Parameterising the Chinese Room with Wubi: Procedural and Declarative Memory at the Syntax–Semantics Interface

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Abstract:

Background: 45 years have passed since the American philosopher John Searle wrote his landmark paper 'Minds, brains, and programs', in which he set out the now familiar "Chinese Room" thought experiment. Searle uses the metaphor of the Chinese Room to criticise the "strong Al" claim that a computer is not merely a "tool in the study of the mind", but really *is* a mind in the sense that "computers given the right programs can be literally said to *understand* and have other cognitive states".

Objective: Setting out to reevaluate the assumptions on which Searle's Chinese Room argument is based, which rely on a distinction between the semantic and syntactic functions of language, we consider (1) what the current state of large language models (LLMs) can tell us about relevant developments in the "strong AI" hypothesis and (2) how such technological innovations can be used to clarify the theory and enhance the process of foreign language acquisition by human subjects.

Approach: Extending Searle's thought experiment, we imagine that its subject, Bob, has been in the Chinese Room for an arbitrarily long period of time. We hypothesise that, over the course of regularly manipulating sequences of symbols according to formal syntactic rules, Bob will *naturally* come to attribute semantic meaning to these sequences, thus effectively becoming proficient in the language composed thereof. Such a process of language acquisition can be described in terms of the gradual development and combination of procedural (implicit) and declarative (explicit) memory functions. To evaluate the hypothesis and provide a parametrisation framework for the Chinese Room, we describe an approach to learning the Chinese language that is primarily based around manipulating sequences of Chinese symbols using the Wubi typing input method.

Results: As well as tentatively confirming Searle's hypothesis that intentionality in human beings is a product of "causal features of the brain", the results clarify that such "causal features" are connected with the ability to understand and use language. Machine learning concepts and procedures are shown to offer useful parallels to the processes involved in the acquisition of linguistic proficiency by human beings.

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Conclusion: While remaining valid, Searle's criticism of "strong AI" acquires a different emphasis in the era of LLM-based artificial intelligence. The acquisition of human languages like Chinese can be enhanced by the use of contemporary AI and related technologies, as well as benefiting from a sharpened understanding of the concepts that underlie them. In the course of leveraging this advantage, we may also consider what our interaction with such technologies implies about the structure of language acquisition. A comparison of the processes of human language acquisition with the multilingual machine learning structures of a contemporary LLM supports the idea of an emergent *implicit interlingua*.

Keywords:

Artificial Intelligence, Procedural Memory, Syntax–Semantics, Chinese Room, Language Acquisition, Wubi Input Method, *Implicit Interlingua, Reciprocal Intentionality.*