AMED-CREST 言語理論講演会

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Where do grammars come from?

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使用言語：英語

入場無料・予約不要

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・場所：上智大学 四谷キャンパス

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主催：革新的先端研究開発支援事業（AMED-CREST）

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講演要旨：

Linguistics and the study of human grammars attempt to provide explanatory accounts of a particular cognitive phenomenon - language. Importantly, such accounts are not about the physiology that supports language behaviour but rather about the complex correlations and interdependencies found in the available observations. These observations rarely include physiological data and the validity of the theoretical accounts put forward never depend upon physical parameters – this is a virtue. Neuroscience attempts to understand and explain the physical and physiological properties of the functioning brain. This includes brain processes that underpin cognitive phenomena. Importantly, such accounts are not about the cognitive observations but rather about the complex correlations and interdependencies found in the available physical observations. These observations rarely include cognitive data and the validity of the theoretical accounts put forward never depend upon cognitive parameters – this too is a virtue.

In between these two domains lie Psycho-Linguistics and Cognitive Neuroscience. Psycholinguistics works to marry Linguistic observations and Linguistic theory to theories about cognitive architecture and its fractionation (Psychology) and attempts to take into account and address Neuroscience results. Cognitive Neuroscience works to marry theories and models of brain functioning with broad notions of cognitive architecture and attempts to take into account and address Linguistic and Psycholinguistic results (or cognitive psychology results more generally). Advancement in these enterprises has been slow for a variety of reasons; however there is an interesting convergence of opinion from across this spectrum of investigation that part of the explanation is that we are not seeing the forest for the trees.

A core challenge is finding a set of observables and a level of description that allows cognitive observation and theory to speak to neuro-physical observation and theory. In this talk I will approach the forest in two ways. One approach is through an examination of Lindenmayer Grammar systems (L-systems) and how humans perceive the regularities in the output of such grammars. I will demonstrate that while L-grammars encode deterministic chaos, humans are particularly good at discriminating and recognising regularities in their output despite being poor at recognising other types of regularity. I will argue that L-grammars characterise a wide range of regular phenomena found in human grammars and provide a model of cognitive building blocks that could be linked with lexical information to provide the rudiments of a linguistic system.

The other approach is to investigate the system dynamics found in brain recordings associated with language processing. The kind of self embedding systems characterised by L-grammars are representative of system dynamics that arise from competing physical interactions. Such competitions are known to exist both in the developing and mature brain. Non-linear modelling of mesoscopic neural activity associated with language processing show wide spread self-organised criticality; a property of L-systems. I will argue that the system dynamic behaviour found in the neuro-dynamics of language processing is consistent with the properties of L-systems. Taken together these observations suggest that portions of both grammar and the physiology that supports it follow from system level properties that derive from physical constraints. At the least, L-systems provide a potential dynamic framework for unifying linguistic and neuroscientific theory.