

## Evidence for Language-mediated Thought in the Perception of Non-gendered Figures

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### 1. Introduction

The subject of linguistic determinism has long fascinated linguists and anthropologists interested in answering the following question: How, and to what extent, are one's thought patterns constrained or determined by his or her native language? This question was most famously addressed in Whorf (1956). As a result of the work of Whorf and his advisor, Edward Sapir, the putative existence of language-constrained or language-mediated thought is often referred to as the Sapir-Whorf hypothesis. However, these researchers never actually co-authored any specific hypothesis on the subject. The "Sapir-Whorf hypothesis" is a misnomer in another respect as well, namely that many of the ideas attributed to the two linguists can be traced back to researchers such as Humboldt, Vico, and Verner, among others (cf Koerner 1992). Nevertheless, linguistic determinism received particularly concentrated attention following the work of Whorf, whose strong formulation of the idea was appealing to many. Despite this fact, interest in linguistic determinism dissipated somewhat in the decades following Whorf's work, due in large part to the influence of the Chomskyan paradigm on linguistic research.

In the last fifteen years or so, there has been a resurgence of research on linguistic determinism, evident in the literature. This work is markedly different from earlier research on the subject, however. It is different in its interpretation of linguistic determinism, since most researchers on the subject do not adopt Whorf's strong version of linguistic determinism, according to which speakers of different languages are characterized by, at least in some respects, incommensurable conceptual patterns. Perhaps more significantly, it is different methodologically, since findings in the most recent studies on the subject are generally experimentally, rather than anecdotally, based. The research also spans a variety of fields, including psychology (e.g. Gordon 2004), anthropology (e.g. Levinson 1997), and linguistics (e.g. Levinson et. al 2003). For example, Gordon (2004) provides experimental data demonstrating how, for the Mura-Pirahã, an isolated Amazonian tribe of approximately 200 people, speakers' conceptions

of numbers are apparently constrained by language-internal factors. Specifically, speakers of this language generally exhibit difficulties in manipulation and recall-oriented exercises that involve the use of numbers greater than two. Gordon provides a plausible interpretation of his results, namely that the Pirahã language only offers numerals for one, two, and “many.” Similar results are provided in Pica et. al (2004) for Mundurukú, a language that also has an extremely restrictive set of cardinal numerals.

Much as the recent evidence vis-à-vis linguistic determinism has surfaced across academic disciplines, it has also surfaced across linguistic domains. Along with the mathematically-oriented findings just mentioned, evidence for language-mediated or language-constrained thought has also been gleaned from domains such as spatial-topology reference (Levinson and Wilkins 2006) and nominal classifier systems (Lucy and Gaskins 2001). Lucy and Gaskins (2001), for example, demonstrate that, in triad discrimination tasks, Yucatec speakers are more likely to group referents according to material, while English speakers are more likely to group the same referents according to shape. This difference in the grouping of nominal referents is consistent with aspects of the nominal classifier system of Yucatec, which seems to result in the more materially-oriented classification of stimuli by speakers of that language.

Most relevant for our purposes, evidence for language-mediated thought has also been uncovered in the linguistic domain of grammatical gender. Recent experimental work has suggested quite convincingly that speakers’ perceptions of the natural gender of nominal referents is influenced by the grammatical gender required by their language in referencing such nominals. This finding contravenes previous expectations and suggests that, even for inanimate objects with no actual gender characteristics, speakers’ perceptions of the objects are affected by the grammatical gender employed in referencing the object. For example, Konishi (1993) tested German and Spanish speakers’ perceptions of two lists of nominals. One of the lists contained objects referred to by grammatically-masculine terms in German and grammatically-feminine terms in Spanish. The converse held for the other list. Significantly, nouns in the first list were perceived to have more masculine characteristics (e.g. higher in potency) by the German speakers, and generally more female characteristics by the Spanish speakers. The converse held for the other list. In a similar vein, Flaherty (2001) found that Spanish speakers tended to name inanimate objects in a way that was consistent with the grammatical gender categories of the language, e.g they provided masculine names for nouns requiring grammatically-masculine gender. Vigliocco et. al (2005) found that Italian speakers tend to group lexemes in semantic discrimination tasks according to grammatical gender. Other relevant studies with similar results include Zubin and Köpcke (1984), Mills (1986) and Tight (2006).

Despite such findings on the influence of grammatical gender on thought, the relevant evidence is somewhat limited in scope. Specifically, the aforementioned studies restrict their attention to influences of grammatical gender on the perception of referents associated with particular lexemes. That is, if a lexeme is characterized by a particular grammatical gender, speakers often associate more masculine qualities with the lexeme’s referent, even if that referent is inanimate. One could make the claim, however, that such language-constrained effects on perception are restricted to the lexical domain, and so are somehow more superficial than some interpretations of the findings might suggest. In fact, Vigliocco et. al (2005) make this very claim.

The goal of the present study is two-fold: First, I seek to provide further evidence for language-mediated thought in the linguistic domain of grammatical gender. Second, I hope to suggest that such evidence is not restricted to idiosyncratic effects on the perception of

referents associated with particular lexemes. Instead, the data I present suggest that grammatical gender, specifically grammatical gender reflected in pronominal paradigms, influences the perception of depictions of animate figures whose gender is ambiguous. For speakers of a language with gender distinctions in their pronominal set, the tendency is to select masculine pronouns when referring to such figures. In and of itself, however, such a tendency is not particularly remarkable since the default usage of masculine pronouns is considered by some to be an arbitrary convention, with little effect on the actual perception of non-gendered referents. However, the results presented below suggest that the selection of masculine pronouns actually determines the perceptions of speakers of the natural gender of non-gendered figures. Most interestingly, perhaps, speakers of a language with no grammatical gender in its pronominal paradigm, in this case Tupí-Karitiâna, do not evince response patterns consistent with the same levels of masculine bias in their perceptions of such figures. In other words, the evidence suggests that the gender-oriented pronominal paradigms of languages such as Brazilian Portuguese constrain perceptions of non-gendered figures in a way that non-gender-oriented paradigms, such as that in Karitiâna, do not.

## 2. Background on Karitiâna

Karitiâna (K henceforth) is a Tupí language spoken as a first language by approximately 300 people in the state of Rondônia, in the northwest region of Brazil. The language has been described by several linguists, most recently Everett (2006). The K pronominal paradigm presented in Table 1 is taken from Everett (2006), and is also consistent with the findings offered in Storto (1999).

Table 1. The pronouns of Karitiâna

	<u>Free pronouns</u>	<u>Absolutive verbal agreement markers</u>
1s	ĩn	i-
1pl.incl	i:tʃa	ij-
1pl.incl	ita	ita-
2s	ãn	a-
2pl	a:tʃa	aj:-
3	i	ø-

As we see in Table 1, gender is not evident in the pronoun system of K. In fact, gender marking does not surface in any domain of the language's grammar. Examples (2)-(4) help to illustrate the manner in which, absent of context, K clauses with anaphoric reference entail an inherent gender ambiguity.

- (2) i na-aka-t i-tepik-ø ese-pip  
 3 nsap<sup>1</sup>-cop-nfut int-dive-nfut water-all  
 "She/he/they dove into the water."

<sup>1</sup> Where possible, the Leipzig glossing rules have been utilized. The sap and nsap morphemes referred to in (2)-(4) refer to language-specific morphemes utilized when the absolutive nominal in a given declarative clause is and is not, respectively, a speech act participant, i.e. a 1<sup>st</sup> or 2<sup>nd</sup> person referent.

- (3)     a:tʃa     na-okit-ø     i  
          2pl nsap-kill-nfut     3  
          "You all killed him/her/them."
- (4)     i     a-taka-hit-ø     ãn i-ti  
          3     2s.abs-sap-give-nfut     2s     3-obl  
          "S/he gave you to him/her/them."

As we see in (2)-(4), the absence of gender characterizes the pronominal and agreement forms regardless of the grammatical relation or semantic role denoted by the anaphoric markers.

Due to the absence of grammatical gender in K, the speakers of the language were selected as subjects for the tasks described in the following section. In doing so, it was hoped that their responses could serve as a useful contrast to the responses of the other subjects in the tasks. These subjects were speakers of Brazilian Portuguese (BP henceforth). Like most languages, BP employs gender distinctions in its grammar. Grammatical gender in BP surfaces for example in the choice of definite and indefinite articles. Such articles may be either masculine or feminine, though this choice does not necessarily correspond to natural gender distinctions of the actual referents described by a noun following an article. More significantly for our purposes, gender also surfaces in the pronoun set of Portuguese. Third person singular referents may be described by a masculine pronoun, 'ele,' or a female pronoun, 'ela.' Similarly, third person plural referents may be described by a masculine pronoun, 'eles,' or a feminine pronoun, 'elas.'

The issue explored here is whether systems of anaphoric reference with a gender distinction somehow constrain the perception of referents that are gender-ambiguous or for which the gender is somehow less relevant. That is, do pronominal systems like that in BP, which are much more common than gender neutral ones such as that in K, force their speakers to construe gender ambiguous-referents as being male or female? Furthermore, if such a choice is "enforced" by the language, are perceptions of such figures biased towards one gender as a result of the enforced construal of gender? The tasks described in the following section were undertaken in the hopes of arriving at answers, admittedly tentative and preliminary ones, to the preceding questions.

### 3. Methods

In order to test for linguistically-biased differences in the perception of non-gendered stimuli, five perceptually-oriented tasks were designed. For the sake of space, I will limit the discussion here to two of the tasks, which entailed the participation of BP and K speakers. The other tasks also involved English speakers. It should be noted, however, that the results of all of the tasks were generally consistent with the two described here. For each of the two tasks described, two pools of task participants were used. In each case, one of the sets of participants was comprised of K speakers. The other set was comprised of BP speakers. The same basic methodology was employed in both tasks, however the stimuli varied in the manner described below.

The general methodology adhered to was the following: Subjects were presented, individually, with a set of visual stimuli. These stimuli consisted of abstract depictions of

faces of human-like referents, presented on a computer screen. The faces were designed so as to be gender ambiguous. (In one of the other tasks not described here, non-human stimuli were employed, however the stimuli for all five tasks represented animate referents of some type.) The faces were depicted performing some basic action, e.g. opening their eyes. Participants were asked to describe the action performed by the depicted face. The descriptions of the respondents were transcribed. After describing the action, participants were asked to provide a name for the face performing the action. Each face presented required a new name. The name for each face was transcribed, and the gender associated with the selected name was noted. This allowed for the facile tabulation of gender impressions, i.e. the perceived genders of the depicted faces, as evidenced by the names selected. In some cases, however, the names selected were gender-neutral. For each pool of participants, the rates of selection of male names, female names, and gender-neutral names were noted. These rates were contrasted with the corresponding rates in the other pool of participants, and tested for significance. Also, for each pool of participants, differences in responses of male and female respondents were noted, so that speaker sex could be controlled for as a possible conflated variable.

Having described the general methodology employed for the two tasks, let me detail task-specific methods. In the case of one task, referred to henceforth as task A, twenty-five K-speaking subjects (thirteen male, twelve female) and thirteen BP-speaking subjects (seven female, six male) were employed. The stimuli used in task A were faces approximating adult human referents, such as those in figures 5-6. The faces were depicted performing four separate actions.

In the case of the other task, referred to henceforth as task B, twenty K-speaking subjects (eleven male, nine female) represented one of the participant pools, while the other pool consisted of six BP-speaking subjects (three male, three female). Given that this project is ongoing, task B, as with several of the tasks not described here, will eventually be undertaken with a greater number of participants. Nevertheless, even the results so far tabulated are strongly suggestive of language-specific effects on response rates.

The crucial difference between task A and task B was that, in the latter case, the stimuli consisted of baby faces such as those found in figures 7-8. Given the inherent gender ambiguity of baby faces more generally, when compared to adult human faces, abstract depictions of baby faces were expected to provide especially strong cases of gender neutrality. When asked in a straightforward fashion whether the faces in task A and task B represented a male or female, speakers of both languages not participating in either task found both sets of stimuli to be gender ambiguous. However, despite the suggestions that the stimuli in both sets could represent either males or females, there was still a slight male-bias in the perception of the adult-like faces. This slight bias did not surface in informal judgments of the baby-like faces utilized in task B, however. For that reason, it could be argued that the results of task B are particularly relevant to the discussion at hand. In task B, the baby-like faces were depicted performing six separate actions.

Figures 5-8 contain samples of the stimuli presented to the participants. However, it should be noted that the samples are much more static than the actual stimuli, which were presented on computer screen as brief cartoon-like actions. In figures 5 and 6, the end points of two depicted actions from task A are represented. In figures 7 and 8, the end points of two depicted actions from task B are represented. Each of the actual stimuli consisted of images presented sequentially on a screen, to give the impression of one face performing a given action.

Figure 5. Last slide in one of four cartoons from task A, of face closing eyes.



Figure 6. Last slide in one of four cartoons from task A, of face opening mouth.

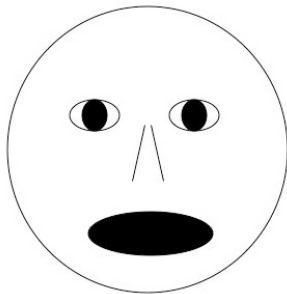


Figure 7. Last slide in one of six cartoons from task B, of baby face sucking pacifier.

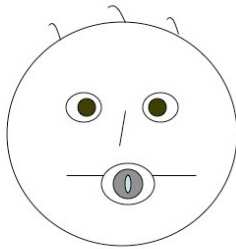
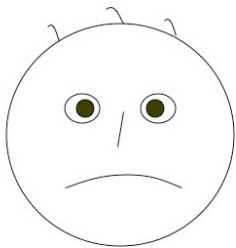


Figure 8. Last slide in one of six cartoons from task B, of baby face frowning.



#### 4. Results

The descriptions of the stimuli were generally restricted to one clause, due to the simplicity of the action witnessed. For example, (9)-(11) contain sample K descriptions of actions such as those in Figures 5-8.

- (9).    naka-hirip-ø        i  
          nsap-cry-nfut     3  
          ‘He or she cried.’
- (10).   piri-nĩrĩñã-n        i  
          vb.foc<sup>2</sup>-awaken-nfut   3  
          ‘He or she woke up.’
- (11).   pĩr-andij-ĩn        i  
          vb.foc-smile-nfut     3  
          ‘He or she smiled/laughed.’

Examples (12)-(14) contain sample transcriptions of BP responses to stimuli from both tasks.

- (12).   Ele            abri-u            a            boca  
          3s.masc        open-3s.past    def.fem     mouth  
          ‘He opened his mouth.’
- (13).   Ele            choro-u  
          3s.masc        cry-3s.past  
          ‘He cried.’
- (14).   Ele            acordo-u  
          3s.masc        awaken-3s.past  
          ‘He woke up.’

As we see in (9)-(14), many of the responses contained pronouns of some sort. For the BP speakers, when a pronoun was present in the response, the pronoun selected was, with very few exceptions, the 3<sup>rd</sup> person singular masculine. In the K responses, most of the responses contained a pronoun as in (9)-(11). The pronoun selected in all cases was the 3<sup>rd</sup> person pronoun, which can be used for males, females, and other animate entities.

Results such as those in (9)-(14) provide some insight into the patterns of pronoun selection when speakers of the respective languages are presented with ambiguous stimuli. The question we are ultimately interested in addressing, however, is whether the patterns of pronominal reference constrain or determine speakers’ perception of the stimuli. That is, is there evidence for language-mediated thought in the perception of these figures, or does the perception of their gender rely only on evidence gleaned from the stimuli? It was hoped that the naming portion of the tasks might provide some evidence relevant to this question.

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<sup>2</sup> This morpheme is employed in the ‘verb focus’ construction in which the verb must occur clause-initially and greater pragmatic emphasis is placed on it. (Cf. Everett 2006.)

In short, the results of the naming portions of the tasks suggested that K-speaking participants were much less likely than BP-speaking participants to choose male names for the gender-ambiguous figures. This pattern surfaced for all stimuli. Figure 15 contains the overall rates of male, female, and non-gender-specific names chosen by each pool of subjects, for task A. Figure 16 contains the results for task B, presented in the same manner as those in Figure 15. Results of tests of significance are also provided in each figure.

Figure 15. Rates of name choices for K and BP speakers, for task A.

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	Male	Female	Gender-neutral
K	68 (68%)	31 (31%)	1 (1%)
BP	36 (90%)	4 (10%)	0 (0%)

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Fisher's exact test:  $p = 0.011$

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Figure 16. Rates of name choices for K and BP speakers, for task B.

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	Male	Female	Gender-neutral
K	67 (55.8%)	51 (42.5%)	2 (1.7%)
BP	33 (92%)	3 (8%)	0 (0%)

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Fisher's exact test:  $p = 0.00009$

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The data in figures 15 and 16 suggest clear differences in the response rates across language groups. In both tasks, and in all of the remaining tasks not discussed here for the sake of space, K speakers exhibited a much higher predilection for female-name selection. This was particularly true in the case of task B, which, as was mentioned above, had the most gender-neutral stimuli. In this sense, the results in figure 16 are especially suggestive of some sort of language bias in the perception of gender of non-sexed human depictions.

It should also be noted that sex of respondents was controlled for, and it was found that, for both languages, female respondents were more likely to choose female names than their male counterparts. However, K females were much more likely than BP-speaking females to choose female names. This was true across both tasks. Similarly, K males were much more likely than BP-speaking males to choose female names. The significant disparities noted in figures 15 and 16 are not attributable to respondent sex, nor are they clearly attributable to some other confounding variable.

As can be seen in figures 15 and 16, BP speakers did perceive the figures to be female in some cases. This was true in four separate instances, representing three speakers, in the case of task A. It was true in three separate instances, also representing three speakers, in the case of task B. Given that only six BP speakers participated in the tasks, it seems clear that the stimuli were not generally perceived as being incompatible with a female perception. However, the female perception was simply not the default perception, particularly in those cases in which a pronoun was employed. (None of the exceptions in which female names were chosen occurred after the pronoun paradigm had been employed in the preceding description.)



## 5. Conclusion

The most plausible interpretation of the patterns described in the preceding section would seem to appeal to the differing patterns of pronoun usage in the languages. For BP speakers, there was a clear preference for male pronoun usage, across both sexes of respondents. One might suggest that this fact is the result of an arbitrary default choice, and does not actually constrain the perceptions of the speakers. However, the naming responses suggest strongly that the actual perceptions of gender were influenced by the pronoun choice. More broadly, we can claim that the actual perceptions of gender were influenced by the speakers' language. In other words, the BP pronoun system appears to lead speakers down a path towards the perception of males, all things being equal. The K pronoun system does not lead speakers down such a path.<sup>3</sup>

Given the gender-ambiguity of the diagrams in both tasks, it might seem plausible that the BP-speaking subjects would choose female names very often, recognizing that their default usage of male pronouns was arbitrary. In such cases, they might appeal to features of the stimuli to make their selection. For instance, for task A two respondents noted the wide lips of the stimuli and suggested it appeared more female. For task B one respondent noted that the baby face depicted could be either male or female, and this made the naming choice more difficult for him. However, for both tasks most BP-speaking respondents quickly supplied a male name, without even asking whether the stimuli represented a male or female. In this sense, speakers were actually generally unconcerned with the gender of the face. They simply considered it to be male, despite the fact that, as outside surveys undertaken prior to tasks A and B suggested, the stimuli were found to be highly gender-ambiguous by speakers of both languages. (That is, when explicitly told to consider the gender of the figures, speakers found the decision difficult and responses were generally split according to gender selection.)

This paper represents work from an ongoing project. One of the goals of the project is to undertake tasks A and B, as well as others not discussed here, with a wider group of subjects from a number of different languages including others which, like K, lack grammatical gender. The results described above are understood to be tentative and to require further substantiation. Nevertheless, it is clear that the results presented are at least consistent with the claim that the language a person speaks helps to constrain and direct their thoughts towards and perceptions of certain stimuli. More specifically, the results presented here are consistent with the claim that the perceptions of non-gendered faces provide further evidence for language-mediated thought.

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<sup>3</sup> The greater gender neutrality of K responses is not easily amenable to a strictly culturally-oriented account, since K society is far from egalitarian, in the sense that male/female roles are clearly delineated, since females do not generally have positions of leadership, and since the society was traditionally patrilineal. (Cf. Landin 1989.)

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