

The role of semantic attunement in bilingualism and second language learning

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Abstract

Different languages include different information about the events they describe in their verbs. When learning their native language, children come to attend specifically to the information that its verbs describe, a process called semantic attunement (Golinkoff et al., 2025). Those who learn a second language as an adult often continue to follow these attentional biases when they speak and write (e.g., Song et al., 2016), resulting in utterances that do not conform to the language being learned (the L2). Lucy (2004) called this effect semantic accent. Many questions remain about semantic attunement, especially in the realm of bilingualism. In particular, it is possible that second-language education ought to include direct instruction about the semantic biases of the target language. Doing so may help students produce more native-sounding language sooner in their training. Apparently, such comparative instruction is not presently offered – at least at the college level.

Keywords: *semantic attunement, language development, bilingualism, second language instruction, second language learning*

Introduction

Imagine a scene of a person walking across a road. Depending on which language the viewer speaks, describing this scene could focus on any of its *components*: the person (figure), the way they move (manner), the road (ground), the direction they take (path), or even others. For example, while an English speaker may say “She walks across the street,” a Spanish speaker describing the same event may say “Ella cruzó la calle caminando” (“She crossed the street walking”). These languages encode different event components in the verb: English uses the verb to describe *manner* information (how an action is performed), while Spanish is more likely to use the verb to describe *path* information, or the trajectory of the action. In each language, other information can be encoded in different parts of the sentence, such as with prepositions or adverbial phrases, but only the information in the verb is *required* for the sentence. In this way, different languages spotlight different event components. Characterized by Talmy (1985), the event components a language highlights is its *event typology*.

Learning which event components are required and which are not is an important part of learning a language. Children start life attending to a wide variety of event components, but as they gain experience with their first language, they begin to focus only on the components which their language spotlights (Göksun et al., 2011). Using an eye-tracking paradigm, Göksun et al. (2011) tested whether English- and Japanese-reared infants would notice the difference between a *bounded* ground (e.g., a street or bridge) and an *unbounded* ground (e.g., a field or a golf course). Japanese uses different verbs to describe each of these categories, but English does not. Silent videos of dynamic events were shown to both groups of infants. After being habituated to events involving one ground type, 14-month-old infants in both language groups showed a novelty preference for the other ground type, showing that they were able to hone in on the difference in ground type between the categories. At 19 months, however, only Japanese-reared infants maintained sensitivity to this distinction. The finding that Japanese-reared infants, but not

English-reared infants, were still able to notice the distinction between the ground types at 19 months of age suggests that their language experience influenced the event components to which they attended.

Further support for the role of language in this process comes from an eye-tracking study working with English-speaking infants. Konishi et al. (2019) examined whether introducing new words could manipulate the event components to which infants attend. Using the same videos and overall procedure as Göksun et al. (2011), Konishi et al. (2019) found that 14-month-old English-reared infants could be induced to no longer attend to the distinction between ground-path categories when both categories were described with the same nonsense preposition (e.g., *She's walking toke the road!*). However, 23-month-old English-reared children, could be induced to notice the distinction again if different prepositions were used to differentiate between them. Notably, it only took a few minutes of exposure to these novel category labels for the children to “rediscover” the distinction (Konishi et al., 2019). Preliminary research suggests, however, that it is much more difficult for adults to notice event components their language does not highlight in this way (Konishi et al., 2019). This process, called *semantic attunement* (Golinkoff et al., 2025), is somewhat analogous to attunement previously observed in other domains, such as phonology (e.g., Tsao et al., 2004), face perception (see Scherf & Scott, 2012), and music perception (Hannon & Trehub, 2005). In both processes, infants gradually learn what kinds of distinction are important to their language, and allocate their attention accordingly. In this way, they become more in tune with their native language, and begin to perform more like adult native speakers. In the case of semantic attunement, this means that infants begin to focus their attention from a wide range of event components to just the ones that their language encodes in the verb, as shown in Göksun et al. (2011).

Thus far, the majority of the research on how and when semantic attunement occurs has focused on monolingually-reared infants. In other domains, such as phonology, bilingually-reared infants have been shown to follow a more complex developmental trajectory, thought to be due to needing to “sort through” varying input from multiple languages (e.g., see Bosch & Sebastián-Gallés, 2003). Many questions remain about semantic attunement, especially in (both native and non-native) bilingual populations.

The current paper aims to discuss how semantic attunement can be applied to second language acquisition in and out of educational settings. Semantic attunement as a framework has only very recently begun to be explored (see Golinkoff et al., 2025), and more research is needed to consider its potential implications for second language acquisition and pedagogy. Looking through the lens of semantic attunement may produce interesting new questions for further research. This paper will highlight gaps in the research to which semantic attunement might be profitably applied.

Bilingual development

The bilingual advantage. Infants being reared in a bilingual environment seem to develop differently from their monolingual peers in various cognitive domains (for a review, see Barac & Bialystok, 2011). For example, previous research has found that bilinguals outperform their monolingual peers in measures of executive function, especially in the domain of inhibitory control (Bialystok, 2009; Carlson & Meltzoff, 2008; Miyake et al., 2000). Besides the “bilingual advantage” seen in certain domains of executive function (e.g., Bialystok et al., 2003), cross-linguistic coactivation of language structures in the bilingual brain may affect visual attention, semantic organization, and memory (Marian & Hayakawa, 2025). For example, one study on visual attention found that *monolingual* Spanish and Catalan-reared infants who were habituated to a silent video of a person speaking French or English were not able to detect when the speaker switched languages, but Spanish-Catalan bilingual infants were (Sebastián-Gallés et al., 2012). Even without sound, the bilingually-reared infants noticed when the speaker switched languages because of visual cues such as the way the mouth moved; monolingual infants did not notice the switch. Even when monolingual French- or English-reared infants viewed the same videos, they were not able to detect the swap, while French-English bilingually-reared infants did (Sebastián-Gallés et al., 2012). This finding suggests that

bilingual infants are able to pay closer attention to visual information, as they were able to notice such a small change.

Further supporting a bilingual advantage with visual attention, Singh et al. (2015) found that infants 6 months of age who were being raised bilingually habituated to visual stimuli more quickly than their monolingual peers. Examining whether bilingualism conveys an advantage in visual attention and memory, Singh et al. (2015) habituated each participant to either a stuffed bear or a stuffed wolf, which were very visually similar. From habituation trial to habituation trial, bilingual infants showed a steeper decrease in visual fixation time, indicating that they were becoming habituated to the stimulus faster than their monolingual peers. After habituation, participants were shown both stuffed animals side-by-side. While both monolingual and bilingual infants preferred to look at the stuffed animal they had *not* seen during habituation, indicating that they were able to tell the difference, bilingual infants looked at the novel stimulus significantly longer (Singh et al., 2015). These results suggest a measurable bilingual advantage in even nonlinguistic (i.e., visual) information processing, as well as in visual memory.

Early bilingualism and attunement. One consequence of the interaction between bilingualism and cognitive development can be seen in the timeline along which bilingually-reared children undergo attunement processes. Previously, bilingual rearing has been thought to *delay* language learning, as bilingually-reared children seemed to lag behind their monolingual peers in word learning and phonological development (see Fennell & Lew-Williams, 2017). Generally, however, studies that found such a “bilingual disadvantage” focused only on one of the child’s languages, and thus did not produce an accurate picture of their actual word learning (Fennell & Lew-Williams, 2017). More recent studies have produced a more nuanced picture, in which bilingually-reared children are presented with unique challenges that *can* result in a longer period of phonological attunement. However, this effect is strongest when the two languages are very similar, and thus harder to tease apart (Bosch & Sebastián-Gallés, 2003; Sebastián-Gallés & Bosch, 2009; Petitto et al., 2012; Garcia-Sierra et al., 2011). It has also been posited that bilingually-reared children may remain more flexible for a longer time than their monolingual peers with regard to learning non-native contrasts from a third language (Graf Estes & Hay, 2015 vs. Hay et al., 2015; Singh, 2018 vs. May & Werker, 2014). In other words, bilingually-reared children may be more easily able to “recapture” attention to phonemes that their languages do not have than their monolingual counterparts. It is unclear how long this additional cognitive flexibility may last, however, and more research is needed to fully characterize the relationship between early bilingualism and phonological attunement.

Given the evidence that bilingually-reared children undergo a more complex (and potentially lengthier) trajectory when it comes to phonological attunement, it stands to reason that they may also experience similar complications in the domain of semantic attunement. Using the same paradigm as Göksun et al. (2011) and Konishi et al. (2019), Singh et al. (2023) compared Mandarin-English bilingual infants to their monolingual peers (all from Singapore). In this study, infants were habituated to one type of ground-crossing event, showing either a bounded or unbounded ground. At test, a split-screen display with one crossing event on the novel ground type and one of the familiar ground were shown. Eye tracking was used to evaluate whether infants preferred the novel ground type, which would indicate that they had successfully formed categories of events based on this non-native distinction. The bilingually-reared infants were found to develop sensitivity to changes in ground type, which is not lexicalized in either of their ambient languages, later than monolingually-reared infants; however, they also retained their sensitivity to it for longer. At 14 months of age, the monolingually-reared infants were sensitive to the non-native ground-path distinction, but this sensitivity declined by 19 months. The bilingually-reared infants, in contrast, did not show sensitivity to this distinction at 14 months, but *were* able to notice it at 19 months. By 24 months, the bilingually-reared infants once again declined in sensitivity to the non-native distinction. Interestingly, and unlike the monolingual infants, the bilingual infants also showed more attention *within* ground types. This developmental trajectory described by Singh et al. (2023)

mirrors similar findings in the phonological domain (see Singh et al., 2018). It is possible that, because bilingually-reared infants are exposed to input from multiple languages, it may take longer for them to hone in on the event components their languages privilege.

It remains to be seen whether and how bilingually-reared children differ from their monolingual peers in terms of semantic attunement in the long term. It is likely that their developmental trajectories in this domain are more complex, and they may even retain more flexibility later in life, mirroring findings in the phonological domain. Much more research is needed to understand how growing up in a bilingual environment may affect infants' semantic attunement.

Acquiring an L2 as an adult: thinking for speaking and semantic accents

Non-native speakers - that is, those who acquire an L2 in adulthood - rarely show native-like performance in their target language, even after years of instruction or even after living in a country where their target language is routinely spoken (Bley-Vroman, 1988; Johnson & Newport, 1989). The acquisition of a native language comes along with the attentional biases associated with it. Therefore, it appears to be very difficult to be "retrained" (Slobin, 1996, 91). Adult L2 learners are therefore faced not only with learning the vocabulary and grammar of their new language, but also with learning its event typology. This is an exceptionally difficult task, which may partially underlie an adult L2 speaker's inability to reach native-like performance.

Thinking for speaking. Slobin (1987) proposed the term *thinking for speaking*, referring to the way that planning an utterance affects how a speaker organizes their thoughts. The idea that one's thoughts are influenced by whether they are planning to speak is intuitively true, but is also supported by research. An eye tracking study on visual attention, for example, found that English and Greek speakers attended to different event components of an animated event when they were told they would need to describe it later, but not otherwise (Papafragou et al., 2008). When shown animated scenes, English speakers looked longer at areas of the screen associated with manner information, and Greek speakers looked longer at areas of the screen associated with path information. Further supporting the specific role of language, the effect disappeared under linguistic interference (i.e., while counting aloud), but not under non-linguistic interference (i.e., a tapping task) (Trueswell & Papafragou, 2010). This suggests that cognitive systems related to language were being used to process the visual scene when it was available under non-linguistic interference. Since the differences between language groups disappeared under linguistic interference, it is unlikely that the effect stemmed from a more general effect of culture or previous experience with looking in general. Rather, it seemed to come from the specific event components each language used in their verbs.

Semantic accent. Planning an utterance in a learner's second language is a complicated task, which can be affected by the native language, producing grammatically sound sentences that still sound strange to a native ear. Lucy (2004, 2010) called this a *semantic accent*, drawing an analogy to phonological accents. These "strange" sentences can take several forms. In one example, Potapova and Boroditsky (2016) found that fluent Russian speakers often include information about events that would be required in Russian but not English in their English utterances. For example, many Russian speakers were found to include telicity information, which English does not require. Second-language speakers might also use words that translate literally between their L1 and L2, but carry different features or connotations, an effect mediated by experience with their L2 (Matsuki et al., 2020). For example, as described in Matsuki et al. (2020), the word "pumpkin" in English is translated as *kabocha* in Japanese, but the actual objects the words refer to differ significantly between cultures. In the U.S., pumpkins are round and orange; in Japan, however, most are green. Even given experience not just with the language but also with the culture and surrounding flora, a native Japanese speaker may display a semantic accent by referring to a green vegetable as a pumpkin. Even when grammatical fluency is reached, a semantic accent may remain, resulting in clearly non-native utterances.

Advanced L2 learners. Although adult L2 learners may never reach fully native proficiency, there is a small amount of research on adult L2 learners' ability to learn and adopt their new language's event typology. One study asked native Danish speakers who were learning Spanish to narrate motion events in Danish or Spanish. Advanced Spanish learners produced narrations that mirrored native Spanish speakers both in terms of the information included and the grammatical structures that were used (Cadierno, 2004). A subsequent study found that Danish speakers who were advanced Spanish learners did not differ from native Spanish speakers in their use of manner verbs (Cadierno & Ruiz, 2006). These findings are a testament to what we know: humans can learn new languages, even well into adulthood. Similarly, a study on native Chinese speakers learning English showed that the adult participants could reach a native-like level of sensitivity to and production of English plurals (Li, 2021).

This does not mean that the task of acquiring a new language in adulthood is easy, however. The literature is not clear on how many adult L2 learners are able to reach native-like proficiency, if any at all (Hyltenstam & Abrahamsson, 2000). Generally, language learners who begin in adulthood are much less likely to reach native-like proficiency in their L2, even given years of practice and immersion. Adult L2 learners often are, however, able to communicate in their second language, even if their performance is clearly non-native (Hyltenstam & Abrahamsson, 2000).

Mastering an L2 requires much practice and exposure. L2 learners with less experience with the new language do seem to rely on their L1 more when producing sentences in their L2. Even at the advanced level, Cadierno (2004) found that Danish speakers learning Spanish often provided more elaborate and complex path information than native Spanish speakers; similarly, Cadierno and Ruiz (2006) found that the Danish speakers used manner verbs inaccurately to describe boundary crossing events in a way that native Spanish speakers did not. Additionally, Inagaki (2001) showed that native Japanese speakers learning English failed to accurately comprehend combinations of manner verbs with locational prepositional phrases (e.g., "John swam under the bridge"), which are not allowed in Japanese. This mismatch also runs in reverse; native English speakers learning Japanese accepted similar constructions in Japanese as grammatical even though they are not (Inagaki, 2001).

Seeking to study how L2 learners may avoid their new language's event typology, Song et al. (2016) provided adult native English-speakers learning Spanish with a wordless picture book and asked them to write descriptions of four pictures. The proportion of path verbs the participants used was measured, and compared to native Spanish speakers. The English-speakers ranged from an intermediate to advanced level in Spanish. When describing an image of an owl, intermediate Spanish learners produced sentences using manner verbs to describe boundary-crossing events that native speakers describe with path verbs. For example, an intermediate Spanish learner produced *El búho vuela fuera del árbol* [translating "The owl flew out of the tree"], which makes use of a manner verb with the path described in a prepositional phrase. Describing the same image, a native Spanish speaker produced *Salió un búho*, ['An owl exited'] which omits the manner entirely and encodes the path in the verb. Overall, the L2 learners used of *volar* "to fly" 7 times when describing the image of the owl, while the native Spanish speakers did not reference the manner of the owl's action at all (Song et al., 2016). These data suggest that the intermediate Spanish learners were relying on their English experience to describe the event and attempting to directly translate English descriptions into Spanish, rather than describing images in the way a native Spanish speaker would. This effect of English event framing on Spanish sentences was mediated by both the level of the Spanish class the learner had taken and their amount of study abroad (i.e., immersion) experience (Song et al., 2016).

Another study examining Japanese-English bilinguals found a similar mediating effect of experience and especially cultural immersion on the degree of semantic accent L2 learners exhibited (Matsuki et al., 2020). In this study, native Japanese speakers who spoke English as an L2 were recruited from Japan and Canada. The participants living in Canada, where they are much more immersed in Western culture, were compared to the ones living in Japan. In both languages, across two sessions, participants performed a

series of tasks investigating which features they associated with various nouns. Working with tokens like the pumpkin-*kabocha* example, wherein a word that translates between languages actually refers to objects with very different features, Matsuki et al. (2020) examined whether native Japanese speakers associated more Japanese-like features (i.e., for “pumpkin,” green skin) with each token, even when presented in English. They found that the participants living in Canada, where they were much more immersed in Western culture, were significantly less likely to associate Japanese-like features with tokens presented in English than their Japan-dwelling counterparts. While both groups of participants behaved similarly on tests presented in Japanese, the participants living in Tokyo associated more Japanese-like features with English tokens, indicating a semantic accent. The participants living in Canada, despite being native Japanese speakers, are more immersed in Western culture than those living in Japan; Matsuki et al. (2020) posits that this immersion mediated the effect of their native language on their feature decisions.

Generally speaking, second-language textbooks do not include explicit instruction about lexicalization biases and event typology (Cubillos, 2019, personal communication). Therefore, students must discover these biases on their own, and only then can they incorporate them into their own utterances. This could be done by statistical learning, or by extrapolating from specific rules disallowing certain structures in the L2 (e.g., manner verb/location PP in Japanese, or a manner verb describing a boundary-crossing event in Spanish). More research is needed to understand how adult language learners acquire and incorporate lexicalization biases from their L2. It is possible that explicit instruction on event typology could help language learners begin to use more native-like structures earlier. For example, in the case of English and Spanish, it may be helpful for an instructor to draw specific attention to event components by presenting images similar to the ones used in Song et al. (2016) and asking students to identify which component(s) their L2 versus their native language focuses on. Students could then be asked to provide written descriptions of these images to see if this exercise affected their semantic accent. Given that adults can engage their metalinguistic awareness, it may be the case that engaging in explicit comparisons like these would highlight the differences between languages and the appropriate encodings in the L2. Additional research of this nature could help determine whether and how semantic attunement should be taken into account in the language classroom.

Future directions

Semantic attunement is still a relatively new avenue of research, and much more is needed to understand a) the process by which it occurs, b) the ways it may interact with bilingualism in children, and c) how adult learners of second languages overcome the event typology they are used to in their native language to acquire those demanded by their L2. As highlighted in Singh et al. (2022), the available research on attunement in the phonological domain lacks diversity. While the effects of phonological attunement are well-supported in the populations studied, a systematic review of the literature showed that the populations studied were a) largely monolingual (despite this not being a global norm), b) not from a diverse geographical location, and c) examining a relatively small subset of phonological contrasts (Singh et al., 2022). A lack of diversity in the research thus far undermines claims of the “universality” of phonological attunement. Since semantic attunement is roughly analogous, this limitation must also be taken into account when researching semantic attunement. Future research in this area should aim to recruit diverse groups of participants from a wide variety of language backgrounds so as to build a more complete understanding.

While there is a dearth of research into semantic attunement overall (Golinkoff et al., 2025), there is almost none available that examines bilingual participants. Just as the differences between bi- and monolingual learners can teach us more about phonological attunement, the same is true for semantic attunement. Much more research is needed comparing bilingually-reared infants to their monolingual peers, including utilizing different event component distinctions. For example, are some event

components more salient than others, even when the participant does not speak a language that lexicalizes them? Do bilingually-reared children remain more sensitive to changes in non-native event component distinctions longer into childhood than their monolingual counterparts? Does it matter if a bilingually-reared infant's ambient languages have similar or more different event typologies? These questions and more remain open.

It is also possible that research into semantic attunement may result in new guidance for second language teachers. Most second language education programs focus on syntactic and phonological aspects of the target language. However, these are not the only aspects by which languages differ. The semantic tendencies of the target language should also be taken into account when teaching a second language (Golinkoff et al., 2025). It is currently unclear whether and how explicit instruction on verb framing might affect semantic accents in second-language learners. Research is needed in order to determine what the best approach to teaching a language's event typology might be. More research is also required to establish whether students learning languages besides Spanish, or with first languages besides English, show semantic accents similar to what was found in Song et al. (2016). Matsuki et al. (2020) found that the strength of a semantic accent is mediated by experience and degree of immersion in the target language, but it remains to be seen whether direct instruction about event typology could also play a role. Finally, it is unclear whether the strength of a semantic accent correlates with other measures of language proficiency.

Semantic attunement, and semantic accents, present complex challenges when learning a new language, whether as a child or an adult. Much about the process remains unknown. Further research is required to understand the process of semantic attunement, whether and how it interacts with bilingualism, and whether and how it ought to be incorporated into a second language learning environment. Currently, there is a dearth of empirical evidence to draw from in response to these questions. Future research into second language acquisition pedagogy ought to take this new framework into account in order to address these knowledge gaps.

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