

Getting Support for ‘Support’: The Privileging of ‘Support-From-Below’ in Early Spatial Language Acquisition

Configurations of support include those that exhibit Support-From-Below (SFB, cup on table), as well as Mechanical Support (stamp on envelope). Indeed, the semantics literature suggests that the meaning of terms such as *on* in English are not based solely on geometric properties, but rather depend strongly on functional, force-dynamic relationships between objects (e.g. Vandeloise, 2005). How do young children learn such spatial language given the complexity of the semantic space? Do children learn about support by learning a very broad, highly abstract category – one that includes stamps on envelopes, coats on hooks, cups on tables, etc.? Much infant cognition research suggests no, with SFB playing a key role in infants’ reasoning about, and categorizing, support relations. Does this ‘privileging’ of SFB have consequences for language learning? The current studies suggest that it does, with very young children learning both canonical expressions for encoding SFB (BE *on*), as well as more specialized lexical items for Mechanical Support (*stick*).

In Study 1, using the Intermodal Preferential Looking Paradigm, 20-month-olds (N = 24) were simultaneously presented with two events: SFB (cube put on top of box) and ‘support via side’ (cube put on side of box), while hearing neutral language during Salience (“Look here, what do you see...”) and spatial language during Test (“Find the toy that IS ON the box”). An eye-tracker measured looking durations and revealed longer looking at SFB during Test, suggesting the privileging of SFB (Figure 1).

In Study 2, children (Ns =14 for 3- and 4-year-olds) were shown a messy playroom and asked to help two children find their missing toy. They then viewed 15 support configurations (5 SFB, 5 hanging, 5 adhesion; e.g., band-aide stuck to apple) and asked “If Nicholas cannot find his band-aide, you’d say ‘your band-aide...’”. Children’s responses were coded in terms of BE *on* use across the three support types. A mixed model logistic regression revealed that Support Type was a significant predictor of BE *on*, with children using BE *on* more for SFB ($M = .75$) than Adhesion ($M = .66$; $B = -.70$) and Hanging ($M = .65$; $B = -.80$). This further suggests the privileging of SFB.

In Study 3, children (Ns =15 for 3- and 4-year-olds) were shown the same support configurations as Study 2 (5 SFB, 5 hanging, 5 adhesion) and heard two characters give *different* descriptions. One character (correctly) described the configuration with BE *on* (“I say it *is on* the apple”, for band-aide stuck to apple) and the 2nd character either described the configuration (correctly) with a more specific verb (“I say it is *stuck to* the apple”) or with an incorrect verb (“I say it is *clipped to* the apple”). Mixed model logistic regressions revealed that older children chose BE *on* more when it was paired with an incorrect verb (e.g., “clip”) vs. when it was paired with a correct verb (e.g., “stick”) (Figure 2). Thus, children map BE *on* to core configurations (SFB), and (correct) lexical verbs mapping to non-core, mechanical support.

In sum, SFB represents the *core* for the category of support, and is privileged in supporting early mappings to spatial language. Our findings raise questions about other factors that may substantially contribute, such as parent input.

Figure 1. Time course analysis for looking durations at SFB and Support-Via-Side events during Salience vs. Test phases

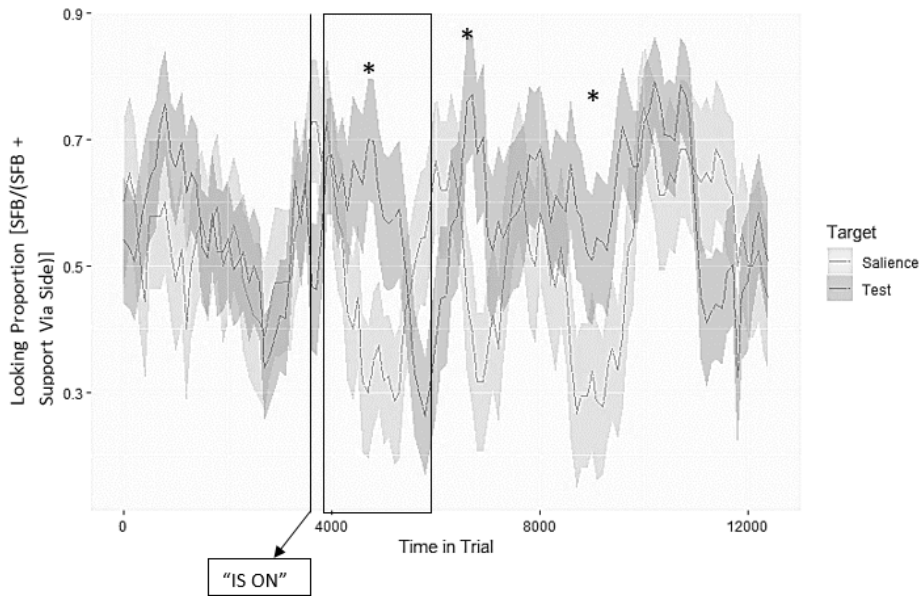
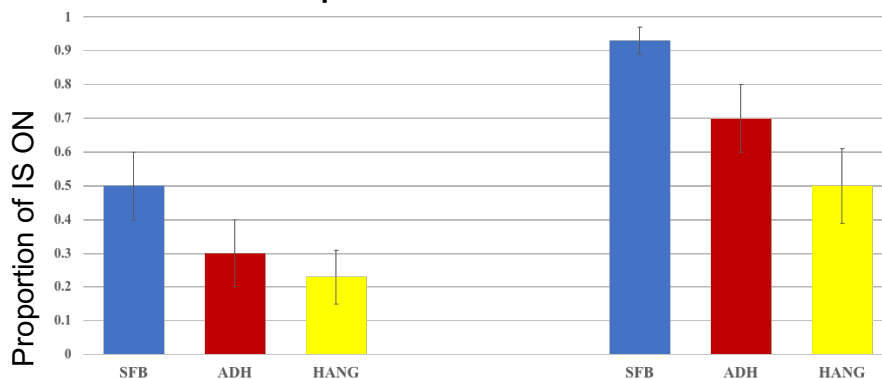


Figure note: The dependent variable was: (looking duration at the SFB event) divided by (looking duration at (the SFB event + the support via the side event)), averaged across Test Trials 1 and 2. The figure indicates when “is on” was uttered during the test trials; note that during the salience trial only neutral, non-spatial language was uttered. Based on prior IPLP studies (see Delle Luche et al., 2015) the 367-2000ms window after the preposition “ON” was uttered was identified as the critical window for comprehension. A time-course analysis in R compared the dependent variable between the Saliency phase and the Test Phase; areas of significant divergence (i.e., $p < .05$) between Saliency and Test are marked with a * on the figure. As can be seen, significant divergences were found within the critical window (i.e., after *is on* was uttered), but not before, suggesting that infants map *is on* to SFB in preference to support via the side.

Figure 2. Proportion *is on* selected (for each type of support configuration: SFB, Adhesion (ADH) and Hanging) when IS ON was paired with a lexical correct verb and when IS ON was paired with a lexical incorrect verb.



IS ON paired with Lexical correct verb (e.g., “is on” vs. “sticks to” for band-aide stuck to apple- an Adhesion configuration)

IS ON paired with Lexical incorrect verb (e.g., “is on” vs. “clips to” for band-aide stuck to apple – an Adhesion configuration)