Jacques Mehler's Language, Cognition and Development Laboratory at SISSA (2001-2016)

Jacques Mehler created the Language, Cognition and Development (LCD) laboratory at SISSA in 2000/2001. The laboratory existed until 2016, when Jacques Mehler and Marina Nespor retired. The lab was financially supported through a number of prestigious, large-scale grants such as funding from the Human Frontiers Science Program (2002-2005), the McDonnell Foundation (2004-2010), the NEST PATHFINDER Initiative (2005-2008), as well as by an ERC Advanced Grant (2011-2016).

Over the 15 years of its existence, the laboratory had had four senior members, Jacques Mehler, the founding director, Marina Nespor, first as a research associate and later as a full-time member, Luca Bonatti, associate professor until 2007, and Marcela Peña, a visiting scientist from Chile. Over the years, the laboratory was home to 24 graduate students and post docs. They came from backgrounds as varied as psychology, linguistics, medicine, molecular biology, engineering, mathematics and philosophy. Many of them now hold permanent positions at different universities and research institutions in Europe and overseas (e.g. Mohinish Shukla, University of Boston, USA; Ágnes Kovács, CEU, Budapest, Hungary; Judit Gervain, CNRS, Paris, France; Jean-Rémy Hochmann, CNRS, Lyon, France; Alissa Ferry, University of Manchester, UK). The laboratory had published over 70 peer-reviewed articles, including papers in some of the highest impact journals such as *Science* and *PNAS*, as well as 20 books or book chapters.

Building on Jacques Mehler's earlier work, the main research interest of the laboratory was to understand how the human mind develops language, a unique cognitive skill of our species. In an attempt to uncover how our genetic endowment and experience synergistically interact to create language in the developing mind, one approach of the laboratory was to explore the initial state of language development, i.e. newborn infants' speech perception and learning abilities. Jacques Mehler and his laboratory conducted pioneering research in this domain, revealing many powerful learning abilities and perceptual biases (Endress et al. 2009) neonates possess that help them break into language. They showed that newborns are able to extract simple structural regularities from speech and build abstract representations of them (Gervain et al. 2008). Further, they have found that newborns are already able to retain words in memory for several minutes, and that this memory is specific to speech (Benavides-Varela et al. 2011, 2012). They also revealed humans possess early, experience-independent linguistic biases concerning syllable structure that shape language perception and acquisition (Gomez et al. 2014). To probe newborns' abilities, the Mehler group was one of the first to adapt a new brain imaging technique, near-infrared spectroscopy (NIRS), to infant, and in particular newborn, research, leading the technological development of this methodology within the field of cognitive developmental neuroscience worldwide (Aslin & Mehler 2005, Gervain et al. 2011, Ferry et al. 2015).

The LCD laboratory had also broken new ground in our understanding of how infants start learning the vocabulary and grammar of their native language during the first years of life, even before they start producing their first words. They have shown that infants can exploit the linguistic division of labor between vowels and consonants, relying on the former to extract grammatical rules, while using the latter to identify words (Hochmann et al. 2011,

Toro et al. 2008, Bonatti et al. 2007, Nespor et al. 2003). They have argued that prosody, i.e. the melody and rhythm of language, guide infants in parsing the continuous speech stream into linguistically relevant units (Shukla et al. 2007, Langus et al. 2012, Guellai et al. 2014). Inspired by differences between spoken and signed languages, they advanced the hypothesis that two forces, the need for ease of communication and the pressure for a readily decodable grammar, shape the structure of language (Langus and Nespor 2010).

Inspired by the intriguing geolinguistic situation of Trieste, situated at the border between Italy and Slovenia, the Mehler lab had conducted ground-breaking research on the impact of bilingualism early in infancy, showing that bilinguals gain in cognitive flexibility and control by having to constantly monitor and activate/inhibit two different languages (Kovacs et al. 2009a,b). This work was the first to find a bilingual advantage early in infancy.

The lab also pioneered work in infant reasoning. Reasoning abilities are typically investigated in adults. Members of the Mehler lab managed to show that infants are able to reason on the basis of probabilities (Teglas et al. 2007).

The laboratory synergistically combined research on the developmental origins of language with research on its evolutionary origins to better understand the extent to which mechanisms underlying language were unique to humans or shared with other animals. The laboratory obtained results suggesting we share some of our perceptual biases with other animals, but we are unique in mapping these to more abstract, linguistic categories (de la Mora et al. 2013, Toro et al. 2016).

Jacques Mehler's Language, Cognition and Development Laboratory had thus been a leading interdisciplinary hub of frontiers research in cognitive developmental neuroscience during its 15 years of existence.