have a contrastive function in both languages. However, these segments exhibit different durations in speakers' production, with the voiced fricative being longer in French than in English. This information is used by French speakers of English as an L2 in the processing of lexical items containing these consonants. According to Pierrehumbert (1999, p. 103), speakers acquire the specificities of these and other phonetic details that characterize their language varieties, which not only define them as speakers of one variety rather than another, but they are also used in linguistic processing, and, therefore, must be part of the representation of word-forms in the lexicon.

The hypothesis that linguistic representations are redundant – like other cognitive representations – and not generated from invariant abstractions, is also based on Langacker's proposal (1987, apud BYBEE, 2023, p. 13), according to which linguistic abstractions are patterns or generalizations grounded in occurrences of linguistic experience, retained in memory along with the contexts in which they occur, including their relation to other similar experiences. This model of linguistic knowledge accommodates linguistic variation not only with respect to the variants themselves, but also in relation to the linguistic and communicative contexts in which these variants occur – contexts that are captured in the linguistic and social conditioning of variation.

Furthermore, the hypothesis of exemplar-based representation of variation, in addition to capturing phonetic gradience, also accommodates the fact that the range of variability of words for the same linguistic variable is not exactly the same. Connine et al. (2008) identified that the variation in the realization of the pretonic schwa vowel in English, as in *opera* ~ *op'ra* and *calorie* ~ *cal'rie*, does not follow the same frequency trend. The item *opera* is more frequently produced without the post-tonic vowel, while *calorie* is more frequently produced with the vowel. The different frequencies of occurrence of the words with a specific variant were shown to influence the processing of these words in tasks involving syllable number identification and lexical access. The authors conducted an experiment with stimuli corresponding to English words manipulated for the duration of the schwa vowel. The stimuli were distributed along a five-level continuum: at the first level, the stimuli had a full vowel realization, followed by three levels of progressively reduced vowel duration, and, finally, the complete absence of the vowel at the fifth level. The task consisted of identifying the number of syllables in each stimulus. The stimuli at both extremes of the continuum were categorically classified as having 3 syllables (level 1) or 2 syllables (level 5), meaning that the identification of syllable number corresponded respectively to the presence or absence of the schwa vowel. In the three ambiguous levels – due to manipulation of the post-tonic vowel duration – there was a significant tendency to identify as three-syllable words those that are more frequently produced with three syllables, that is, with schwa realization. Since, in words that tend to occur with the schwa variant, the variant without the post-tonic vowel results in consonant clusters that do not exist in English (e.g., *cal'rie, crim'nal, def'nite*), another experiment was designed to verify whether the behavior observed in the previous experiment was based on the production frequency of the word with a given variant rather than on phonotactic cues. Thus, two lexical decision experiments were conducted, including three groups of words: lexical items more frequently produced with schwa, but whose realization without it results in illegal consonant clusters in English; lexical items more frequently

produced without schwa, whose realization without the vowel yields legal consonant clusters (e.g., *op'ra, choc'late, gas'line*); and finally, lexical items more frequently produced with the schwa, but whose realization without the vowel results in illegal consonant clusters (e.g., *aver'ge, mem'ry, cath'lic*). The results for reaction time (RT) in the lexical decision task were statistically significant and showed that three-syllable stimuli corresponding to words that are more frequently produced with the schwa vowel — and that display an illegal consonant sequence when produced without it — yielded shorter RTs than stimuli corresponding to words more frequently produced without the post-tonic vowel, regardless of whether the consonant sequence in the schwa-less variant exists in English or not. Similarly, in the experiment in which all stimuli were from the variant without the post-tonic vowel, lexical items that are more frequently produced without the vowel — regardless of whether the consonant sequence occurs in English — showed shorter RTs than items that are more frequently produced with schwa. These results reinforce the hypothesis that the mental representation of these items contain the different variants, and they also provide evidence that the exemplars are organized around a dominant variant, in this case the one most frequently used in the production of the item. This result also shows that the frequency effect on the robustness of representations refers to the frequency with which a particular phonetic detail or variant occurs in the language, with consequences for the perception of lexical item properties – in the case studied, the number of syllables – and for lexical recognition.

The following section presents the main contributions of studies on the word-final coda (r) in BP, specifically in the Carioca variety, aiming to describe the current stage of BP concerning coda (r) variation in infinitives and nominals to support the research hypotheses. Since the study focused on coda variation in word-final position, issues involving coda variation in internal position, as in *morfologia ~ moØfologia*, will not be addressed.

3 Word-final coda (r) in BP

There are many sociolinguistic studies on the variation of the coda (r) in BP. These studies adopt different interpretations regarding the relationship between the representation of coda (r) and the variants observed in actual usage. Most of them adopt the classical view as a rule applied to an abstract representation containing the coda. Votre (1978) proposed a rule of final coda (r), whereas Callou et al. (1998), Da Hora and Monaretto (2003), and Mollica (2003) proposed a rule of coda (r) deletion, analyzing coda deletion separately in medial, and word-final codas. The authors analyze word-final codas despite the grammatical class of the lexical items in which they occur.

Oliveira (1983), in a study of the speech community of Belo Horizonte, proposed that the analysis of the variable coda (r) in BP should be conducted separately, considering both the position of the coda within the word and the grammatical class of the lexical item. Accordingly, Oliveira proposed three analyses: one for internal codas, one for codas in infinitives, and another for codas in nominals. The reason for this approach lies in historical evidence indicating that the tendency toward coda (r) absence in verbs is older, already documented in texts of Old Portuguese. The analysis revealed, in addition to specific linguistic constraints for each group of words, distinct rates of word-final coda absence: over 95% in infinitives, and 44% in nouns. The results led Oliveira to postulate that realizations of the final coda in infinitives result from the application of a coda insertion rule conditioned by speech style (with a tendency toward insertion in formal contexts), whereas in nominals, the process involves a deletion rule. In a subsequent study, Oliveira (1997) reanalyzed the deletion of word-final coda (r) in nominals, arguing that the implementation unit of sound processes is the lexical item rather than the individual sound. Data from the Belo Horizonte variety show that some lexical items are more

affected than others, and also that individuals from the same social group may exhibit distinct patterns in the realization or absence of the coda in the same lexical items.

Gomes (2006) argued that Oliveira's position, which distinguishes between nominals and verbs in the analysis of the variation of the word-final coda (r), appears to be the most accurate. This assessment is based not only on the results of Oliveira's own study but also on findings from other investigations that similarly indicate a greater tendency for coda deletion in infinitives. Regarding Oliveira's hypothesis about the role of the lexical item, Gomes (2006) maintains that this view is consistent with Usage-Based Models, as exemplar-based representations capture the specific properties of each lexical item.

Gomes (2006) considered Oliveira's position – of separating nouns and verbs when addressing the variation of word-final coda (r) – to be the most accurate, not only because of Oliveira's results but also due to findings from other studies that point to the same trend of high frequency of coda absence in infinitives. Regarding Oliveira's hypothesis on the role of the lexical item, Gomes (2006) argues that this view aligns with the assumptions of Usage-Based Models, since exemplar-based representations capture the specificities of each lexical item.

Regarding the Carioca variety, Callou et al. (1998) and Mollica (2003) show that, respectively, both among university students and among speakers with Elementary School and High-School, the absence of coda in infinitives is quite high: 82% in the NURC 1990 sample, and 88% in the Census 2000 sample. In word-final nominals, however, coda absence is less frequent than coda realization: 32% in the NURC 1990 sample, and 36% in the Census 2000 sample. In data from two samples of adolescents living in slums in the city of Rio de Janeiro, a rate of 70.8% of coda absence in nominals was observed among High-School students participating in a vocational training program at FIOCRUZ, and 83% of coda absence among socially excluded adolescents serving socio-educational measures in a public institution (MELO, 2017). Menezes and Gomes (2012) found that the rate of coda absence in infinitives is quite low in spontaneous speech data from children aged between 2;1 and 5;0 in the AQUIVAR/PEUL/UFRJ sample. Among children aged 4;5 to 5;0 – whose data rule out the possibility that coda absence might be interpreted as developmental variation – it was found eight out of seventy-three tokens, corresponding to 7.3% of the total occurrences in that age range. Regarding word-final codas in nominals, for the same age group, most data contained the coda, with sixteen occurrences out of twenty-seven corresponding to 59% of the total data for this group of children. The authors concluded that the central or dominant representation for infinitives, according to Connine et al. (2008), is the absence of the coda, while for nominals, the dominant representation is the coda. However, due to the limited amount of data, it was not possible to observe variation by item or by child in that sample. They also observed that children's production rates of noun and infinitive codas reflect the patterns observed among adults in the Carioca speech samples.

Considering the results of studies on the coda (r) in the Carioca variety for both adults and children, and based on the assumptions of UBM, it is possible to formulate the general hypothesis that the representation of infinitives for adult Carioca speakers includes the different phonetic possibilities found in the variety – as mentioned in the Introduction – as well as the absence of the coda. Furthermore, because of the advanced process of change in BP, coda absence in infinitives is the dominant variant for the speakers of this variety. With respect to nominals, the same representational hypothesis can be proposed, though differing in the dominant variant. Given the stratification by educational level and social group observed in the results for the coda (r) in nominals across different studies of the Carioca variety, it is possible that differences in the dominant variant arise according to speakers' social characteristics.

The following section presents the methodology employed to obtain controlled production of infinitives and nominals.

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4 Methodology

The controlled production of infinitives and nominals, aiming the production of the word-final coda (r), was carried out through an experiment employing the *priming* technique. As mentioned in the Introduction, *priming* effect concerns the effect of activating a given form (*prime*) on the production and perception of subsequent forms (*target*). The total number of target stimuli was 32, including 16 nouns and 16 verbs. Participants were exposed to experimental stimuli containing only items from the same grammatical class – either nouns or verbs. No participant heard the same lexical item with both variants (presence or absence of the coda). The 16 stimuli from each grammatical category were divided into four lists, so that two lists contained the same eight items but in different variants. Consequently, participants who responded to List 1A or List 1B heard the same lexical items but with different variants. The four items without the coda in List 1A were presented with the coda in List 1B, and vice-versa for the remaining four items. Lists 2A and 2B followed the same procedure with the remaining eight words, totaling 16 for each grammatical category (see Appendix 1 and Appendix 2).

The experimental stimuli, as well as the fillers (eight per list), were recorded by two female speakers aged between 22 and 25 years. Each participant listened to eight experimental stimuli and eight fillers. The experiment task consisted of producing a target word in response to a question about a sentence previously presented, as illustrated in the following examples:

(1) Infinitives

Yesterday evening, because of the neighbor's loud music, Júlia preferred to watch (ver) TV because she couldn't sleep (dormir) (with coda)
Question: What couldn't Júlia do (fazer) last night? (with coda)

Yesterday evening, because of the neighbor's loud music, Júlia preferred to watch (vêØ) TV because she couldn't sleep (dormiØ) (without coda)
Question: What couldn't Júlia do (fazêØ) last night? (without coda)

(2) Nouns

Renata bought sugar (acúçar) but forgot the salt (with coda)
Question: What did Renata buy? (with coda)
Renata bought sugar (açúcaØ) but forgot the salt (without coda)
Question: What did Renata buy? (without coda)

(3) Filler

Suely only travels by car because she is afraid of flying.
Question: What kind of transportation does Suely always use?

The production context of the target item was also controlled. Sentences and questions were designed to elicit the answer either as a single-word (e.g., *sleep*) or as the last word, if the answer contained a syntactic constituent such as "couldn't sleep" in response to the question "What couldn't Julia do last night?", as in Example (1). This production context – coda followed by a pause – according to Serra and Callou (2012), disfavors coda realization. The authors argue that the coda (r) tends to be maintained within intonational phrases marked by pauses or intonational contours, typically at the boundaries of higher-level constituents, such as

between clauses (see Serra & Callou, 2015, p. 102). In this phase of the study, productions of the relevant lexical items were elicited only in prosodic contexts that disfavor coda realization.

Control conditions for the stimuli included word length (only words with two or more syllables were selected), following phonetic context (consonants only), and grammatical class (noun or verb). The dependent variable was the participant's response, while the independent variables were the stimulus variant, and the participant's educational level and gender. A total of 34 participants completed the experiment: 20 university students (11 women and 9 men) and 14 with Elementary and High School level of education (9 women and 5 men). Participants were distributed as follows according to the grammatical class of the stimuli: 16 responded to the noun lists, and 18 to the infinitive lists. Each participant heard eight target stimuli (four with coda and four without coda) and eight fillers. The experiment was applied individually at the university. The study was approved by the Ethics Committee of IESC/UFRJ, Process No. 5.394.803.

5 Results

Out of a total of 272 responses, 140 for each grammatical class, 230 were analyzed, 105 from the lists with nouns, and 125 from the lists with infinitives, because the participants replaced the target words by another that did not contain a coda (in the noun lists), by inflected verbal forms (in the infinitive lists), or, in some cases, they simply didn't answered. The data of each grammatical class was submitted to logistic regression. The application factor was the absence of the coda; the independent variables were the stimulus variant (with or without coda), participants' educational level and gender; and the random variables were the lexical item and the participant.

5.1 Infinitives

Of the total 125 responses to the infinitive stimuli, 41 were produced with and 73 without the coda, corresponding respectively to 41% and 59% of the total. Given the high percentage of final coda absence in infinitives in spontaneous speech, a higher rate of coda absence was expected. However, it is important to note that the experimental design adopted—without providing an interactional or situational context for the participants' productions, focusing instead on eliciting a response centered on a specific lexical item, and conducted in a university classroom—may have contributed to greater monitoring on the part of the participants. It should also be noted that the linguistic context of a coda followed by a pause, as intended in the participants' responses, tends to disfavor coda absence. Even so, responses without the coda were more frequent.

The results of logistic regression did not show significance of any variable. For all factors of all independent variables (stimulus variant, educational level, and gender), a *p*-value > 0.05 was found. This result indicates that the presence or absence of the coda in the infinitive stimuli had no effect on the responses – that is, no priming effect was observed as expected. The fact that most responses lacked the coda in the experimental task suggests that simply hearing a stimulus with the coda is not enough to trigger that variant in the speaker's mental representation. Participants' behavior also did not differ according to education level or gender..

The distribution of responses with and without coda was also examined across items and participants. Of the 16 verbs, production without coda prevailed in 9, occurred equally in 3, and production with coda outweighed in 4. The cases in which production with coda prevailed are not interpreted as counterevidence to the dominance of coda-less representation in the

organization of exemplars, given the elicitation conditions for infinitives in this experiment, as mentioned earlier. Regarding distribution of responses per participants, among the 18 who responded to the infinitive lists, only 4 produced more verbs with coda. Of these, 3 had High School education. Another 4 participants produced 50% of each variant. Expanding data collection with new participants may provide a clearer indication of the trend observed thus far regarding the predominance of production without coda.

5.2 Nominals

Out of a total of 105 responses to the nominal stimuli, 65 were produced with a coda and 40, without a coda, corresponding to 62% and 38% of the total, respectively. There was, therefore, a predominance of coda production for these stimuli. Once again, it is necessary to take into account the experimental production conditions; however, this result mirrors the distribution between coda realization and non-realization found in speech data from individuals with University, High School, and Elementary School education, respectively from NURC 1990 and Census 2000 samples.

The logistic regression results revealed an effect of the variable *education level*. The p-value obtained was 0.028, and the intercept was -1.9218, suggesting that coda production was disfavored among university students compared to non-university participants. Table 1 below shows the distribution of responses with and without coda by educational level.

Table 1. **Distribution of responses by variant and educational level**

Variant	with coda		without coda		Total
Educational level					
University	51	75%	17	25%	68
Non University	14	38%	23	62%	37
Total	65		40		105

The distribution of responses in Table 1 shows a higher concentration of coda production among university participants, while non-university participants tended to produce word-forms without coda. The distribution of responses in Table 1 shows a higher concentration of coda productions among university students, while non-university participants tended to produce forms without the coda. This result is noteworthy because, in Mello (2017), social stratification was observed in the realization of final codas in nominals, based on data from a sample comprising two groups of adolescents from low-income families, living in slums in Rio de Janeiro: one group of socially excluded adolescents with irregular schooling, and another attending public High Schools and participating as scholarship students in a vocational training program at a public institution in the city.

For all factors of the remaining independent variables (stimulus variant and participants' sex), the p-value was greater than 0.05. This result indicates that the presence or absence of the coda in the nominal stimulus lists had no effect on the responses—that is, no priming effect was observed, contrary to expectations.

The distribution of responses with and without coda was also analyzed by item and participant. Of the 16 nouns, only 2 lexical items (*mulher* "woman" and *fêmur* "femur") did not show predominance of coda production, while *interior* and *terror* presented equal proportions of both variants (50%). Regarding participant distribution, among the 16 who responded to the noun lists, 10 produced more nouns with than without coda, 1 produced 50% of each, and 5 produced mostly nouns without coda. Of these last 5, only one is a university participant.

The characteristics mapped for items and participants in the responses to the stimulus lists with infinitives and nouns point to the possibility of variability in the cognitive organization of exemplars by nouns and by individuals with respect to the dominant variant. This situation can be accommodated within the hypotheses of MBU representations. Due to the experimental design of this study, there is insufficient evidence to account for the specificity of certain items or of individual participants. Nevertheless, these results may serve as a basis for developing other types of research focusing on the behavior of items and individuals.

In general, the results from this stage of the study indicate that even under conditions involving some communicative tension – that is, in an experimental task without an interactional or situational context – participants tended to produce infinitives without coda and nouns with coda. With regard to verbs, the absence of both the priming effect and the effect of participants' education level was taken as evidence that, given the advanced stage of the change toward coda absence, the variant without coda is the dominant among speakers of the Carioca variety. Regarding nouns, there was a predominance of productions with a coda; however, this result is due to the overwhelmingly coda-favoring behavior of the university-level participants, which does not allow for a generalization of the hypothesis of a dominant coda representation regardless of the speakers' social characteristics.

Expanding the experiment to include additional participants, with a more balanced distribution by education level, will provide a clearer basis for evaluating the current findings.

6 Final Remarks

In this article, we sought to present research findings focused on the issue of the cognitive organization of variation. According to the assumptions of Variationist Sociolinguistics, linguistic knowledge encompasses variation in its structural, cognitive, and social dimensions. According to the assumptions of the Usage-Based Models, the variability observed in speech is part of the representation of words in the mental lexicon, which includes not only phonetic detail but also social characteristics of the speakers. The analysis of the evidence presented, combining the assumptions of both approaches, accounts for the differences observed with respect to the grammatical class of lexical items ending in coda (r), the effect of the social variable 'participants' level of education' in the case of nominals, and the stage of linguistic change regarding infinitives.

Expanding the number of participants in the present experiment and conducting another study with experimental stimuli containing the prosodic context that favors the absence of coda, as in "Marcela bought brown sugar but forgot the demerara sugar – Question: What did Marcela buy?" (the relevant word followed by a complement), will provide further evidence related to the hypothesis of detailed lexical representations and the hypothesis regarding the cognitive organization of exemplars around a dominant variant, that one which is the most frequent for a given item or for categories of lexical items. The results presented here also highlight the importance of observing the behavior of specific lexical items and individual speakers in the dynamics of linguistic variation, as well as of the shared linguistic knowledge among speakers of the same language variety.

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APPENDIX 1

INFINITIVE			
1A	1B	2A	2B
assistir	assistiØ	falar	falaØ
chorar	choraØ	sair	saiØ
acender	acendeØ	ouvir	ouviØ
pedir	pediØ	cortar	cortaØ
bebeØ	beber	desobedeceØ	desobedecer
cantaØ	cantar	perdeØ	perder
veØ	ver	escreveØr	escrever
comeØ	comer	caiØ	cair

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APPENDIX 2

NOUN			
1A	1B	2A	2B
açúcar	açúcaØ	militar	militaØ
femur	femuØ	abajur	abajuØ
jogador	jogadoØ	calor	caloØ
radar	radaØ	terror	terroØ
colaØ	colar	placaØ	placar
interioØ	interior	prazeØ	prazer
lazeØ	lazer	mulheØ	mulher
colheØ	colher	azaØ	azar