

Anton Rothwell, *Real-time phoneme recognition for use in robot language Acquisition*. MSc thesis, Sept 2010, University of Hertfordshire.

Research has shown that infants acquire language at an early stage by "babbling" combinations of phonemes - small units of speech - that form early syllables. As the infant matures, it hears the language from its mother and those closest to it and gradually through babbling begins to form basic word shapes without meaning. These word shapes consist of simple syllable constructs and tend to be biased towards what it has heard and the sounds it is physiologically capable of producing. In this thesis, system is designed and implemented that simulates word acquisition through babble and listening to a teacher. A key part of the system developed, extracts phonemes from a teacher in real-time and supplies them to a Linguistically Enabled Synthetic Agent (LESA). The agent is able to babble initially randomly, and then with bias towards the teacher's speech such that a word that the teacher is trying to teach the system, is eventually produced. Human Robot Interaction experiments are conducted in real-time using the LESA system and an iCub humanoid robot for the purposes of provoking interaction with the human teacher. It is found that the system can successfully learn words taught to it from the teacher and that the teacher will naturally want to encourage the system to learn. Ways of enhancing the system to produce more complex word formations are discussed and also alternative approaches based on more biological methods for extraction of phonemes are considered.