



**Karolinska
Institutet**

Department of Clinical Neuroscience

Skriv titeln här/Title of the thesis

Implicit Structured Sequence Learning

AKADEMISK AVHANDLING

som för avläggande av medicine doktorexamen vid Karolinska Institutet offentligen försvaras i Föreläsningssalen, Atrium, Nobels väg 12 B

Fredagen den 3 Maj, 2013, kl 10.00

av

Vasiliki Folia

Huvudhandledare:

Docent Karl-Magnus Petersson
Karolinska Institutet
Department for Clinical Neuroscience

Bihandledare:

Professor Martin Ingvar
Karolinska Institutet
Department for Clinical Neuroscience

Fakultetsopponent:

Professor Thomas F. Münte
University of Lübeck
Department of Neurology

Betygsnämnd:

Professor Francisco Lacerda
Stockholm University
Department of Linguistics

Professor Fredrik Ullén
Karolinska Institutet
Department for Neuroscience

Professor Mats Olsson
Karolinska Institutet
Department for Clinical Neuroscience

Stockholm 2013

ABSTRACT

A simple question:

Do you know how you manage to speak your native language without making grammatical errors despite the fact that you probably do not know how to describe the grammatical rules you use?

Sometimes such simple questions do not have simple answers. The amazing capacity to effectively communicate complex information and thoughts through the medium of language is the result of the way language, and more specifically, linguistic rules are learned: in an implicit manner. Learning is implicit when we acquire new information without intending to do so and without awareness that knowledge is acquired (Forkstam & Petersson, 2005). In this thesis, an implicit artificial grammar learning (AGL) paradigm (Stadler & Frensch, 1998) was investigated from two perspectives: as a model probing the acquisition of structural, or syntactic, aspects of natural language (Petersson, 2005; Petersson, Forkstam, & Ingvar, 2004) and as a model for implicit learning. Reber, in his seminal work on AGL (1967), proposed that successful task-performance of participants is due to their ability to learn new grammatical rules implicitly. This ability, he claimed, is comparable to the way humans acquire the syntax-rules of their native language without systematic explicit guidance or awareness of what is learned.

The AGL paradigm used here is unique in combining implicit acquisition with core characteristics of the actual conditions for syntax learning: implicit learning from grammatical examples without performance feedback. Three studies employed the above paradigm in combination with functional magnetic resonance imaging (fMRI) to investigate structured sequence processing, while one study investigated a well-characterized natural language paradigm to investigate syntactic and semantic processing and their interaction. Consequently Reber's statement (1967) concerning the comparability of the processes involved in artificial and natural language syntax could be investigated at the neurobiological level.

ISBN 978-91-7549-065-6