Effects of uncertainty on word learning in 2-year-old infants and adults

Alan Langus, Marc Hullebus, Tom Fritzsche, Barbara Höhle & Adamantios Gafos

University of Potsdam

Variability modulates word learning. Variability in the visual context can boost and variability in the number of alternative referents or stimulus dimensions hinder infants' ability to learn words. We hypothesize that these conflicting findings can be accounted for by the notion of entropy of the learning situation. Entropy is a measure of uncertainty, with situations that involve more alternative events or where events occur with equal frequency having higher entropy than situations with fewer alternative events or where events occur with unequal frequencies. While studies suggest that higher uncertainty makes learning more difficult for adults5,6, the way uncertainty affects infants' word learning has so far not been directly tested. German-speaking adults (N=48) and 26-mo German-learning infants (N=48) participated in a familiarization-switch paradigm. Participants in the High Entropy condition saw three object-label pairs that occurred with the same frequency during the familiarization (x10/x10/x10). Participants in the Low Entropy condition saw the same three object-label pairs with different frequencies (x5/x10/x15). Participants were then tested on Same-, Switch- and Novel trials. To assess whether entropy affects learning, we compared participants' performance on the target object-label pair that occurred with the same frequency in both conditions (x10). We measured participants' pupil size at test. Adults' and infants' pupils dilated significantly more in the Novel and Switch trials than in Same trials, showing that participants learned the three words. When seeing the target object-label pair at test, adults' and infants' pupils dilated significantly more in the High Entropy than in the Low Entropy condition. Our results show that learning words is not only influenced by the frequency of occurrence of single object-label pairs but also by the predictability of the learning situation as a whole. Infants and adults appear to learn words better in more predictable situations.