

# SENTENCE INTERPRETATION IN BILINGUAL AND MONOLINGUAL SPANISH SPEAKERS: GRAMMATICAL PROCESSING IN A MONOLINGUAL MODE

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The present study of sentence processing in early Spanish-English bilinguals builds on previous work looking at the effects of word order, subject-verb agreement and animacy on choice of the agent of a sentence in English and Spanish sentences. In earlier work, choice data revealed a pattern of amalgamation (a combination of L1 and L2 strategies in both languages), and reaction time revealed a pattern of differentiation (L1 strategies in L1 and L2 strategies in L2). The current study used two cues that are available only in Spanish (the accusative preposition *a* and clitic agreement) in combination with a cue that is present both in English and Spanish (verb agreement), to assess interpretation of Spanish sentences by monolingual and

bilingual speakers. The results revealed a strikingly different pattern from the previous study. Bilinguals and monolinguals showed many similarities in the strategies employed to choose the agent, with very slight differences in patterns of reaction time. Although the dissociation between reaction time and percent first noun choice remained, it was in the opposite direction from earlier work. That is, bilinguals were slightly more differentiated in their pattern of agent choice and slightly less differentiated in their pattern of reaction times. The results are discussed with regard to the influence of processing 'climate' on bilingual speakers, emphasizing the dynamic and flexible nature of fluent bilingualism.

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Bilinguals live (by definition) in two linguistic worlds. As Grosjean (1992) and Paradis (1987) have pointed out, bilinguals do not behave like two monolingual speaker/listeners housed in a single brain. Instead, the evidence to date suggests that bilinguals display a qualitatively different form of language processing, based on a system that is in a sense "in between" the individual's two codes (Cutler & Mehler, 1992; Hernandez, Bates, & Avila, 1994; Kilborn, 1989; Kilborn & Ito, 1989; Liu, Bates, & Li, 1992; Vaid & Pandit, 1991). This is true not only for late bilinguals but also true for many early bilinguals who have achieved what appears to be native-like fluency in both of their codes (Hernandez et al., 1994; Liu et al., 1992; Kluender, Kutas, & Bates, 1992; Vaid & Pandit, 1991). Despite the evidence in favor of the "in-between view" there is also evidence that bilinguals are susceptible to the processing climate of a particular experiment. For example, Soares and Grosjean (1984) looked at lexical decisions in both a monolingual mode, where subjects saw words from one language, and a bilingual mode, where subjects saw words from both languages. Bilinguals in a monolingual mode were as fast as monolinguals in accurately identifying real words. In a bilingual mode, however, bilinguals showed much slower reaction times overall. Furthermore, even in a monolingual mode bilinguals were slower than monolinguals when identifying nonwords, presumably because they searched both lexicons in order to make a nonword response. These results suggest that bilinguals are sensitive to what Soares and Grosjean (1984) calls a "monolingual or bilingual

mode" of processing.

Whereas a monolingual and bilingual mode of processing may make sense at the lexical level, it is not entirely clear whether similar types of effects occur at higher levels of processing and representation. Thus, it may or may not be the case that grammatical processing shows many of the same phenomena that are shown at the lexical level. The present study used a different mix of cues (i.e., informational types) than previous studies in order to determine which sentence interpretation strategies, like lexical decisions, are sensitive to the particular processing climate of an experiment.

One model that has attempted to provide a more dynamic account of monolingual and bilingual language processing is the Competition Model of Bates and MacWhinney (1982, 1987, 1989). The Competition Model (CM) is a functionalist approach to language, in which linguistic representations are viewed not as a set of discrete and autonomous rules, but as a set of probabilistic mappings between form and meaning. The model begins with the assumption that all listeners (bilingual and monolingual) must deal with two important but occasionally conflicting tasks. On the one hand, listeners must know in advance which pieces of information in the input language carry valuable information and merit attentional priority. On the other hand, they must be sensitive to the processing costs and timing parameters of a particular language in order to deploy resources in the most efficient way. Bates & MacWhinney (1989) have referred to these two dimensions of language processing with the terms cue validity (the information value associated with particular linguistic forms) and cue cost (the processing costs involved in using those forms, including demands on perception and memory). Sentence comprehension is viewed as a process of interactive activation, a form of constraint satisfaction in which linguistic forms or "cues" compete and converge in order to lead to a particular interpretation, i.e., the interpretation that provides the best fit to this particular configuration of inputs.

The effects of cue validity have been explored for the most part using the sentence interpretation task in which the subject is

presented with strings consisting of two nouns and a verb, representing various competing and converging combinations of word order, morphology, and semantic information (e.g., animate vs. inanimate nouns), and pragmatic information (e.g., topicalization and/or contrastive stress). In all these experiments, the subject's task is to choose the agent of the sentence. Results from these studies have consistently confirmed that speakers of different languages can have radically different configurations of cue strengths, in accord with predictions based on cue validity (Bates et al, 1982; Bates, MacWhinney, Caselli, Devescovi, Natale, & Venza, 1984; Smith & Mimica, 1984; Mimica, Sullivan, & Smith, in press; Miao, Chen, & Ying, 1986; Kilborn and Ito, 1989; Bavin and Shopen, 1989; Sokolov, 1989; McDonald, 1989; Kail, 1989; MacWhinney, Osmán-Sági & Slobin, 1991; Vaid & Pandit, 1991; Vaid & Chengappa, 1988). When cues are set into competition, the strongest cues "win", determining assignment of agent-object roles. Finally, the CM predicts that Spanish listeners will rely primarily on morphological cues in sentence interpretation, ignoring word order if the two sources of information do not agree. By contrast, English listeners should rely primarily on word order cues, at the expense of morphological information. Three previous studies have confirmed this prediction for Spanish and English (Hernandez, Bates, & Avila, 1994; Wulfeck, Juarez, & Bates, 1986; Kail, 1989).

There are, however, a number of studies in which predictions based exclusively on cue validity have failed. In all of these studies (at least so far), the exceptions can be explained by aspects of cue cost. For example, children who are acquiring French, Italian, Spanish, Serbo-Croatian, or German do not make consistent use of agreement cues in this sentence interpretation task until 5 - 6 years of age (Kail, 1989; Bates et al., 1984; see Bates and MacWhinney, 1989 for a review). This contrasts markedly with the development of "local" case cues that are used consistently by children before 3 - 4 years of age (Slobin & Bever, 1982; Bates et al., 1984; MacWhinney, Pleh & Bates, 1985). Hence cue validity and cost interact to determine cross-linguistic differences in the use and development of sentence interpretation strategies.

With a few exceptions, the evidence in support of cue validity and cue cost comes from "off-line" studies, i.e., studies with no time constraints and no information about the time course of sentence processing. However, the CM does make some specific predictions about reaction time. First, the model predicts a negative correlation between amount of information (cue convergence) and reaction time. That is, sentences with several converging cues should result in faster RTs, compared with sentences in which the listener must rely on a single cue to assign semantic roles. Second, sentences with a competition among cues should result in slower RTs, compared with items in which all cues point in the same direction. Third, there should be a direct relationship between speed and cue strength, with stronger cues leading to faster reaction times (compared with sentences in which the listener must rely on a combination of relatively weak cues). Finally, cue strength will interact with the first two predictions (convergence and competition), so that a sentence with a very strong cue may be resolved quickly even though that cue faces a "conspiracy" of weaker competitors. These four predictions have now been tested in several on-line studies of sentence interpretation within the CM (Kail, 1989; Li, Bates, Liu, & MacWhinney, 1992; MacWhinney, 1976, 1985; MacWhinney & Pleh, 1988; Kilborn, 1987; Von Berger, Wulfeck, Bates, & Fink, 1992; Mimica et al., 1994). For the most part, results are compatible with the CM in its original form, but there are also some interesting exceptions. For example, convergence does not always lead to faster reaction times if a very strong cue is available. Instead, listeners sometimes operate as if "enough is enough," so that weak converging cues are either ignored (i.e. have no further effect on reaction times) or actually result in a slight delay compared with items in which the strong cue acts alone. This effect is reminiscent of Simon's principle of "satisficing" (1960), an heretical contribution to economic theory based on the finding that people do not always act to maximize gain. Instead, they operate to maximize gain up to but not beyond a certain degree of effort. We will return to this point in explaining some of the effects observed in previous studies and in our own study with Spanish speakers.

In the cross-linguistic studies that we have described so far, language is treated as a between-subjects variable. In the study of bilinguals, cross-linguistic variation must be treated as a within-subjects variable. Bilingualism presents a particularly interesting challenge to the CM, because the same individual has to develop two different sets of mappings between form and meaning, mappings that can coalesce or diverge in a number of ways. At the same time, the CM offers some useful mechanisms to describe patterns of transfer and dominance in different bilingual situations. Four distinct patterns of dominance are theoretically possible and could be described with the quantitative mechanisms provided by the CM:

- 1) Differentiation refers to the use of separate strategies for each language, identical to the strategies shown by monolinguals. Although many theories of bilingualism assume that differentiation is the desired end-point of second language learning, note that this is also equivalent to the claim that bilinguals ought to behave like two monolinguals housed in a single brain;
- 2) Forward Transfer is defined as the use of L1 strategies in processing L2. This is the pattern that we would expect to find in late bilinguals with relatively little experience in their second language and it is an effect that should diminish over time;
- 3) Backward Transfer refers to the use of L2 strategies in processing L1. Backward transfer represents a feedback process in which new learning influences old strategies. In the extreme case, backward transfer could result in the elimination or replacement of L1 processing strategies by L2, a possible step in the direction of language loss (Wong-Fillmore, 1991).
- 4) Amalgamation is our term for a situation in which bilingual listeners apply a single set of strategies to both their languages, derived by merging the two cue hierarchies used by monolinguals. In the limit, amalgamation could be

viewed as a combination of forward and backward transfer.

All four patterns of dominance and transfer have been reported in studies of sentence interpretation in bilingual listeners within the CM, including studies of Dutch-English, Spanish-English, Chinese-English, German-English, Japanese-English and Hindi-English speakers (for reviews, see Kilborn and Ito, 1989; McDonald, 1989; Vaid and Pandit, 1991). In late bilinguals, forward transfer is the most common pattern and in some individuals it seems to persist more than 30 years after immersion in an L2 environment (Bates & MacWhinney, 1981). At the same time, backward transfer has been observed in adult learners with no more than 2 - 3 years of exposure to L2 (Liu et al., 1992). In early bilinguals, the two most common patterns that have been observed so far are forward transfer (L1 dominance) and amalgamation. Of the four logically possible patterns of transfer and dominance, full differentiation is the least common-- although many individuals do display partially differentiated patterns of amalgamation (e.g., Spanish-English bilinguals who rely primarily on agreement in both of their languages, but make greater use of word order in English). In short, we find a wide array of in-between patterns in bilingual listeners, suggesting that "bilingualism is a matter of degree" (Kilborn, 1987).

In order to investigate the nature of sentence processing strategies in bilingual and monolingual English and Spanish speakers, Hernandez et al. (1994) manipulated word order, verb agreement, and animacy in a sentence interpretation paradigm. Data for percent first noun choice and reaction times were collected. The results revealed an amalgamated, in-between pattern of results for percent first noun choice in the bilingual college-age group when compared to each monolingual group. Whereas monolinguals in Spanish relied almost exclusively on verb agreement and monolinguals in English relied almost exclusively on word order, bilinguals relied on an amalgam of word order and verb agreement strategies in both languages. Specifically, bilinguals' word order strategies were weaker than those of monolingual English speakers. In addition, their verb agreement strategies were also weaker. In reaction time, however,

bilinguals revealed a much more monolingual-like pattern of performance in Spanish and English, respectively. That is, bilinguals showed a pattern of agent choice that reflected a combination of both monolingual choice profiles. However, bilinguals' time for each choice reflected a monolingual tendency. These data were interpreted as showing an amalgamation of choice strategies but a differentiation in chronometrical processing.

The data from Hernandez et al. (1994) extend previous studies by showing that bilinguals use a complex mix of processing strategies that can reveal amalgamated and differentiated profiles using different dependent variables. Thus, it appears that bilinguals can appear to be more like monolinguals or bilinguals depending on the dependent measure used. However, a number of questions could be addressed using different cues to agency. First of all, it is important to understand if the dissociation between choice and reaction time appears in the same direction across different sets of cues with different cue validities. Second, it is important to understand how bilinguals process cues that are only in one of their languages vs. cues in both of their languages. Is it the case that the in-between profile obtained in choice previously was the product of the set of cues used? Is cue validity preserved when different cues are used?

The answer to the first question is partially provided by the results in a study with monolingual Spanish speakers (Kail, 1989). In this study, Kail used three variations of word order (NVN, VNN, and NNV), three of verb agreement (agrees with first noun, second noun or neither), three of clitic agreement (points to first noun as object, second noun, or neither) and two of accusative (points to first noun or second noun as object). Both clitic agreement and the accusative preposition are important morphological markers in Spanish. Object clitics serve to indicate the object of a sentence. Often times they are used in sentences that have a reference to a previously mentioned person. For example, *Juan buscaba a Susana. Ayer la encontré.* "Juan looked for Susan. Yesterday her<sub>cl</sub> found." The clitic *la* in the second sentence helps to identify the person that John found. When placed in a sentence it helps to mark who is doing the action *Jorge la*

*corretió la gallina*<sup>2</sup> “Jorge her<sub>cl</sub> chased the chicken.” In this sentence, the clitic helps to further identify what was being chased. The accusative preposition *a* also helps to signal the object of a sentence. However, it appears next to the object. Hence, in the sentence *Juan corretió a una vaca*. “Juan chased a cow” the *a* helps to indicate that the pig was being chased. The clitic and accusative preposition can be used to “flip” from canonical word order. Hence, *La vaca la corretió Juan* & *A la vaca corretió Juan* both mean that the cow was chased by Juan. Both are syntactically permissible sentences that would be understood by a native Spanish speaker. However, it should be clear that the preferred interpretation of a sentence with an object clitic is OVS, but the canonical location of the preposition *a* is before the second noun and hence the preferred interpretation is SVO.

The results from Kail’s study revealed a large effect of accusative and smaller effects of word order, clitic agreement, and verb agreement. The accusative marker acted like a deterministic cue in terms of percent first noun choice. Only 4-5% of the time participants chose as the agent of the sentence the noun that was not indicated by the accusative. The effects for clitic and verb agreement were not very large. The interactions also revealed a number of interesting data. First, the clitic by preposition interaction revealed that when the preposition indicated the first noun as agent (P1) any clitic tended to slowdown processing. For example, in the sentence *Juan corretió a la vaca* a clitic (*la* or *lo*) before the verb *corretió* will actually slow processing down. When the preposition indicated the second noun as agent, the clitic speeded processing if it converged with the preposition and slowed processing if it competed. That is, in the sentence *A la vaca corretió Juan* the preposition *la* would speed and *lo* would slow processing when each occurred before the verb *corretió*. Thus clitics tend to influence processing of non-canonical sentences. Similar findings were also reported for verb agreement. Namely, that verb agreement influences processing but only for non-canonical (P2) sentences.

The results from Kail's study suggest that the accusative preposition plays an almost categorical role in which agent was chosen by Spanish speakers. Both clitic agreement and verb agreement played a complimentary role to the stronger accusative preposition. These results provide a different pattern than that reported in Hernandez et al. (1994). In that study, verb agreement played a strong role in sentence interpretation. Taken together, these two studies suggest that the accusative preposition plays a stronger role in agent choice than subject and clitic agreement do. Hence, the use of agreement cues may differ depending on what other cues are present in the experiment.

The present study serves as an extension of Kail's and Hernandez et al.'s previous studies. In this experiment, the same basic sentence interpretation paradigm was used. Participants were presented with strings that included two nouns and a verb in canonical word order (NVN). Two types of agreement were used, verb agreement indicating the agent of a sentence and clitic agreement indicating the object of a sentence being one or none of the nouns (note that no clitic is present when there is no clitic agreement). In addition, the accusative preposition *a* was used indicating the object of the sentence. These three factors were rotated in an orthogonal fashion for each subject. This served as a partial replication of Kail (1989) because it used clitic agreement, verb agreement, and the accusative preposition. Thus it should help to confirm the influence of these three cues in sentence processing in Spanish monolinguals. Given previous results we expect the accusative marker to be strong in determining percent choice and reaction time. Furthermore, we expect clitic and verb agreement to play a complimentary role in sentence interpretation. Specifically, both should compete or converge with accusative when it biases the second noun as agent (i.e., in non-canonical conditions).

The present study should also help to explore the effects of the accusative preposition and of verb and clitic agreement on bilingual language processing. In this regard, there are two possibilities. First, cue validity suggests that the presence of a strong cue can overshadow the use of weaker cues. In this view,

the presence of the accusative preposition *a* should weaken the other cues and serve to decrease the differences between bilinguals and monolinguals. Alternatively, there is the possibility that bilinguals will continue to show a pattern of amalgamation that is analogous to previous studies (Hernandez et al., 1994; Liu & Bates, 1992). That is, rather than cues being weighted according to their language specific validity they will be weighted according to the specific linguistic experience of the speaker. This hypothesis would predict that bilinguals use cues that exist in both languages more than those which are used in only one language. The cue validity position would argue that the order from strongest to weakest would be accusative, verb agreement, and clitic agreement for bilinguals. The amalgamation position would hold that verb agreement (present in both languages) should be stronger than accusative and clitic agreement but only in bilinguals. Finally, the use of reaction time and percent first noun choice should help to resolve another issue that was brought up by Hernandez et al., namely, the idea that reaction time shows a more differentiated profile of processing while percent first noun choice shows a more amalgamated profile of processing. If this pattern holds up, we should expect bilinguals to show a stronger correlation with monolinguals for reaction time than for percent noun choice. It remains to be seen if this dissociation between reaction time and choice holds up with a set of different cues.

## METHOD

### Subjects

Forty-eight subjects participated in this study. Subjects were enrolled undergraduates or graduate students at the University of California, San Diego or at the University of Baja California, Mexicali. The participants were recruited by means of posters, class announcements, and through references. Compensation was five dollars for one hour of participation or class credit for undergraduate psychology courses. Subjects were divided into two different groups: bilingual Spanish-English and monolingual Spanish.

*Bilinguals.* This group consisted of 11 men and 16 women (N=27) with a mean age of 21.51 (S.D. = 4.02). 20 of the bilinguals tested considered themselves native Spanish speakers, whereas only 4 considered themselves to be native English speakers. The remaining 3 considered both English and Spanish to be their native language. The mean number of years spent speaking Spanish was 21.23 as compared to 15.21 years spent speaking English. Furthermore, self-ratings revealed that subjects thought their usage was about equal in both languages (12.27 in English vs. 11.85 in Spanish on a scale from 0 to 20) and that their skill was about equal in both languages (24.5 in English vs. 25.11 in Spanish on a scale from 0 to 30). This is a characteristic profile for Spanish-English bilinguals in Southern California.

*Monolingual Spanish.* This group was comprised of 5 men and 16 women (N=21) with a mean age of 21.43 (S.D.=1.27). These subjects were tested on site at the University of Baja California in Mexicali, Mexico. All participants were native Spanish speakers who report no writing or speaking skills in English. Their English comprehension was limited to a few routine expressions.

## **Language Questionnaire**

A questionnaire on language history was used in the bilingual group to acquire information regarding experience and proficiency in English and Spanish (Liu, et al., 1992). Information obtained included age at first exposure, formal language education, frequency of usage (e.g., family, friends, pets and teachers) and subjective ratings for skills in writing, reading, speech and comprehension. A copy of the questionnaire is available as an appendix to Liu et al. (1992).

## **Experimental Stimuli**

The stimuli consisted of 162 sentences. These were generated by a random selection from a pool of seventeen animate nouns (animals) and 16 transitive action verbs (see Appendix 1 for a complete list of verbs and nouns used for each language). The three dependent variables were accusative (P1 points to first noun

as agent, P2 points to second noun as agent, P0 no accusative), agreement between clitic and noun (C1 clitic biases first noun as agent, C2 biases second noun as agent, C0 clitic not present), and agreement between noun and verb (Ag1: verb agrees with the first noun, Ag2: verb agrees with the second noun or Ag0: ambiguous agreement). Crossing the three variables each with three levels yielded 27 possible sentences types (i.e., cells). As can be seen in Table 1, only half of the sentences were grammatical. The use of grammatical and ungrammatical stimuli is common in this paradigm and has led to the discovery of various sentence processing strategies (see Bates and MacWhinney, 1987 for more discussion). We will consider the role of grammaticality in a set of analyses later.

**Table 1.** Sample stimuli for each of the 27 conditions of the experiment.

Condition	English	Spanish
P1,C1,Ag1	The dog <i>cl</i> <sub>dog</sub> is chasing <i>acc</i> the cows	El perro las está corretiando a las vacas
P1,C1,Ag0	The dog <i>cl</i> <sub>dog</sub> is chasing <i>acc</i> the cow	El perro la está corretiando a la vaca
P1,C1,Ag2	The dog <i>cl</i> <sub>dogs</sub> is chasing <i>acc</i> the cows	El perro las están corretiando a las vacas
P1,C2,Ag1	The dog <i>cl</i> <sub>cows</sub> is chasing <i>acc</i> the cows	El perro lo está corretiando a las vacas
P1,C2,Ag0	The dog <i>cl</i> <sub>cow</sub> is chasing <i>acc</i> the cow	El perro lo está corretiando a la vaca
P1,C2,Ag2	The dog <i>cl</i> <sub>cows</sub> are chasing <i>acc</i> the cows	El perro lo están corretiando a las vacas
P1,C0,Ag1	The dog is chasing <i>acc</i> the cows	El perro está corretiando a las vacas
P1,C0,Ag0	The dog is chasing <i>acc</i> the cow	El perro está corretiando a la vaca
P1,C0,Ag2	The dog are chasing <i>acc</i> the cows	El perro están corretiando a las vacas
P0,C1,Ag1	The dog <i>cl</i> <sub>dog</sub> is chasing the cows	El perro las está corretiando las vacas
P0,C1,Ag0	The dog <i>cl</i> <sub>dog</sub> is chasing the cow	El perro la está corretiando la vaca
P0,C1,Ag2	The dog <i>cl</i> <sub>dogs</sub> is chasing the cows	El perro las están corretiando las vacas
P0,C2,Ag1	The dog <i>cl</i> <sub>cows</sub> is chasing the cows	El perro lo está corretiando las vacas
P0,C2,Ag0	The dog <i>cl</i> <sub>cow</sub> is chasing the cow	El perro lo está corretiando la vaca
P0,C2,Ag2	The dog <i>cl</i> <sub>cows</sub> are chasing the cows	El perro lo están corretiando las vacas

Table 1 (continued).

Condition	English	Spanish
P0,C0,Ag1	The dog is chasing the cows	El perro está corretiando las vacas
P0,C0,Ag0	The dog is chasing the cow	El perro está corretiando la vaca
P0,C0,Ag2	The dog are chasing the cows	El perro están corretiando las vacas
P2,C1,Ag1	<i>acc</i> The dog <i>cl</i> <sub>dog</sub> is chasing the cows	Al perro las está corretiando las vacas
P2,C1,Ag0	<i>acc</i> The dog <i>cl</i> <sub>dog</sub> is chasing the cow	Al perro la está corretiando la vaca
P2,C1,Ag2	<i>acc</i> The dog <i>cl</i> <sub>dogs</sub> is chasing the cows	Al perro las están corretiando las vacas
P2,C2,Ag1	<i>acc</i> The dog <i>cl</i> <sub>cows</sub> is chasing the cows	Al perro lo está corretiando las vacas
P2,C2,Ag0	<i>acc</i> The dog <i>cl</i> <sub>cow</sub> is chasing the cow	Al perro lo está corretiando la vaca
P2,C2,Ag2	<i>acc</i> The dog <i>cl</i> <sub>cows</sub> are chasing the cows	Al perro los están corretiando las vacas
P2,C0,Ag1	<i>acc</i> The dog is chasing the cows	Al perro está corretiando las vacas
P2,C0,Ag0	<i>acc</i> The dog is chasing the cow	Al perro está corretiando la vaca
P2,C0,Ag2	<i>acc</i> The dog are chasing the cows	Al perro están corretiando las vacas

Each cell contained six sentences, thus accounting for a total of 162 sentences. The six sentences within each cell varied in accordance with the agreement condition. In the Ag0 condition, three sentences utilized two singular nouns and the other three utilized two plural nouns. In the Ag1 and Ag2 conditions, three sentences were first noun singular and second noun plural and vice-versa for the remaining three. To facilitate comparison with earlier studies, the present progressive form of the verb was used for all sentences (see MacWhinney, Bates, Caselli, Devescovi, Natale, & Venza, 1984).

### Procedure

Both groups of participants were tested in a single session in accordance with their native language. Each session was held in an enclosed room with both experimenter and subject. Any and all conversation between the two was conducted in Spanish.

Instructions were read to the subject prior to the baseline, practice and testing modules of the experiment according to the same language in which the experiment was administered. Prior to commencing the actual test stimuli, a baseline of 50 trials was administered to acquire a rate of responding to visual stimuli.

These stimuli consisted of faces that were presented on either side of the screen. Subjects were required to press a button according to the position of the face on the screen. The baseline serves to establish whether a subject is able to complete the task. The baseline was subsequently followed by a 15-trial practice session where subjects were presented with sentences representative of the 27 possible combinations. The 162 test stimuli followed upon completion of the practice session. All of the practice and test sentences in the experiment were preceded by the auditory presentation of the two nouns that comprised each sentence and a picture of each of these on separate sides of the screen. Subjects were instructed to determine which of the two nouns was responsible for performing the action in the sentence and to press the button corresponding to the side on which the picture of that noun appeared. Participants were told to respond as soon as they decided. If no response was registered after a 3 second response window, a No Response was recorded in the data file. Responses obtained prior to the expired time were recorded. These included the noun chosen and the corresponding reaction time.

The stimuli were presented on a Macintosh IIsx computer using the PsyScope experimental shell from Carnegie Mellon University (Cohen, MacWhinney, Flatt, & Provost, 1993). The auditory stimuli were presented through a set of Tascam speakers and the visual stimuli were presented on a Macintosh 12" monochrome monitor. Response collection was done through a Carnegie-Mellon University button box.

## RESULTS

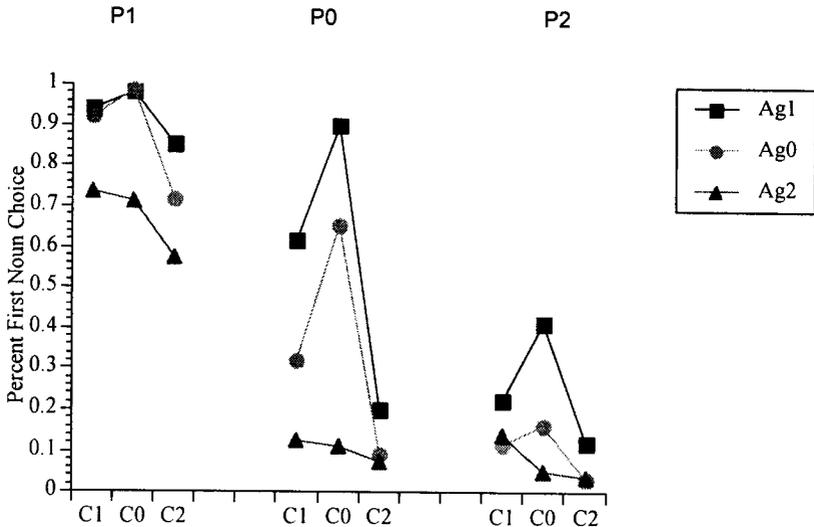
For the following sections, items with reaction times beyond 3 seconds after the end of the sentences were eliminated. These responses only made up 3.75% of all responses. For each group, analyses were conducted for percent first noun choice or for reaction time. In addition, the percent of variance accounted for was calculated for each main effect. This was done by adding the sums of squares for each main effect and interaction. The sums of squares for the main effect were divided by the total.

In this sentence interpretation paradigm, the measure "percent correct" has no real meaning. The interpretation of a subject's performance is better understood as percent first-noun choice. In all of the following text and figures, the results are presented with numbers that range from 0% to 100%. 0% implies that the subject or group never chose the first noun, 100% implies that the subject or group always chose the first noun, and scores in the 50% range constitute random performance (i.e., half the time choose the first noun and half the time choose the second noun).

The following sections will report two sets of analyses. The first will be a set of analyses looking at the monolingual group. The results replicate those of previous studies using the sentence interpretation paradigm with Spanish speakers (Kail, 1989). After this there will be an analysis that compares results between the bilingual and monolingual group.

### **Monolingual Data**

*Agent choice.* These subjects showed the expected pattern of performance, based on the predictions of cue validity and on previous studies of sentence interpretation in Spanish. Accusative biasing accounted for 73% of the experimental variance  $F(2,40)=155.42$ ,  $p<0.00$ , verb agreement for 13%  $F(2,40)=52.17$ ,  $p<0.000$ , and clitic agreement for 10% of the experimental variance  $F(2,40)=53.35$ ,  $p<0.000$ . There were also significant interactions of accusative by clitic agreement  $F(4,80)=10.13$   $p<0.000$ , accusative by verb agreement ( $F(4,80)=14.98$   $p<0.000$ ), clitic by verb agreement  $F(4,80)=20.04$ ,  $p<0.000$  accusative by clitic agreement by verb agreement  $F(8,160)=10.12$ ,  $p<0.000$ , which can be seen in Figure 1.



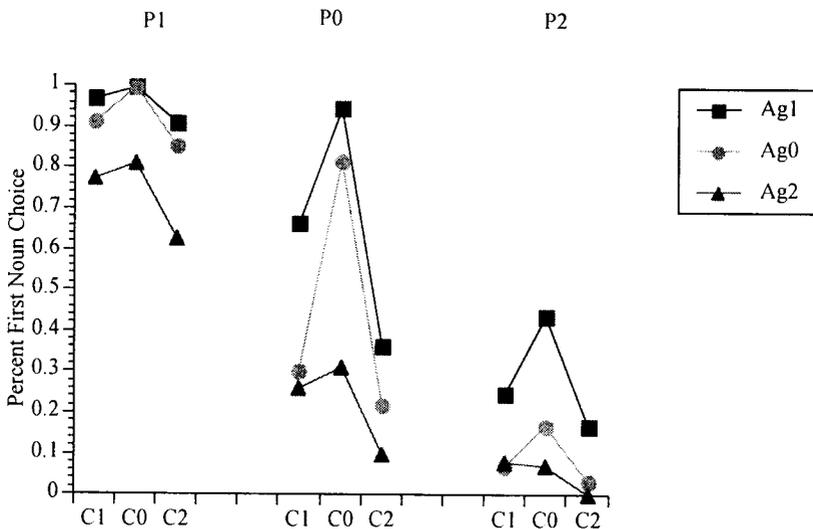
**Figure 1.** Accusative by clitic agreement by verb agreement interaction for monolinguals for percent first-noun choice.

In order to further understand the nature of the three-way interaction, three two-way ANOVAS (accusative by clitic) were run for each condition of the accusative (P1, P0, P2). For P1, there was a main effect of verb agreement  $F(2,40)=16.98$ ,  $p < 0.000$  and clitic agreement  $F(2,40)=15.21$ ,  $p < 0.000$  and no interaction. For P0, there was a main effect of verb agreement  $F(2,40)=80.60$ ,  $p < 0.000$  and clitic agreement  $F(2,40)=52.80$ ,  $p < 0.000$  and a verb agreement by clitic agreement interaction ( $F(4,80)=24.52$ ,  $p < 0.000$ ). For P2, there was a main effect of verb agreement  $F(2,40)=16.99$ ,  $p < 0.000$  and clitic agreement  $F(2,40)=8.10$ ,  $p < 0.000$  and a verb agreement by clitic agreement interaction  $F(4,80)=9.90$ ,  $p < 0.000$ .

These analyses can be summarized in the following manner. When there was no accusative marker, verb agreement and clitic agreement interacted in guiding sentence interpretation. First, when there was no clitic present (*El perro está corretiando las vacas*), verb agreement followed the usual pattern predicted by the competition model. Participants chose the first noun when the verb agreed with it 90% of the time and the first noun 11% of the time when it agreed with the second noun (i.e. the second noun and a little above chance when there was no morphology whatsoever (65%). This pattern of verb agreement was also present when the clitic biased the first noun as agent (*El perro las está corretiando a las vacas*). However, it should be noted that there was a general tendency for participants to choose the second noun when the clitic was present. This tendency was strongest in the C2 condition (*El perro lo está corretiando las vacas*). Specifically, participants showed a very small effect of agreement (12% change for Ag1 - Ag2) compared to the other two conditions (79% for C0 and 49% for C1). Hence, when there is no accusative present, clitic agreement and verb agreement interact in biasing which of the nouns is chosen as the actor.

For the canonical location of the accusative (P1) both verb and clitic agreement biased which noun is chosen. However, there was no interaction consistent with the view that the accusative reduces the effects of both types of agreement. Finally, for the non-canonical condition (P2), there was an interaction between verb agreement and clitic agreement. Specifically, verb agreement had a stronger effect on choice when there was no clitic. However, the presence of the clitic lead to participants "ignoring" the verb and choosing the second noun. Taken together these results lead to three consistent conclusions. First of all, the accusative is the strongest cue for choosing the agent of a sentence. Second, clitic agreement and verb agreement interact when there is no preposition or when the accusative is in the non-canonical position. Third, clitics serve as an indicator of OVS interpretations even when they indicate the first noun as subject.

*Reaction time results.* Accusative biasing accounted for 12% of the experimental variance, verb agreement for 10%, and clitic agreement for 20%. The data were placed into a 3x3x3 (accusative by clitic agreement by verb agreement) ANOVA. The results of this ANOVA yielded a significant main effect of accusative preposition  $F(2,40)= 6.72, p < 0.003$ , of clitic agreement  $F(2,40)= 20.05, p < 0.000$  and of verb agreement  $F(4,80)= 8.88 p < 0.001$ . It also yielded significant interactions of accusative marker by clitic agreement  $F(4,80)= 24.01, p < 0.000$ , accusative marker by verb agreement ( $F(4,80)= 21.08, p < 0.000$ ), clitic agreement by verb agreement  $F(4,80)= 7.52, p < 0.000$ , and accusative marker by clitic agreement by verb agreement  $F(8,160)= 3.06, p < 0.003$ . Notice that clitic agreement accounted for more of the experimental variance than the other two variables. This is evidence that choice and RT may be telling slightly different stories. The results from these effects can be seen in Figure 2.



**Figure 2.** Accusative by clitic agreement by verb agreement interaction for bilinguals for percent first-noun choice.

In order to further understand the nature of the three-way interaction, three two-way ANOVAs (accusative by clitic) were run for each condition of the accusative (P1, P0, P2). For P1, there was a main effect of verb agreement  $F(2,40)=49.08$ ,  $p < 0.000$  and clitic agreement  $F(2,40)=51.14$ ,  $p < 0.000$  and a verb agreement by clitic agreement interaction  $F(4,80)=7.93$ ,  $p < 0.000$ . For P0, there was a main effect of clitic agreement  $F(2,40)=7.06$ ,  $p < 0.000$  and a verb agreement by clitic agreement interaction  $F(4,80)=5.06$ ,  $p < 0.001$ . For P2, there was a main effect of verb agreement  $F(2,40)=20.86$ ,  $p < 0.000$  and clitic agreement  $F(2,40)=13.43$ ,  $p < 0.000$  and no interaction.

These analyses can be summarized in the following manner. When there was no accusative marker, verb agreement and clitic agreement interact in guiding sentence interpretation. When the verb agrees with the first noun, the presence of a clitic agreement slows processing (*El perro lo/las está corretiando las vacas*). When the verb agrees with the second noun, clitic agreement shows convergence and competition (*El perro lo/las están corretiando las vacas*; the sentence with *lo* was faster than *las*). Most interestingly, when the verb agrees with both nouns, clitic agreement speeds processing for the non-canonical interpretation of the sentence. For the canonical location of the accusative (P1) both verb and clitic agreement affected reaction time. Reaction times were fastest when no clitic was present (*El perro está corretiando a las vacas*). Verb agreement slowed reaction time in the Ag2 condition when it competed with the accusative marker (*El perro están corretiando a las vacas*). However, it did not significantly speed reaction time in the Ag1 condition relative to the Ag0 condition (*El perro está corretiando a la/las vaca/vacas* were identical). Finally, for the P2 condition both clitic agreement and verb agreement speeded processing when they converged with the accusative and slowed processing when they competed with the accusative. Taken together, these results lead to three consistent conclusions. First of all, the accusative plays a significant but much weaker role in the speed with which an agent is chosen for a sentence. Second, clitic agreement and verb agreement interact in speeding decisions in the P1 and P0 condition. Third, clitics serve as an indicator of OVS interpretations even when they indicate the

first noun as subject. It slows processing in the P1 condition whether it competes or converges. It slows processing in the P0 Ag1 condition whether it competes or converges with verb agreement. It speeds processing in the P2 condition for Ag0 and Ag2 and helps to overcome some of the slowing that occurs in the Ag1 P2 condition even in the C1 condition where it does not agree with the accusative marker. In short, it is an indicator of the OVS interpretation.

To summarize, the present results revealed some similarities and differences between previous studies by Kail investigating the nature of processing of the object clitic, the accusative preposition *a*, and verb agreement. Of particular interest was the fact that under certain conditions we observed cue convergence and competition, whereas under other conditions we did not. The question remains, however, whether the results for monolinguals will be similar to the ones observed in bilinguals.

### Comparisons between Monolinguals and Bilinguals

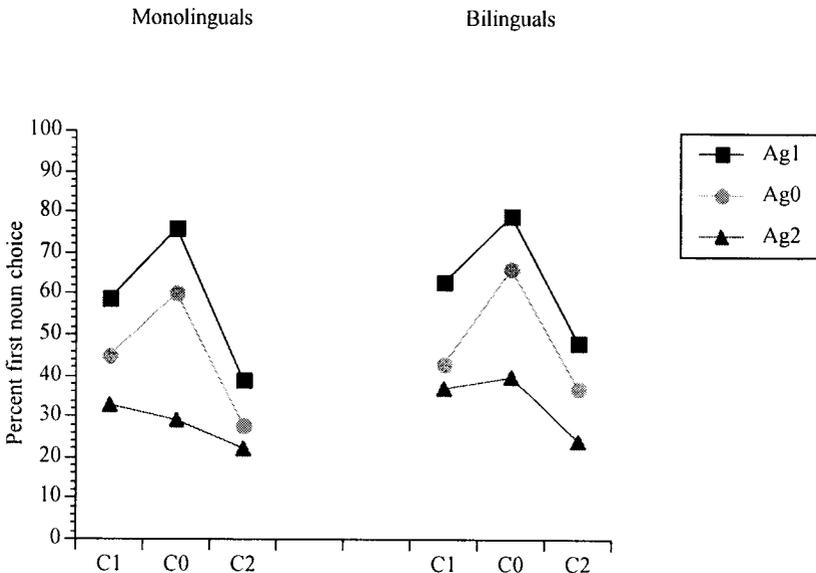
*Agent choice.* The relevant comparisons here can be found in Table 2. The data from bilinguals and monolinguals were placed into a 2x3x3x3 (group by accusative by clitic agreement by verb agreement) within-subjects ANOVA for both percent first noun choice and for z-score reaction time (in order to eliminate any differences in raw reaction times across groups). The results for percent first noun choice (see Table 2) yielded significant main effects of accusative preposition  $F(2,92)= 384.51, p < 0.000$ , clitic agreement  $F(2,92)= 99.82, p < 0.000$ , and verb agreement  $F(2,92)= 120.05, p < 0.000$ . In addition, there were significant interactions of accusative by clitic agreement  $F(4,184)= 28.25, p < 0.000$ , accusative by verb agreement  $F(4,184)= 28.28, p < 0.000$ , clitic agreement by verb agreement  $F(4,184)= 31.31, p < 0.000$ , group by clitic agreement by verb agreement  $F(4,184)= 3.92, p < 0.004$ , and accusative by clitic agreement by verb agreement  $F(8,368)= 17.52, p < 0.000$  (see Figure 3). The comparison between groups showed only an interaction of group by clitic agreement by verb agreement. This analysis was further evaluated by looking at the simple effect of clitic agreement for each level of verb agreement. There was a

main effect of clitic agreement for Ag1  $F(1,46)= 114.13, p < 0.000$ , Ag0  $F(1,46)= 84.04, p < 0.000$ , and Ag2.  $F(1,46)= 18.46, p < 0.000$ . There was a group by clitic agreement interaction but only for the Ag0 condition  $F(2,92)= 3.33, p < 0.040$ . A set of posthoc comparisons were run to identify exactly which points were significantly different across groups. The results revealed that bilinguals chose the first noun more in the Ag0, C2 condition  $F(1,46)= 9.25, p < 0.000$  only. There were no differences between the other conditions. Hence, the data are consistent with a slight "softening" of the second noun strategy in bilinguals when there is no additional competition or convergence from the verb. The differences between groups in terms of percent first noun choice are very subtle.

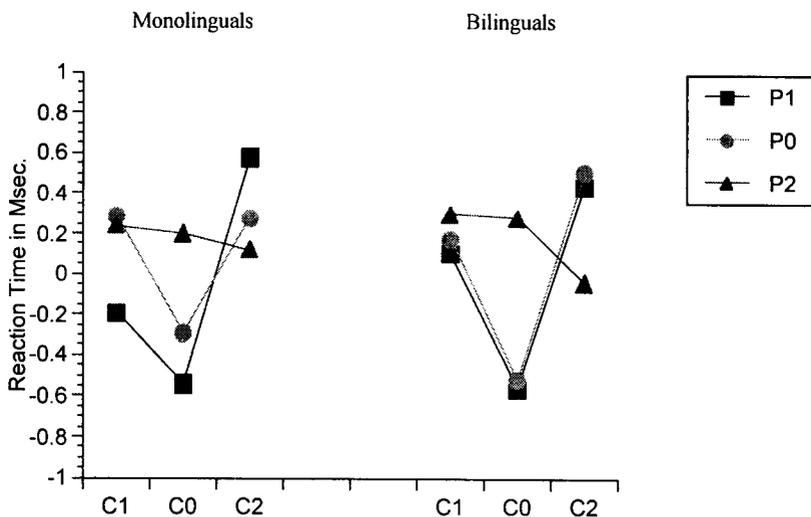
To summarize so far, in the current experiment both monolinguals and bilinguals used the accusative marker to decide the agent of a sentence. Although clitic agreement and verb agreement interacted between each other and with the accusative marker, they were much weaker cues to subjecthood. These results replicate Kail's findings that the accusative marker plays an almost categorical role in first agent choice in Spanish. The present results also extend the findings from Hernandez et al. (1994). The interaction between groups was the product of a stronger SVO interpretation in bilinguals, as compared to monolinguals, for NVN sentences. However, these findings were much less striking than that of Hernandez et al. In addition, there was also a tendency for bilinguals to choose the second noun as the subject of the sentence more often when the clitic indicated the first noun as agent and the verb agreed with both nouns.

**Table 2.** Proportion first-noun choice and reaction times for main effects in bilinguals and monolinguals.

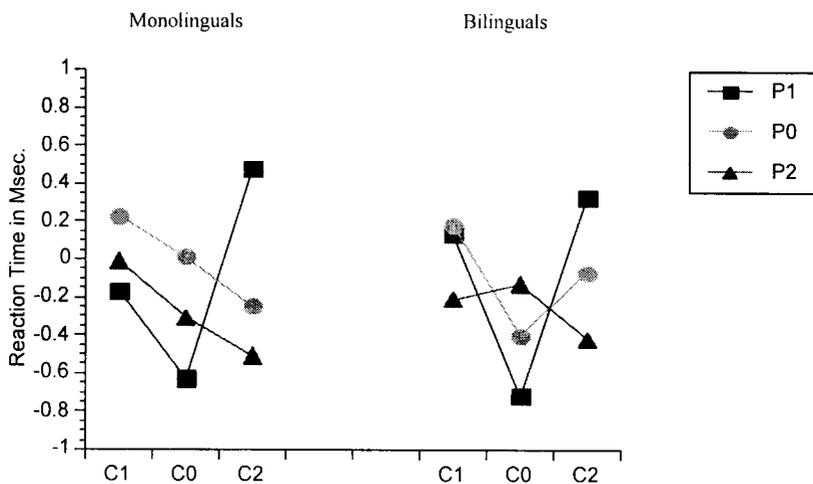
Test language Group		Dependent Variable			
		Percent first-noun choice		Reaction times	
		Monolingual	Bilingual	Monolingual	Bilingual
Accusative	P1	83	87	4410	4021
	P0	34	44	4336	3931
	P2	14	14	4235	3858
Clitic agreement	C1	46	47	4412	4051
	C0	55	62	4196	3789
	C2	30	36	4372	3971
Verb agreement	Ag1	58	63	4373	3982
	Ag0	44	48	4233	3835
	Ag2	28	34	4374	3993

**Figure 3.** Group by verb agreement by clitic agreement interaction for percent first-noun choice.

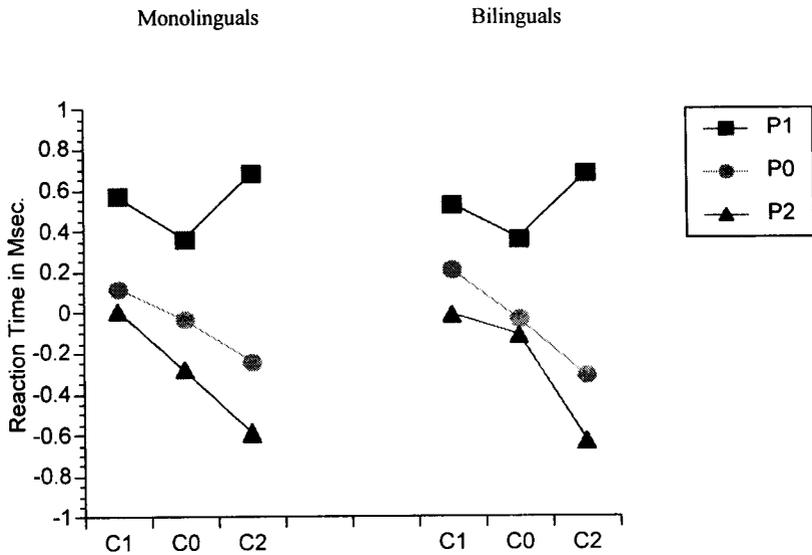
*Reaction Time.* A set of between-group analyses was conducted to compare the two groups. In order to eliminate any differences in raw reaction time the z-scores were computed for each subject. The data from these two groups were placed into a 2x3x3x3 (group by accusative by clitic agreement by verb agreement) between-subjects ANOVA with reaction time as the dependent variable. The results of this ANOVA yielded a significant main effect of group  $F(1,46)= 7.06, p < 0.011$  accusative preposition  $F(2,92)= 8.33, p < 0.000$ , of clitic agreement  $F(2,92)= 53.84, p < 0.000$  and of verb agreement  $F(2,92)= 23.51, p < 0.000$ . It also yielded significant interactions of accusative marker by clitic agreement  $F(4,184)= 49.55, p < 0.000$ , accusative marker by verb agreement  $F(4,184)= 43.36, p < 0.000$ , clitic agreement by verb agreement  $F(4,184)= 15.58, p < 0.000$ , accusative marker by clitic agreement by verb agreement  $F(8,368)= 5.53, p < 0.000$ , and group by accusative marker by clitic agreement  $F(4,184)= 4.75, p < 0.001$ . The group by accusative by clitic agreement interaction seen in Figure 4 showed a few differences between bilinguals' and monolinguals' reaction times. First of all, in the P1 condition bilinguals showed a larger slowing for the C1 condition, suggesting that they are less likely to take advantage of the convergence between the accusative and the clitic compared to monolinguals. When there was no accusative, bilinguals were slowed by clitic agreement (C1 and C2), whereas monolinguals were only slowed in the C1 condition. In the P2 condition, bilinguals showed less facilitation than monolinguals for the C0 condition. Thus the differences between bilinguals and monolinguals in terms of reaction times appear when looking at the interaction between accusative and clitic agreement.



**Figure 4a.** Group by accusative by clitic agreement interaction for monolinguals for reaction time (Ag1).



**Figure 4b.** Group by accusative by clitic agreement interaction for monolinguals for reaction time (Ag0).



**Figure 4c.** Group by accusative by clitic agreement interaction for monolinguals for reaction time (Ag2).

### Post-hoc Analyses

A set of analyses was performed to further understand the effects of different factors on reaction times. The factors that were used included group, grammaticality of the sentence, choice consistency (i.e., how far above or below chance they were), the point at which the agent could be chosen, and length of the sentence in words. For each factor, a percentage of variance change and its significance were calculated by performing a regression and factoring out the variance due to each of the factors used. The results from these analyses can be seen in Table 3.

**Table 3.** Percentage of variance change and correlation with RT for each factor.

Variable	Measure			
	Correlation with RT	% of unique variance	<i>F</i> -ratio	Significance
Group	0.599**	35.0%	158.98	$p < 0.0001$
Grammaticality	0.559**	4.0%	18.74	$p < 0.001$
Choice consistency	-0.593**	16.0%	72.02	$p < 0.0001$
Choice Point	-0.033	0.1%	0.731	$p < 0.3968$
Length	0.342*	3.1%	13.95	$p < 0.0005$

The results revealed that all five factors correlated with RT. When observing the amount of variance accounted for by each factor when the other factors were taken out only one factor (point at which the agent could be chosen) did not contribute any unique variance. Group contributed the most variance (35%) followed by choice consistency (16%), grammaticality (4%), and length (3.1%). The group variable was the product of the fact that bilinguals were faster than monolinguals. Choice consistency was negatively related to RT. Specifically, the farther participants were from chance performance, the faster their RTs. Longer sentences lead to longer RTs. Grammaticality correlated positively with RT. Grammatical sentences were interpreted faster than ungrammatical sentences. Although both grammaticality and length contribute to reaction times, choice consistency contributes more. Hence, the reaction time effects observed in the current experiment are the products of language processing strategies more than they are the products of length or grammaticality or both.

## DISCUSSION

In the introduction four possible profiles of bilingualism were presented (e.g., differentiation, amalgamation, forward and backward transfer), together with evidence showing that all four can and do occur in this sentence interpretation paradigm. In fact, Hernandez et al. (1994) found that for early Spanish-English bilinguals, results from percent first noun choice can reveal an

amalgamated pattern of results, whereas results from reaction times can show a more differentiated pattern of results (i.e., bilinguals in one language look like monolinguals in that language). The current study was set up to extend these findings using a set of cues that were only present in Spanish and one cue that was present in both languages. The intention was to look at whether the presence of a strong cue in Spanish might make bilinguals look more like monolinguals. This would be the equivalent of making bilinguals perform in a monolingual grammatical mode, a point we will return to below.

As a partial replication of Kail (1987), the current study confirmed and added to previous findings. The accusative preposition *a* had an almost categorical effect on percent first noun choice for both groups. Both groups used this cue to guide their percent first noun choice. The verb agreement and clitic agreement played smaller roles much like Kail's previous findings. For reaction time, very similar results were also observed. Of specific interest was the fact that agreement tended to slow participants' responses. Aside from these general findings there were a few differences in some of the interactions. For example, Kail found a very strong competition between accusative and clitic for the P1 C2 condition, an effect that was not found in the current study. The most likely reason for this difference is that Kail varied word order and we did not. The direct effect of word order could only be assessed by investigating these effects in subsequent studies that used the two noncanonical word orders that Kail did. Despite these subtle differences, the current study did replicate the most general findings.

The second question we set out to answer involved the nature of amalgamation and differentiation in previous studies. Two hypotheses were proposed. The first one suggested that the validity of a cue in bilinguals is strengthened when it is present in both languages, a notion based on the finding that verb agreement (present in both languages) was stronger than word order (present in English) only. In the present study, this would result in a different profile of results in which verb agreement is the strongest cue in the bilingual group and not in the monolingual group. The

second hypothesis was based on the general notion of cue validity. In this view, when a very strong cue was used in Spanish it should lead to very few differences between bilinguals and monolinguals. Results from the current study support the second hypothesis in which cue validity plays a strong role in determining agent choice. Specifically, the accusative preposition effectively reduced the effects of clitic agreement and verb agreement and reduced the difference between bilinguals and monolinguals. Furthermore, verb agreement, clitic agreement and the accusative marker can completely override the effects of canonical word order.

Our present findings do leave one question. Are bilinguals similar to monolinguals because a strong cue is serving to "wipe out" the other two? Or alternatively, do bilinguals look like monolinguals because they have been put in a different language mode? On the first account we would expect the strong effects of word order (first noun preference since the sentences were all NVN) to appear when the other cues were absent (P0, C0, Ag0). When the verb agreed with both nouns (Ag0) in Hernandez et al's study (1994), bilinguals chose the first noun over 90% of the time whereas Spanish monolinguals chose the first noun just slightly over 50% of the time. In the present study, however, bilinguals chose the first noun in the P0, C0, Ag0 condition 81% of the time compared to 65% of the time for monolinguals. Although there was still a first noun preference for bilinguals, it was slightly smaller in the present study. Thus the answer seems to be a little bit of both. When a strong cue was present, bilinguals showed similar patterns of performance compared to monolinguals. When this cue was absent, the differences appeared but were weaker than they were in experiments that do not use the strong cue. Hence, it appears that cue validity and processing mode both played a role in the current results.

As opposed to the results for percent first noun choice, the results from reaction times revealed stronger differences between the two groups. Both groups showed no differences and small effects of the accusative preposition on their reaction times. There were differences across groups in processing the accusative preposition and in clitic agreement. Bilinguals were slowed less

than monolinguals when the accusative preposition signaled the first noun as subject and the clitic signaled the second noun as subject. Similarly, bilinguals showed less of a slowdown when there was no clitic agreement in the absence of an accusative preposition compared to monolinguals. Thus the differences between bilinguals and monolinguals in terms of reaction times are driven by both clitic agreement and the accusative preposition. Finally, post-hoc regression analyses revealed that choice consistency played the strongest role in reaction time.

In the introduction, we suggested that the interactive nature of previous results with Spanish-English bilinguals might have been the result of the cues that were used. Although verb agreement, word order and animacy had different cue validities across languages, they were cues that could be presented in either language and might "encourage" an interaction. By using the accusative preposition and clitic agreement, cues that are present only in Spanish, the nature of the in-betweenness observed previously was put to the test. In the current study, the differences between bilinguals and monolinguals were very small. This lends support to the notion that when placed with cues that are present in only one of their languages, bilinguals show a more monolingual profile of results. Furthermore, we suggest that this is due to both the strong cue validity of the accusative preposition as well as to a change in the nature of processing strategies by bilinguals.

Although the interactions between groups were subtle, it was found that for percent first noun choice there were few differences between groups, whereas for reaction times there were larger differences. Thus it appears that reaction times can be more sensitive to differences between groups under some conditions. Furthermore, it is clear that reaction times and percent first noun choice may be sensitive to different aspects of sentence interpretation.

So far the current results are presented as supporting the notion that bilinguals have different modes of processing for sentence interpretation. However, the terminology that has been borrowed is the same as the one that is used for word recognition

by Soares and Grosjean (1984). In that study, bilinguals were asked to make lexical decisions for words in a mixed-language or single-language list. Compared to monolinguals, bilinguals were just as fast to make lexical decisions to words in a single-language list but were slower when seeing items in a mixed-language list. For nonwords bilinguals were slower than monolinguals for single language lists and even slower for mixed-language lists. Soares and Grosjean suggest that bilinguals were activating items from both languages in the mixed-language mode and hence there was a slowdown in reaction times. In the present study, the terminology monolingual (grammatical) mode was borrowed from Soares and Grosjean's work. It is important to clarify exactly how a bilingual mode at the lexical level differs from one at the grammatical level.

One way in which word recognition differs from grammatical processing has to do with the level of processing. Traditional views of language processing suggest that syntactic information is separate from semantic information (Friederici, 1995; Friederici & Mecklinger, 1996). Alternative views, however, view grammar as being lexical (i.e., contained within the lexical entry). The current study does not in any way resolve this debate. However, it does suggest that the types of phenomena that are observed at the lexical level are similar to those observed at the sentence level. In other words, bilinguals are sensitive to the types of stimuli that are being presented and may adjust their recognition strategies accordingly. This brings us back to another point that Grosjean has termed "bilingual flexibility." The present study shows that bilinguals are not static individuals. The processing of language is highly influenced by the external conditions. In this study, even very strong strategies such as percent first noun choice in NVN sentences can change when different cues are used. These types of effects have been observed in other studies that look at word recognition in bilinguals (Hernandez, Bates, & Avila, 1996; Soares & Grosjean, 1984). It is only in further understanding the movement from one mode to the other that we can begin to provide an account of bilingual language processing as it occurs moment to moment.

## NOTES

1. Support for this research was provided by a grant to Elizabeth Bates, "Cross-linguistic studies in aphasia" (NIH/NIDCD Grant #2-RO1-DC00216-10), and "Aging and Bilingualism" (NIA Grant # 5-R01-AG13474-03). We would like to thank Miriam Ranzolin, Claudia Baeza, Fabian Castañeda and Nydia Contreras for their assistance in experiment preparation and data collection in San Diego. We would also like to thank Jesus Galaz and Horacio Gonzalez for graciously offering us lab space and technical assistance at the University of Baja California.

2. This particular construction is only permissible in certain varieties of Spanish.

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## APPENDIX

Nouns and verbs used in the experiment.

Animate nouns		Verbs	
Spanish Item	English Translation	Spanish Item	English Translation
<i>puerco</i>	pig	<i>comiendo</i>	eating
<i>oso</i>	bear	<i>golpeando</i>	patting
<i>vaca</i>	cow	<i>besando</i>	kissing
<i>cebra</i>	zebra	<i>lamiendo</i>	licking
<i>caballo</i>	horse	<i>mordiendo</i>	biting
<i>elefante</i>	elephant	<i>arrastrando</i>	hitting
<i>gato</i>	cat	<i>empujando</i>	pushing
<i>conejo</i>	bunny	<i>agarrando</i>	grabbing
<i>pájaro</i>	bird	<i>rasguñando</i>	scratching
<i>cabra</i>	goat	<i>corretiando</i>	chasing
<i>perro</i>	dog	<i>sacudiendo</i>	bumping
<i>pato</i>	duck	<i>tocando</i>	touching
<i>girafa</i>	giraffe	<i>acariciando</i>	petting
<i>rana</i>	frog	<i>pelliscando</i>	pinching
<i>gallina</i>	chicken	<i>jaland</i>	pulling
<i>ardilla</i>	squirrel	<i>pateando</i>	kicking
<i>vibora</i>	snake		