HABILITATION A DIRIGER DES RECHERCHES

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Résumé

SUMMARY

Everyone agrees that human cognition eventually differs from other animals' cognition: only humans build huge towers, invent sophisticated tools like smart phones, communication systems like the Morse code, or external memories like books and the internet. These achievements are (in part) due to our abilities to represent abstract concepts (*freedom*, *electron*) and combine them to produce novel ideas (*free electron*). The research presented in this memoire aims at investigating the developmental origins of these abilities in human infants. I will first present experimental work investigating infants' representation of abstract relations, in particular the relations *same* and *different*. Abstract relations are particularly interesting because they allow a characterization of the type of thoughts available to infants. Abstract relations cannot, by definition, be represented with perceptual images, whereas they would be represented by discrete symbols in a propositional language of thought. Employing a variety of experimental paradigms, relying on eye-tracking and pupillometry techniques, I show that young infants (as young as 6 months) already represent the relations *same* and *different*, but that these representations likely differ from that of older children and adults. I propose and test a hypothesis with respect to the format of representation of abstract relations in infancy. I conclude that young infants lack discrete symbols to represent abstract relations, but rather build those representations, juxtaposing representations of individual entities. A number of observations suggest that the acquisition of specific words (e.g., the word "same") may be the causal factor in the transition from infants' representations to mature representations of abstract relations, enabling a propositional language of thought. This hypothesis underlies that one key factor in enabling human-unique cognitive abilities is a combinatorial speech code that allows the creation of thousands of words. I thus investigate speech representations in young infants, focusing on the *lack of invariance problem*. Finally, I lay out future directions of my research, in order to better understand how infants and children think before and after they acquire language.