

The London Underground Diagram as an example of cognitive niche construction

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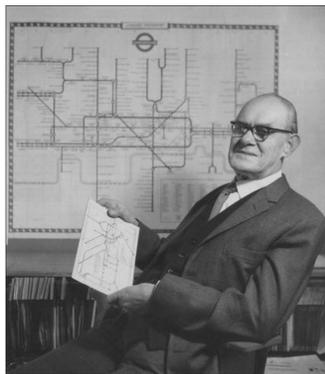
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1. Introduction

- The London Underground Diagram (LUD) established an international paradigm in external aids for wayfinding.

How to relate this paradigm change with the visual meaning of the diagram?

What is the relation between development of meaning strategies and development of cognitive strategies?



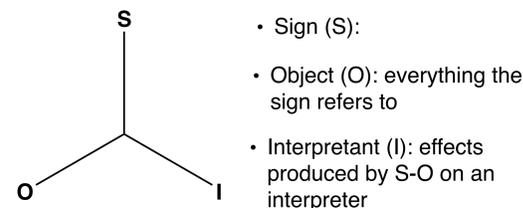
The engineer Henry Beck, who designed the LUD in 1933, holding his original sketch.

Cognitive niche construction

- Cognitive niche: organisms' cognitive abilities take advantage of environmental opportunities for development, i.e., organism's cognitive abilities fill a niche.
- A cognitive niche can be understood as sets of problem spaces that demand or select a set of cognitive abilities
- However, organisms not only respond to problems posed by the environment; often their response alter the environment and radically transform the problems.
- Cognitive niche construction:** transformation, by the organism, of problem spaces that form a cognitive niche.

Signs and Meaning

- What is the "meaning" of a sign?
- ...a communicative intent? ...a concept?
- Peirce's pragmaticist semiotics: meaning is better understood as *semiosis*: a logical process, indecomposably triadic, represented as follows



2. Example Analysis

How do we navigate the city?



In terms of geographic location...

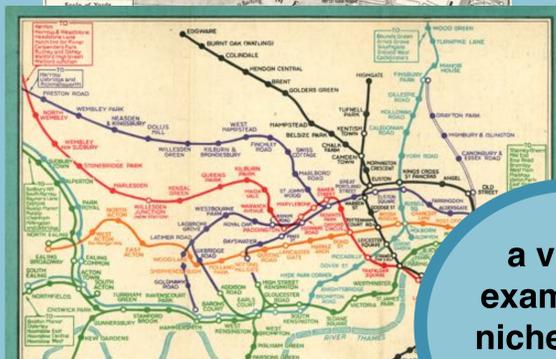
- flexible routes
- potentially infinite points of decision
- visible landscape and landmarks to anchor points of decision
- duration highly influenced by distance

In terms of connectivity...

- fixed routes
- fixed points of decision
- no visible landscape
- duration determined by number of stops more than by distance

Different means of locomotion lead to different problem spaces on wayfinding tasks

How do we visually represent urban navigation?



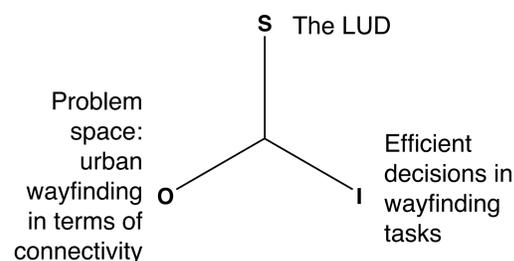
a visual example of niche construction



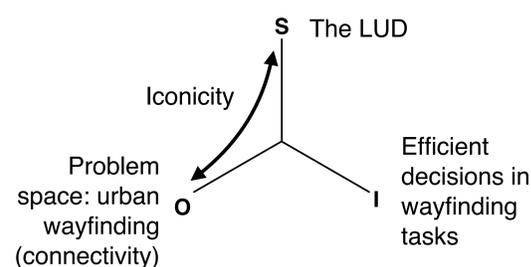
The LUD in semiosis and cognitive niche construction

- The LUD signifies relevant information for wayfinding tasks (meaning / semiosis)
- The LUD transforms the problem space of wayfinding tasks for the user (cognitive niche construction)
- The LUD in semiosis + cognitive niche construction:

1. O in S-O-I is a problem space:



2. Changes in the LUD (S) changed the problem space (O), the sign determines the object. In Peirce's terminology, S-O is an iconic relation, and S is an **Icon**



3. Conclusions

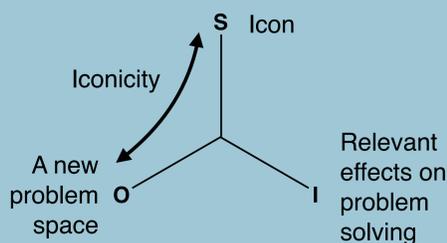
I - The LUD means wayfinding in terms of connectivity

the interpretants generated are constrained by a problem space based on connectivity

II - The LUD's meaning participates in niche construction

the properties of the LUD as a sign transform the availability of resources for spatial cognition in urban wayfinding tasks

III - Cognitive niche construction: Iconic meaning of problem spaces



4. Further questions

Iconic meaning of problem spaces as a pre-requisite for niche construction. Can we verify that?

Can this function as connection between niche construction, cultural evolution and development of signs?

Other examples?