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CHAPTER 12

Event perception and language learning

Early interactions between language and thought

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How do children learn relational words such as verbs and prepositions? We present a framework for testing children's acquisition of relational words. We argue that learning relational language requires first discriminating and abstracting a set of components in events. Children then come to interpret these event components in line with their native language. In this process of *trading spaces,* infants start from a common non-linguistic base and focus on event components encoding once they start to learn their native language, becoming language-specific interpreters. Not only does language focus attention on particular components of events, but it also might serve as a tool for constructing complex event concepts. We discuss the implications both for first language learning and second language acquisition.

Keywords: event perception, relational language, language and thought, second language

Tilbe Göksun: Before I met Prof. Ayhan Aksu-Koç, I had heard about her knowledge, insight, and enthusiasm in the child language acquisition field, and I had read all her work. I have never been her student, even though she has been teaching in my undergraduate university for many years. We met on a hot summer day at the airport in July 2005 while we were both going to the IASCL Conference in Berlin. At that time, I was a recent MA graduate who was going to Temple University for a PhD in a month. The conference was unforgettable with 'Ayhan hocam' (as we say in Turkish). She knows how to enjoy life and transfers her never-ending energy to everyone around her. I feel so fortunate to be close to her, share intellectual opinions, and pleasant moments. Ayhan hocam – what is the next airport where we will get good bread-chocolate?

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Aslı Erciyes: My initial acquaintance with Prof. Ayhan Aksu-Koç was when I was a student in the psychology Master's program at Boğaziçi University. I was fascinated by her knowledge, wisdom and enthusiasm as I got to know her. She introduced me to the field of language acquisition, where, under her supervision, I completed my Master's thesis and decided to continue for my PhD. I am honored for having the privilege to work with her for both my Master's and PhD theses; it is a privilege, to my knowledge, no other student has ever been rewarded with. I witnessed and experienced myself how she acted "soft on people and hard on issues" which became my life long motto. Working with her is like an efficient, inspiring and joyful journey, a journey I appreciate every moment of.

1. Introduction

The study of verbs and other relational words such as prepositions lie at the juncture of event perception and language development. Verbs are particularly important, binding words together in ways that represent *who is doing what to whom* and how things unfold over space and time. To acquire relational terms such as *run, walk, in,* and *on,* we argue that infants universally notice a common set of foundational components in events – dividing the world in language-ready ways. As children learn how to express event components in their native language, they highlight certain components over others and metaphorically *trade spaces*; moving from being 'language-generalists' to 'language-specific interpreters' of events (George, Göksun, Hirsh-Pasek & Golinkoff 2014; Golinkoff & Hirsh-Pasek 2008; Göksun, Hirsh-Pasek & Golinkoff 2010a). We are building this theory on the typological prevalence hypothesis of Gentner and Bowerman (2009), which suggests that semantic categories sharing cognitive and perceptual commonalities that are salient to humans can be learned with little input. Yet, concepts that are less natural and vary crosslinguistically can be learned with more language experience. In this chapter, we refine our theory of *trading spaces* and emphasize early interactions between language learning and thought processes. By providing evidence from recent research findings from various languages, we seek to underline the nature of the link between event perception and language learning. With this primary aim, the chapter will address the following questions: (1) Do children across the world parse events in similar ways and, if so, when and how do they tailor the packaging of event components to meet the demands of their native tongue? (2) How does learning one's native language impact this change? Can language also play a pivotal role in guiding children's perception of more complex relations in events? (3) Would there be similar developmental trajectories for children who are raised bilingual or children learning a second language before age five? All these questions are very

relevant to Prof. Ayhan Aksu-Koç's work and emphasis on the early interactions between language and cognition (e.g., Aksu-Koç 1994). We start the chapter by explaining the trading spaces framework in detail and then attempt to answer these three questions.

2. Trading spaces

An event is "a segment of time at a given location that is perceived by an observer to have a beginning and an end and their relations" (Zacks & Tversky 2001: 3). As outlined by Talmy (1985, 2000), events involve different semantic components that are expressed by relational terms (see also Jackendoff 1983). These include the *figure* (the moving or conceptually movable entity), and its relation to the *ground* (the reference entity or stationary setting). Figures take trajectories named *paths* (e.g., *in front of, over*) with respect to grounds, and use various *manners* of motion (how action is performed, e.g., *jumping*). Events also have starting points or *sources*, and/or endpoints of motion or *goals.* Events often, though not always, include *causa*l relation between objects, as in "Sally pushed John down." Last, events include spatial relations such as *containment* (e.g., putting things *in* a container) and *support* (e.g., putting things *on* a surface) among others.

In her perceptual meaning analysis, Mandler (2012) suggests that prior to language learning prelinguistic infants construct image schemas by attending to basic spatial components such as contact, path, or containment. Later, they re-describe them to form the concepts that are encoded in their native language. A cross-linguistic analysis of many different languages led Slobin (1996: 88) to conclude that languages are not "neutral coding systems of an objective reality." The exact same event can be described differently depending on a given language. Thus, while learning a language, children pay attention to how their particular language community encodes aspects of events. In this process, children learn to "think for speaking" (Slobin 1996, 2001). Gentner and Bowerman (2009) further argued that semantic categories that share cognitive and perceptual commonalities across languages are easier for children to learn with little or no native language input.

Learning relational terms within a language is a tough process for young children. Compared to nouns, relational words – and particularly verbs – are difficult to learn even in languages in which verbs can occur alone in a sentence or appear at its end, a salient position for the recency effect (Gentner 1982; Imai et al. 2008; Waxman et al. 2013). Verbs take continuous, dynamic events that evolve through space and time, and divide them into categories of actions (Hespos, Grossman & Saylor 2010).

As children learn their native language, infants move from being *language-generalists* to *language-specific* interpreters of events. This does not mean that infants reshape their semantic space or even their view of event categories through attention to language. Infants likely see events similarly before and after they learn language. It does, however, suggest that that sensitivity to particular distinctions in events can be highlighted or dampened as children gain exposure to the patterns in their native language, achieving new perspectives on events. Thus, there is not much of a conceptual change or structural reorganization of event categories, but children's attention to event categories might change. Moreover, some event categories are revealed only through language as children grasp the specific meaning of events (George 2014; Göksun, George, Hirsh-Pasek & Golinkoff 2013), such as the causal relation of "prevent" (Wolff 2003). In this case, language not only guides attention to particular aspects of events, but also acts as a tool in the formation of event categories. Trading spaces can be viewed as a useful framework to test these assumptions about learning relational language.

In the next two sections, we first discuss infants as *language-generalists,* providing evidence for how they detect and categorize events in the absence of language. Then, we address how infants become *language-specific* interpreters as they learn their native language and how language learning may also assist in the construction of some event concepts.

3. Nonlinguistic event processing: When and how do children package event components?

During the first year, infants display remarkable abilities in event processing. Infants distinguish biological motion from non-biological motion for both people and other mammals (Arterberry & Bornstein 2002) and identify both rational and intentional actions (Csibra, Gergely, Biro, Koos & Brockbank 1999). They discriminate changes in patterns of motion (e.g., Bogartz, Shinskey & Schilling 2000) and remember specific patterns (Bahrick & Pickens 1995) Infants also parse actions in events (e.g., Baldwin, Baird, Saylor & Clark 2001; Hespos, Saylor & Grossmann 2009; Sharon & Wynn 1998), follow an agent's intention (Saylor, Baldwin, Baird & LaBounty 2007), and segment continuous motion based on statistical regularities (Roseberry, Richie, Hirsh-Pasek, Golinkoff & Shipley 2011; Stahl, Romberg, Roseberry, Hirsh-Pasek & Golinkoff 2014).

Parsing actions and seeing the regularities in events prepares infants to focus on and distinguish between event components linked to linguistic expressions (Clark 2003). As a first step in learning relational language, infants need to attend to event components such as path, manner, figure, and ground. These components

are salient and visually available to children. They are universally encoded across languages (Jackendoff 1983; Talmy 2000). For example, the path of an event is expressed in all languages and appears in varied language forms like verbs (e.g., *exit, enter*) and prepositions such as *over* and *across*. Thus, even though path is linguistically expressed across the globe, languages vary how they code these event components (e.g., *jump up* in English can be formulated as *zıplayarak çıktı,* 'go up jumpingly' in Turkish). The trading spaces framework suggests that prelinguistic infants or young language learners will both discriminate between various event components and categorize across several exemplars such that they will continue to focus on commonalities in an element like *path* from a character that is running under a dome or skipping under a bridge (Göksun, Hirsh-Pasek & Golinkoff 2010a). Below we present evidence for this first step of trading spaces – that all children regardless of their native language will share attention to a set of non-linguistic event components in spatial relations and motion events. In each case we argue that young infants are *language-generalists,* who can attend to events and dissect the components in them even when their native language does not have a specific encoding for the construct.

3.1 Static events

The most frequently studied spatial relations in early infancy are *containment* and *support* events. A containment relation refers to fully or partially surrounding an object by a container as 'the coffee is *in* the mug,' whereas a support relation occurs when one object appears on top of a surface as 'the mug is *on* the coffee table.' Languages express these relations in various ways. For example, in Dutch, even though the coding of *in* is similar to English, *on* relations can be divided into three different types. *Op* is used for canonical support relations (e.g., the mug is *on* the table), *aan* is used for hanging and attachment (e.g., the painting is *on* the wall), and *om* is expressed for encirclement with contact (e.g., the ring *on* the finger) (Gentner & Bowerman 2009). Another type of division comes from Korean, in which containment and support events are encoded based on the degree of fitness (tight or loose fit) between objects. *Kkita* refers to a *tight fitting* relation between objects; a ring on a finger and a book in a cover are both labeled with kkita. In contrast *nehta* refers to a *loose fitting* between objects; a pencil in a pencil case and a book on a table are coded with nehta (Choi & Bowerman 1991).

By 6 months of age, English-reared infants can discriminate between the spatial relations of containment and support (e.g., Aguiar & Baillargeon 1999; Baillargeon 2004; Baillargeon & Wang 2002; Hespos & Baillargeon 2001, 2008, Hespos & Piccin 2009), and even English-reared 5-month-olds who are reared in a language that

does not focus on tightness or looseness of fit, nonetheless differentiate between tight-fit and loose-fit events in both containment and support categories (Hespos & Spelke 2004).

Six-month-old infants not only discriminate, but also categorize containment relations (Casasola, Cohen & Chiarello 2003). Support relations, in contrast, are not categorized before 14 months of age unless the task is simplified by reducing the number of exemplars of the category (Casasola 2005, see also Casasola & Park 2013). In addition, both English- and Korean-reared 9-month-old infants categorize events observing the common degree-of-fit relation (i.e., tight- or loose-fit; McDonough, Choi & Mandler 2003). Prelinguistic infants are sensitive to spatial distinctions that are not encoded in their native language. In terms of containment and support, children learning English are tuned to pay attention to aspects of events and actions codified in different languages of the world.

3.2 Dynamic events

Motion events involve several different components. Among them, *path* (trajectory of motion) and *manner* of motion (how action is performed) have been studied across many languages and populations. Satellite-framed languages such as English and Russian integrate motion with manner in the main verb and express path with a verb particle or a satellite (e.g., run *down*). In contrast, verb-framed languages such as Spanish, Turkish, and Hebrew incorporate motion with path in the main verb and express manner in the subordinated verb (e.g., in Turkish, *koşarak çıktı* 'go up runningly') (Talmy 1985, 2000). In addition to this categorization, Mandarin is considered to be an equipollently framed language as both path and manner information are expressed by equivalent grammatical forms (Chen & Guo 2009).

Pulverman and colleagues showed that seven-month-old English- and Spanish-reared prelinguistic infants could discriminate between path and manner changes in dynamic events (Pulverman et al. 2008, 2013). For example, when habituated to an animated starfish moving on a specific path with respect to a ball (e.g., *under* the ball) and with a specific manner (e.g., *bending*), infants dishabituated to the clips when there was a change in either the path (e.g., *over* the ball) or manner (e.g., *jumping*). Further studies showed that infants could also extract the common path among several dynamic scenes (hopping *under*, jumping *under*, bending *under*, and twisting *under*) at 10 months of age and extract the same manner over several paths at 13 months of age (Pruden et al. 2012, 2013). Thirteen- to 15-month-old English-learning children can also successfully categorize dynamic realistic events such as extracting the path of *through* from different examples of the same woman's actions (hopping *through*, crawling *through,* walking *through*, spinning *through*)

(Konishi, Pruden, Hirsh-Pasek & Golinkoff 2016). Ten- to 13-month-olds also form categories of two manners (i.e., hopping and marching) over five different actors (Song, Pruden, Golinkoff & Hirsh-Pasek in press). Additionally, the categorical division between paths like *over* and *under* are even more salient to prelinguistic infants than are *within-category* distance changes (e.g., *5 inches over* versus *15 inches over*) (Roseberry, Göksun, Hirsh-Pasek & Golinkoff 2012). Though infants might note continuous changes within categories, it appears that they are likely to create categorical information from the flow of action. This strategy is helpful to language development, as these categorical units become the referents for word to world mappings.

In another interesting language-specific aspect of encoding motion, languages like Japanese, but not English, use different verbs to express motion over various grounds (i.e., reference points). For example, crossing a *bounded* surface (e.g., *wataru* for crossing a street) is encoded differently than crossing an *unbounded* surface (e.g., *tooru* for crossing a field). Using looking time paradigms, Göksun and colleagues (2011) found that 11-month-old English-reared infants noticed changes in figures (e.g., *a man* crossing a road is different than *a woman* crossing a road) and 14-month-olds detected changes in the grounds that people crossed. Importantly and somewhat surprisingly, both English- and Japanese-reared 14-month-olds noticed categorical ground distinctions coded only in Japanese. That is, all children perceived that crossing *a street* was different than crossing *a field*, but that crossing *a street* and crossing *a road* were similar (Göksun, Hirsh-Pasek, Golinkoff, Imai, Konishi & Okada 2011). Thus, there appears to be a universal starting point in the interpretation of events with respect to motion events. That is, all children seem to behave like Japanese-learning children even if the language in which they are reared will not make ground distinctions.

A control study using the same movies but in grayscale replicated the results and argued against the possibility that infants were simply using the color of the grounds as a feature for ground discrimination. Further, in another study infants were familiarized with three different *wataru* grounds (the same woman crossing a *railroad track*, a *road*, and a *bridge*), and shown either a novel *wataru* ground (a street) and a *tooru* ground (a field) or two *tooru* grounds based on Japanese distinctions (a field and a tennis court) comparisons at test. Infants learning English extracted the common properties among the wataru grounds in the familiarization phase and looked longer to the novel wataru ground. Thus, infants categorize the geometry of the ground using multiple exemplars of this non-native ground category, and extend it to a novel exemplar from the same category (Göksun 2010). Preliminary results from a recent study show that Turkish-learning children display similar attention to figures and grounds as children learning Japanese (Erciyes & Göksun 2016).

In a motion event, the source is a location or reference object from which a figure moves and the goal is a location or reference object towards which the figure moves (Jackendoff 1983; Talmy 1985). Languages encode goals more frequently than sources for both the movements of intentional and inanimate figures (Lakusta & Landau 2012; Regier & Zheng 2007). Twelve-month-old infants discriminate between goals, but can attend to source changes at the same age only when the sources are made salient as with the introduction of sparkles (Lakusta et al. 2007). Recent evidence suggests that a goal bias may be limited to goal-directed motion by agents (Lakusta & Carey 2015). At 14 months of age, infants can form a category of goals across different objects and spatial relations, yet they cannot form source categories (Lakusta & Carey 2008).

Thus, even though we do not have an exhaustive catalogue of the discriminations that children can make within events, the early evidence suggests that infants can perceive event components that will be eventually encoded during their language learning. Difficulties in learning relational words can be in mapping or packaging these components based on the demands of a native language. Moreover, infants initially parse events in ways that are not necessarily relevant for their native language, that is, they discriminate and form categories of event components that their native language may not encode. How do young children start from this equivalent base and become *language-specialists*? Language itself may play an essential role in guiding children's perception to some aspects of events over others and to the construction of more complex relations in events.

4. How does learning one's native language impact event processing?

The first tenet of the trading spaces framework suggests that infants need to attend to, discriminate, and categorize several components in non-linguistic static and dynamic events. At this stage, infants are *language-generalists,* detecting non-native distinctions in events. Language can influence event processing both by directing attention to categorization of event components and by formulating event categories with the help of one's native language. In this section we focus on these different effects of language with the following questions: How does labeling event components impact discrimination and categorization of event components? What happens after infants start producing language? When and how do they become *language-specialists*?

4.1 Labeling event components

One simple hypothesis is that labeling might facilitate the discrimination and categorization of event components by drawing attention to certain features over others. For example, hearing the familiar word *on* aided 18-month-olds to abstract the category of support instantiated with both familiar and novel objects (Casasola 2005), and for non-native relations that are not coded in their native language (e.g., the word *'tight'* for *kkita* for American children; Casasola, Bhagwat & Burke 2009). Likewise, when presented with a novel verb label (e.g., javing), children were able to categorize paths and manners at 7 and 10 months of age, respectively, earlier than they could without labels (Pruden & Hirsh-Pasek 2006; Pruden et al. 2013). These labels can facilitate looking for commonalities across the spatial scenes and can aid children learning the spatial categories. Additionally, with the labels infants can detect the commonalities in events at an earlier age.

A recent study examined whether labeling might not merely strengthen but also *weaken* 13- to 15-month-old infants' sensitivity to Japanese ground path categories (Konishi 2015). English-reared infants at this age discriminated between Japanese ground categories, as in Göksun et al. (2011), when general language such as "Wow, look at her!" was presented with the visual stimuli. When a common label ("Look, she's walking *toke* the _____ (ground)!") was used across two types of grounds (wataru and tooru) during familiarization, infants merged these ground categories and lost their sensitivity to this non-native distinction. Göksun et al. (2011) found that in the absence of accompanying linguistic stimuli, English-reared infants dampened their non-native categorization at 19 months of age whereas Japanese-reared infants at the same age continued to discriminate between wataru and tooru grounds.

Interestingly, English-reared children at 21 to 24 months of age heightened their sensitivity to Japanese ground-path distinctions when they were exposed to novel words labeling these distinctions (*toke* and *keet*) as they viewed the visual stimuli during familiarization, but not when a general sentence such as "Wow, look at her!" was given (Konishi 2015). These findings suggest that non-native categorization of event components can be flexible. Even after children become language-specific interpreters, they can regain sensitivity to non-native spatial categories with minimal training. Further work is being conducted to see if any overlaid auditory stimulus, such as a tone corresponding to the speech, gives the same effect. Preliminary results suggest that tones do not work (Konishi 2015) and that this is an effect exclusive to language.

4.2 Vocabulary knowledge

Becoming effective users of a native language appears to influence attention to event components (Göksun et al. 2010a; George et al. 2014). One way to analyze this issue is through children's knowledge of the language, and in particular, vocabulary. By learning more about their native language, children realize more about the general *patterns* of language use. Thus, they may note the distinctions between events even before they learn relevant or exact words for specific relations. In turn, children who know more about their native language may have a dampened sensitivity to non-native distinctions compared to same-aged children who have fewer words in their lexicon. Evidence suggests that this might be the case. English-reared 19-month-olds who have fewer receptive vocabulary items relative to their peers still show sensitivity to Japanese ground-path distinctions (Göksun 2010). Similarly, English-speaking 29-month-olds with larger expressive vocabularies and who know the word 'in' are less likely to differentiate the degree-of-fit relations encoded in Korean than children who speak fewer words. Korean-speaking children preserved these distinctions regardless of their vocabulary levels (Choi 2006). Thus, children who know more words are also more likely to make native distinctions in events, which in turn influence their nonnative distinctions and render them less likely to make nonnative distinctions. In a recent study, Konishi and colleagues (in press) also found that categorization of path and manner at 13 to 15 months of age predicts children's verb comprehension at 30 months of age, extending the effect of vocabulary size in the native language to the comprehension of event components.

To this point, we have discussed the role of language in guiding infants' attention to native and non-native event components. Both labeling and vocabulary knowledge seem to guide infants' preferences for native categorical distinctions while trading spaces. As children learn more about the distinctions or general patterns in their native language through increasing their vocabulary knowledge, they become *language-specific interpreters,* by viewing events differently than they did before they knew as much language. But when do children start talking about events using the encoding style of their native language?

4.3 Expression of events

Children start using language specific spatial terms for degree of fit relations starting at around 2 years of age (Bowerman & Choi 1994; Choi & Bowerman 1991). For motion events, in a novel verb-learning situation, English-, Spanish-, and Japanese-speaking 2.5-year-olds extend a novel verb to the path of the action, but

3-year-olds in each language group displayed language-specific patterns of verb construal (Maguire et al. 2010). For example, English-speaking children assume that a novel verb labels manner, and Spanish-speaking children are less likely to interpret the novel verb as manner. These biases are also present in children's production of event components (e.g., Allen et al. 2007; Özçalışkan & Slobin 1999; Papafragou, Hulbert & Trueswell 2008). For example, Allen and colleagues showed that 3-year-old English-speaking children used *manner* + *path* combinations (e.g., 'The red guy rolled down.') more frequently than Turkish- and Japanese-speaking children. In contrast, Turkish- and Japanese-speaking children produced the same information in two separate clauses (e.g., 'The red guy went down, rolling'), reflecting the adult-like patterns of their corresponding languages. However, others suggest that children's early motion event expressions predominantly involve path only information regardless of their native language (Gullberg, Hendriks & Hickmann 2008; Özçalışkan & Slobin 1999). For other event components such as sources and goals, both children and adults represent a strong goal bias in the languages studied (Johanson, Selimis & Papafragou 2008; Regier & Zheng 2007). Thus, after age 3 children become language-specific interpreters of events by packaging these events in ways that are coded in their native language.

We argue that after this age, language serves as a tool for the formation of concepts. That is, language is used for more than guiding or highlighting the distinctions in semantic categories; it highlights concepts children might not attain otherwise.

4.4 Language as a mediator

Given that after age 3 children become language-specific interpreters of events, are there any cases in which language might be necessary for constructing event concepts? As in the typological prevalence hypothesis (Gentner & Bowerman 2009), some semantic categories require linguistic input to be learned. Causal events are an informative area for research. Developmental studies show that infants in their first year of life expect motion events to have causes, detect causal from non-causal events, and follow simple chains of causal events (e.g., Göksun, Hirsh-Pasek & Golinkoff 2010b; Leslie & Keeble 1987; Muentener & Carey 2010; see also Rakison & Krogh 2012). Even though children have the necessary conceptual underpinnings to describe causal events, it is not until age 4 that they reliably use causal verbs to describe causal relations. In fact, one of our key findings is that prior to using causal language, 4- and 5-year-olds rely on gestures to supplement their language skills. For example, when saying 'you hit the ball,' children made a fist hand shape to express the instrument, 'stick,' in gesture) (Göksun et al. 2010b; see also Furman,

Küntay & Özyürek 2014; Özçalışkan, Gentner & Goldin-Meadow 2014). Thus, in this case, language maps onto already existing causal representations.

Language does not merely describe events that are simple causal relations between objects such as one ball hitting the other one, but also represents complex relations that *integrate* various causal forces like helping, stopping, and preventing. In a recent study, Göksun and colleagues asked whether preschoolers evaluate different causal events based on the theory of force dynamics of Wolff (2003). *Cause* is represented in events where one force moves an object. In an *Enable* event, a secondary force promotes motion in the intended direction, and in a *Prevent* event, a secondary force hinders motion in the intended direction. Preschoolers represented the forces in causal events only incompletely. They were good at judging the direction and endpoint of the ball in one-force *Cause* trials. However, only 5-year-old children integrated two forces (Göksun, George, Hirsh-Pasek & Golinkoff 2013). These complex causal events involve several subevents that encode goal paths, causal forces, and end states. Thus, children may build their broader force dynamics categories from simpler events. To learn, for example, the meaning of *'prevent'*, children divide the event into simple fine-grained movements such as the two different path relations – an intended goal, and a causal part (George, Hirsh-Pasek & Golinkoff under review). Causal language as expressed through verbs might direct children's attention to relevant characteristics of multiple force interactions. In this case, language not only maps onto the causal representations, but also *mediates* children's formation of force dynamic causal categories. In particular, language might initially only guide children's attention to certain event components, and then as children become more sophisticated language users by learning the patterns of their native language, it can also mediate their attention to event components. More research is needed to examine how language mediates the formation of different event categories.

In sum, at around 3–4 years of age, children become *language-specific* event interpreters, organizing their semantic categories with respect to the standards of their native language. Research both with children and adults show that these event categories or lexicalization biases are malleable (Choi & Hattrup 2012; Konishi 2015; Papafragou et al. 2008; Shafto, Havasi & Snedeker 2014; but see Hespos & Spelke 2004). For example, Shafto and colleagues recently found that when both English-speaking adults and 5-year-old children were trained to postulate manner verbs for ambiguous events, they tended to extend additional novel verbs to manners of motion whereas those who were trained on path verbs extended additional novel verbs to paths of motion. Hence, lexicalization biases can be flexible and switch to non-native interpretations through training.

If language learning affects attention to key aspects of events and if a person is learning two languages, might they then have heightened attention to a broader set

of event categories? This is a key question, as we know relatively little about how children might simultaneously organize event categories. Further, how difficult is switching attention to new categorizations once you are deeply entrenched in the native language? Are individuals' event categories fully malleable? Research on second language learning, in contrast, suggests that it takes years to acquire the way in which a second language encodes events (Song, Pulverman, Pepe, Golinkoff & Hirsh-Pasek 2016). We explore this in the following section.

5. Learning more than one language

Over two-thirds of the world's children are raised bilingual or learn a second language at an early age (McCabe et al. 2013). Yet, little is known about how bilinguals or second language learners (SLL) overcome the difficulties in learning relational terms in their various languages. Compared to children learning only one language, SLLs need to learn how to package events in two languages and overcome the lexicalization biases from their first language that are formed in early childhood (George et al. 2014). By way of example, native Turkish-speaking children who are learning English may find it difficult to encode motion events in English as Turkish does not invariably specify manners in verbs.

Research on motion event conceptualization in a second language has mainly focused on adults who sequentially learn two languages (e.g., Brown & Gullberg 2008; Flecken, Weimar, Carroll & von Stutterheim 2015; Han & Cadierno 2010; Hohenstein, Eisenberg & Naigles 2006; Negueruela, Lantolf, Jordan & Gelabert 2004; Özçalışkan 2016; Song et al. 2016). For example, Hohenstein, Eisenberg and Naigles (2006) tested L1 Spanish – L2 English adult bilinguals in their expression of motion events. In each language, bilinguals resembled monolinguals in their descriptions. Yet, they also used more non-native lexicalization patterns (e.g., path verbs in English) in both languages. The age of acquisition also had an effect. Early L2 learners showed an L2 to L1 effect; thus early bilinguals used fewer path verbs in Spanish (L1) compared to monolinguals, showing an effect of English (L2). Lai, Rodriguez and Narasimhan (2014) also tested early and late L2 learners (L1 Spanish – L2 English) for their descriptions of motion events. Late L2 learners used paths of motion more often in Spanish than in English. However, early bilinguals had a path preference regardless of the language in use. In a written sentence solicitation task Song and colleagues (2016) indicated that advanced, but not intermediate, native English-speaking adults who were learning Spanish showed a path bias comparable to the bias in native Spanish speakers. That is, it took many years of training to loosen biases from a first language when learning a second language.

Together, these results suggest that L2 learners reflect the lexicalization patterns of their L1 in describing motion events, thus, L1 conceptual transfer to L2 (but see Özçalışkan 2016, for exceptions). Nevertheless, other factors such as the age of acquisition can influence the degree of impact of transfer from L1 to L2. Even though these studies are informative about the similarities and differences between L1 and L2 event conceptualizations, they do not speak to children's attentional shifts in the bilingual mind. There are no studies of which we are aware that test the salience of nonlinguistic event components in bilingual infants and probe the relationship between nonlinguistic event categorization and later language learning. As noted above, monolingual infants learning diverse languages perceive events similarly even when their languages do not emphasize certain event components in their lexicalization patterns. For example, English-learning children discriminate between bounded vs. unbounded crossing events encoded only in Japanese (Göksun et al. 2011). One possibility is that bilingual children may continue to pay attention to non-native encodings of events (i.e., distinctions that are not encoded by any language that they learn) longer than monolingual children. That is, even though bilingual children may follow the same developmental trajectories as monolingual children go through, the timelines of switching from being language-generalist to language-specialist might differ. However, bilingual children may also behave differently from very early on. To be able to learn both languages effectively, children need to continue paying attention to both languages' lexicalization patterns. Such research can have implications for educators concerning how to teach a second language, by moving away from an emphasis on vocabulary and grammar teaching to focusing on lexicalization patterns of the second language.

6. Conclusions

Relational language is dependent on an understanding and interpretation of events. The current state of the field suggests that infants learning different languages are universalists who parse events similarly – thereby preparing them for early language learning. With exposure to their native tongue, certain event components are heightened or dampened in ways that reflect patterns within the native language. This chapter offered evidence for a "trading spaces" framework built on Gentner and Bowerman's (2009) typological prevalence hypothesis. To date, different lines of research converge to support this framework and to suggest that infants begin the language learning process as *language-generalists* only to become *language-specific* interpreters of events when they need to talk about events. Language can also play

a pivotal role in guiding children's perception of more complex relations in events – such as causation. Trading spaces can also be viewed as a suitable framework to test children's and adults' construal of events when they are learning relational words in two languages.

References

Aksu-Koç, A. 1994. Development of linguistic forms: Turkish. In *Relating Events in Narrative*, R. Berman & D. I. Slobin (eds), 329–388. Hillsdale NJ: Lawrence Erlbaum Associates.

Aguiar, A. & Baillargeon, R. 1999. 2.5-month-old infants' reasoning about when objects should and should not be occluded. *Cognitive Psychology* 39: 116–157. doi: 10.1006/cogp.1999.0717

Allen, S., Özyürek, A., Kita, S., Brown, A., Furman, R., Ishizuka, T. & Fujii, M. 2007. Language-specific and universal influences in children's syntactic packaging of manner and path: A comparison of English, Japanese, and Turkish. *Cognition* 102: 16–48. doi: 10.1016/j.cognition.2005.12.006

Arterberry, M. E. & Bornstein, M. H. 2002. Infant perceptual and conceptual categorization: The roles of static and dynamic stimulus attributes. *Cognition* 86: 1–24. doi: 10.1016/S0010-0277(02)00108-7

Bahrick, L. E. & Pickens, J. N. 1995. Infant memory for object motion across a period of three months: Implications for a four- phase attention function. *Journal of Experimental Child Psychology* 59: 341–373. doi: 10.1006/jecp.1995.1017

Baillargeon, R. 2004. Infants' physical world. *Current Directions in Psychological Science* 13: 89–94. doi: 10.1111/j.0963-7214.2004.00281.x

Baillargeon, R. & Wang, S. H. 2002. Event categorization in infancy. *Trends in Cognitive Sciences* 6: 85–93. doi: 10.1016/S1364-6613(00)01836-2

Baldwin, D. A., Baird, J. A., Saylor, M. M. & Clark, A. M. 2001. Infants parse dynamic action. *Child Development* 72: 708–717. doi: 10.1111/1467-8624.00310

Bogartz, R. S., Shinskey, J. L. & Schilling, T. H. 2000. Object permanence in five-and-a-half-month-old infants. *Infancy* 1: 403–428. doi: 10.1207/S15327078IN0104_3

Bowerman, M. & Choi, S. 1994. Linguistic and nonlinguistic determinants of spatial semantic development. Paper presented at the *Boston University Conference on Language Development*, Boston, MA.

Brown, A. & Gullberg, M. 2008. Bidirectional crosslinguistic influence in L1-L2 encoding of manner in speech and gesture: A study of Japanese speakers of English. *Studies in Second Language Acquisition* 30: 225–251. doi: 10.1017/S0272263108080327

Casasola, M. 2005. When less is more: How infants learn to form an abstract categorical representation of support. *Child Development* 76: 279–290. doi: 10.1111/j.1467-8624.2005.00844.x

Casasola, M., Bhagwat, J. & Burke, A. S. 2009. Learning to form a spatial category of tight-fit relations: how experience with a label can give a boost. *Developmental Psychology* 45: 711–723. doi: 10.1037/a0015475

Casasola, M., Cohen, L. B. & Chiarello, E. 2003. Six-month-old infants' categorization of containment spatial relations. *Child Development* 74: 679–693. doi: 10.1111/1467-8624.00562

Casasola, M. & Park, Y. 2013. Developmental changes in infant spatial categorization: When more is best and when less is enough. *Child Development* 84: 1004–1019. doi: 10.1111/cdev.12010

Chen, L. & Guo, J. 2009. Motion events in Chinese novels: Evidence for an equipollently-framed language. *Journal of Pragmatics* 41: 1749–1766. doi: 10.1016/j.pragma.2008.10.015

Choi, S. 2006. Influence of language-specific input on spatial cognition: Categories of containment. *First Language* 26: 207–232. doi: 10.1177/0142723706060748

Choi, S. & Bowerman, M. 1991. Learning to express motion events in English and Korean: The influence of language-specific lexicalization patterns. *Cognition* 41: 83–121. doi: 10.1016/0010-0277(91)90033-Z

Choi, S. & Hattrup, K. 2012. Relative contribution of perception/cognition and language on spatial categorization. *Cognitive Science* 36: 102–129. doi: 10.1111/j.1551-6709.2011.01201.x

Clark, E. V. 2003. *First Language Acquisition*. Cambridge: CUP.

Csibra, G., Gergely, G., Biro, S., Koos, O. & Brockbank, M. 1999. Goal attribution without agency cues: The perception of "pure reason" in infancy. *Cognition* 72: 237–267. doi: 10.1016/S0010-0277(99)00039-6

Erciyes, A. & Göksun, T. 2016, January. On the way to learn relational words: Detecting event components in dynamic events. Poster presented at the *16th BCCCD conference*, Budapest, Hungary.

Flecken, M., Carroll, M., Weimar, K. & von Stutterheim, C. 2015. Driving along the road or heading for the village? Conceptual differences underlying motion event encoding in French, German, and French–German L2 users. *The Modern Language Journal* 99: 100–122. doi: 10.1111/j.1540-4781.2015.12181.x

Furman, R., Küntay, A. C. & Özyürek, A. 2014. Early language-specificity of children's event encoding in speech and gesture: evidence from caused motion in Turkish. *Language, Cognition and Neuroscience* 29: 620–634. doi: 10.1080/01690965.2013.824993

Gentner, D. 1982. Why nouns are learned before verbs: Linguistic relativity versus natural partitioning. In *Language Development: Language, Thought, and Culture*, S. Kuczaj (ed.), 301–334. Hillsdale, NJ: Lawrence Erlbaum Associates.

Gentner, D. & Bowerman, M. 2009. Why some spatial semantic categories are harder to learn than others: The typological prevalence hypothesis. In *Crosslinguistic Approaches to the Psychology of Language: Research in the Tradition of Dan Isaac Slobin*, J. Guo, E. Lieven, S. Ervin-Tripp, N. Budwig, S. Özçalışkan & K. Nakamura (eds), 465–480. New York NY: Lawrence Erlbaum Associates.

George, N. 2014. The Force of Language: How Children Acquire the Semantic Categories. PhD dissertation, Temple University.

George, N., Göksun, T., Hirsh-Pasek, K. & Golinkoff, R. M. 2014. Carving the world for language learning: How neuroscientific research can enrich the study of first and second language learning. *Developmental Neuropsychology* 39: 262–284. doi: 10.1080/87565641.2014.906602

George, N., Hirsh-Pasek, K. & Golinkoff, R. Under review. Force dynamics: A semantic window into event hierarchies.

Golinkoff, R. M., & Hirsh-Pasek, K. 2008. How toddlers begin to learn verbs. *Trends in Cognitive Science* 12: 397–403. doi: 10.1016/j.tics.2008.07.003

Göksun, T. 2010. The "Who" and "Where" of Events: Infants' Processing of Figures and Grounds in Nonlinguistic Events. PhD dissertation, Temple University.

Göksun, T., George, N. R., Hirsh-Pasek, K. & Golinkoff, R. M. 2013. Forces and motion: How young children understand causal events. *Child Development* 84: 1285–1295. doi: 10.1111/cdev.12035

Göksun, T., Hirsh-Pasek, K. & Golinkoff, R. M. 2010a. Trading spaces: Carving up events for learning language. *Perspectives on Psychological Science* 5: 33–42. doi:10.1177/1745691609356783

Göksun, T., Hirsh-Pasek, K. & Golinkoff, R. M. 2010b. How do preschoolers express cause in gesture and speech? *Cognitive Development* 25: 56–68. doi:10.1016/j.cogdev.2009.11.001

Göksun, T., Hirsh-Pasek, K., Golinkoff, R. M., Imai, M., Konishi, H. & Okada, H. 2011. Who is crossing where? Infants' discrimination of figures and grounds in events. *Cognition* 121: 176–195. doi:10.1016/j.cognition.2011.07.002

Gullberg, M., Hendriks, H. & Hickmann, M. 2008. Learning to talk and gesture about motion in French. *First Language* 28: 200–236. doi:10.1177/0142723707088074

Han, Z., & Cadierno, T. (eds) 2010. *Linguistic Relativity in SLA: Thinking for Speaking*. Bristol: Multilingual Matters.

Hespos, S. J. & Baillargeon, R. 2001. Reasoning about containment events in very young infants. *Cognition* 78: 207–245. doi:10.1016/S0010-0277(00)00118-9

Hespos, S. J. & Baillargeon, R. 2008. Young infants' actions reveal their developing knowledge of support variables: Converging evidence for violation-of-expectation findings. *Cognition* 107: 304–316. doi:10.1016/j.cognition.2007.07.009

Hespos, S. J., Grossman, S. R. & Saylor, M. M. 2010. Infants' ability to parse continuous actions: Further evidence. *Neural Networks* 23: 1026–1032. doi:10.1016/j.neunet.2010.07.010

Hespos, S. J. & Piccin, T. 2009. To generalize or not to generalize: Spatial categories are influenced by physical attributes and language. *Developmental Science* 12: 88–95. doi:10.1111/j.1467-7687.2008.00749.x

Hespos, S. J. & Spelke, E. S. 2004. Conceptual precursors to language. *Nature* 430: 453–456. doi:10.1038/nature02634

Hespos, S. J., Saylor, M. M. & Grossman, S. R. 2009. Infants' ability to parse continuous actions. *Developmental Psychology* 45: 575–585. doi:10.1037/a0014145

Hohenstein, J., Eisenberg, A. & Naigles, L. 2006. Is he floating across or crossing afloat? Cross-influence of L1 and L2 in Spanish-English bilingual adults. *Bilingualism: Language and Cognition* 9: 249–261. doi:10.1017/S1366728906002616

Imai, M., Li, L., Haryu, E., Okada, H., Hirsh-Pasek, H. & Golinkoff, R. M. 2008. Novel noun and verb learning in Chinese, English, and Japanese children: Universality and language specificity in novel noun and verb learning. *Child Development* 79: 979–1000. doi:10.1111/j.1467-8624.2008.01171.x

Jackendoff, R. 1983. *Semantics and Cognition* [Current Studies in Linguistics Series 8]. Cambridge MA: The MIT Press.

Johanson, M., Selimis, S., & Papafragou, A. 2008. Cross-linguistic biases in the semantics and the acquisition of spatial language. Paper presented at the *33rd Boston University Conference on Language Development*, Boston, MA.

Konishi, H. 2015. Semantic Reorganization: Does Language Influence Infants' Perception of Components of Events? PhD dissertation, University of Delaware.

Konishi, H., Pruden, S. M., Golinkoff, R. M. & Hirsh-Pasek, K. 2016. Categorization of dynamic realistic motion events: Infants form categories of path before manner. *Journal of Experimental Child Psychology* 152: 54–70. doi:10.1016/j.jecp.2016.07.002

Konishi, H., Stahl, A. E., Golinkoff, R. M. & Hirsh-Pasek, KK. In press. *Journal of Experimental Child Psychology*.

Lai, V. T., Rodríguez, G. G. & Narasimhan, B. 2014. Thinking-for-speaking in early and late bilinguals. *Bilingualism: Language and Cognition* 17: 139–152. doi:10.1017/S1366728913000151

Lakusta, L. & Carey, S. 2008, March. Infants' categorization of sources and goals in motion events. Paper presented in *Conceptual primitives for processing events and learning relational terms. Symposium at the 16th International Conference on Infant Studies*, S. Pruden, & T. Göksun (Chairs), Vancouver, Canada.

Lakusta, L., Wagner, L., O'Hearn, K. & Landau, B. 2007. Conceptual foundations of spatial language: evidence for a goal bias in infants. *Language Learning and Development* 3: 179–197. doi: 10.1080/15475440701360168

Lakusta, L. & Landau, B. 2012. Language and memory for motion events: Origins of the asymmetry between source and goal paths. *Cognitive Science* 36: 517–544. doi: 10.1111/j.1551-6709.2011.01220.x

Lakusta, L. & Carey, S. 2015. Twelve-month-old infants' encoding of goal and source paths in agentive and non-agentive motion events. *Language Learning and Development* 11: 152–175. doi: 10.1080/15475441.2014.896168

Leslie, A. M. & Keeble, S. 1987. Do six-month-old infants perceive causality? *Cognition* 25: 265–288. doi: 10.1016/S0010-0277(87)80006-9

Maguire, M. J., Hirsh-Pasek, K., Golinkoff, R. M., Haryu, E., Imai, M., Vengas, S. & Sanchez-Davis, B. 2010. A developmental shift from similar to language-specific strategies in verb acquisition: A comparison of English, Spanish and Japanese. *Cognition* 114: 299–319. doi: 10.1016/j.cognition.2009.10.002

Mandler, J. M. 2012. On the spatial foundations of the conceptual system and its enrichment. *Cognitive Science* 36: 421–451. doi: 10.1111/j.1551-6709.2012.01241.x

McCabe, A., Tamis-LeMonda, C. S., Bornstein, M. H., Cates, C. B., Golinkoff, R., Guerra, A. W. & Mendelsohn, A. 2013. Multilingual children. *Social Policy Report* 27: 2014–51.

McDonough, L., Choi, S. & Mandler, J. M. 2003. Understanding spatial relations: Flexible infants, lexical adults. *Cognitive Psychology* 46: 229–259. doi: 10.1016/S0010-0285(02)00514-5

Muentener, P. & Carey, S. 2010. Infants' causal representations of state change events. *Cognitive Psychology* 61: 63–86. doi: 10.1016/j.cogpsych.2010.02.001

Negueruela, E., Lantolf, J. P., Jordan, S. R., & Gelabert, J. 2004. The "private function" of gesture in second language communicative activity: A study on motion verbs and gesturing in English and Spanish. *International Journal of Applied Linguistics* 14: 113–147. doi: 10.1111/j.1473-4192.2004.00056.x

Özçalışkan, Ş. 2016. Do gestures follow speech in bilinguals' description of motion? *Bilingualism: Language and Cognition* 19: 644–653. doi: 10.1017/S1366728915000796

Özçalışkan, Ş. & Slobin, D. I. 1999. Learning "how to search for the frog": Expression of manner of motion in English, Spanish, and Turkish. In *Proceedings of the 23rd Annual Boston University Conference on Language Development*, A. Greenhill, H. Littlefield, & C. Tano (eds) 541–552. Somerville MA: Cascadilla Press.

Özçalışkan, Ş., Gentner, D. & Goldin-Meadow, S. 2014. Do iconic gestures pave the way for children's early verbs? *Applied Psycholinguistics* 35: 1143–1162. doi: 10.1017/S0142716412000720

Papafragou, A., Hulbert, J. & Trueswell, J. 2008. Does language guide event perception? Evidence from eye movements. *Cognition* 108: 155–184. doi: 10.1016/j.cognition.2008.02.007

Pruden, S. M. & Hirsh-Pasek, K. 2006. Foundations of verb learning: Labels promote action category formation. In *Proceedings of the 30th annual Boston University Conference on Language Development*, D. Bamman, T. Magnitskaia & C. Zaller (eds), 476–488. Somerville MA: Cascadilla Press.

Pruden, S. M., Göksun, T., Roseberry, S., Hirsh-Pasek, K. & Golinkoff, R. M. 2012. Find your manners: How do infants detect the invariant manner of motion in dynamic events? *Child Development* 83: 977–991. doi: 10.1111/j.1467-8624.2012.01737.x

Pruden, S. M., Roseberry, S., Göksun, T., Hirsh-Pasek, K. & Golinkoff, R. M. 2013. Infant categorization of path relations during dynamic events. *Child Development* 84: 331–345. doi: 10.1111/j.1467-8624.2012.01843.x

Pulverman, R., Golinkoff, R. M., Hirsh-Pasek, K. & Sootsman-Buresh, J. 2008. Infants discriminate paths and manners in non- linguistic dynamic events. *Cognition* 108: 825–830. doi: 10.1016/j.cognition.2008.04.009

Pulverman, R., Song, L., Pruden, S. M., Golinkoff, R. M. & Hirsh-Pasek, K. 2013. Preverbal infants' attention to manner and path: Foundations for learning relational terms. *Child Development* 84: 241–252. doi: 10.1111/cdev.12030

Rakison, D. H. & Krogh, L. 2012. Does causal action facilitate causal perception in infants younger than 6 months of age? *Developmental Science* 15: 43–53. doi: 10.1111/j.1467-7687.2011.01096.x

Regier, T. & Zheng, Z. 2007. Attention to endpoints: A cross- linguistic constraint on spatial meaning. *Cognitive Science* 31: 705–719. doi: 10.1080/15326900701399954

Roseberry, S., Richie, R., Hirsh-Pasek, K., Golinkoff, R. M. & Shipley, T. F. 2011. Babies catch a break 7-to 9-month-olds track statistical probabilities in continuous dynamic events. *Psychological Science* 22: 1422–1424. doi: 10.1177/0956797611422074

Roseberry, S., Göksun, T., Hirsh-Pasek, K. & Golinkoff, R. M. 2012. Carving categories in a continuous world: Preverbal infants discriminate categorical changes before distance changes in dynamic events. *Spatial Cognition & Computation* 12: 231–251. doi: 10.1080/13875868.2011.564338

Saylor, M. M., Baldwin, D. A., Baird, J. A. & LaBounty, J. 2007. Infants' on-line segmentation of dynamic human action. *Journal of Cognition and Development* 8: 113–128. doi: 10.1080/15248370709336996

Shafto, C. L., Havasi, C. & Snedeker, J. 2014. On the plasticity of semantic generalizations: Children and adults modify their verb lexicalization biases in response to changing input. *Developmental Psychology* 50: 794–808. doi: 10.1037/a0034253

Sharon, T. & Wynn, K. 1998. Individuation of actions from continuous motion. *Psychological Science* 9: 357–362. doi: 10.1111/1467-9280.00068

Slobin, D. I. 1996. From "thought and language" to "thinking to speaking." In *Rethinking Linguistic Relativity*, J. J. Gumperz & S. C. Levinson (eds), 70–96. Cambridge: CUP.

Slobin, D. I. 2001. Form-function relations: How do children find out what they are? In *Language Acquisition and Conceptual Development*, M. Bowerman & S. C. Levinson (eds), 406–449. Cambridge: CUP. doi: 10.1017/CBO9780511620669.016

Song, L., Pulverman, R., Pepe, C., Golinkoff, R. M. & Hirsh-Pasek, K. 2016. Does the owl fly out of the tree or does the owl exit the tree flying? How L2 learners overcome their L1 lexicalization biases. *Language Learning and Development* 12(1): 42–59. doi: 10.1080/15475441.2014.989051

Song, L. Pruden, S. Golinkoff, R. M. & Hirsh-Pasek, K. In press. Prelinguistic foundations of verb learning: Infants discriminate and categorize dynamic human actions. *Journal of Experimental Child Psychology*.

Stahl, A. E., Romberg, A. R., Roseberry, S., Golinkoff, R. M. & Hirsh-Pasek, K. 2014. Infants segment continuous events using transitional probabilities. *Child Development* 85: 1821–1826. doi: 10.1111/cdev.12217

Talmy, L. 1985. Lexicalization patterns: Semantic structure in lexical forms. In *Language Typology and Syntactic Description*, T. Shopen (ed.), 57–149. Cambridge: CUP.

Talmy, L. 2000. *Toward a Cognitive Semantics: Vol. 1. Concept Structuring Systems*. Cambridge MA: The MIT Press.

Waxman, S., Fu, X., Arunachalam, S., Leddon, E., Geraghty, K. & Song, H. J. 2013. Are nouns learned before verbs? Infants provide insight into a long-standing debate. *Child Development Perspectives* 7: 155–159. doi: 10.1111/cdep.12032

Wolff, P. 2003. Direct causation in the linguistic coding and individuation of causal events. *Cognition* 88: 1–48. doi: 10.1016/S0010-0277(03)00004-0

Zacks, J. M. & Tversky, B. 2001. Event structure in perception and conception. *Psychological Bulletin* 127: 3–21. doi: 10.1037/0033-2909.127.1.3