NACS 645 – Innateness 2: Language

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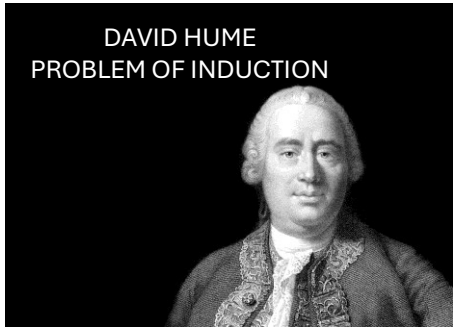
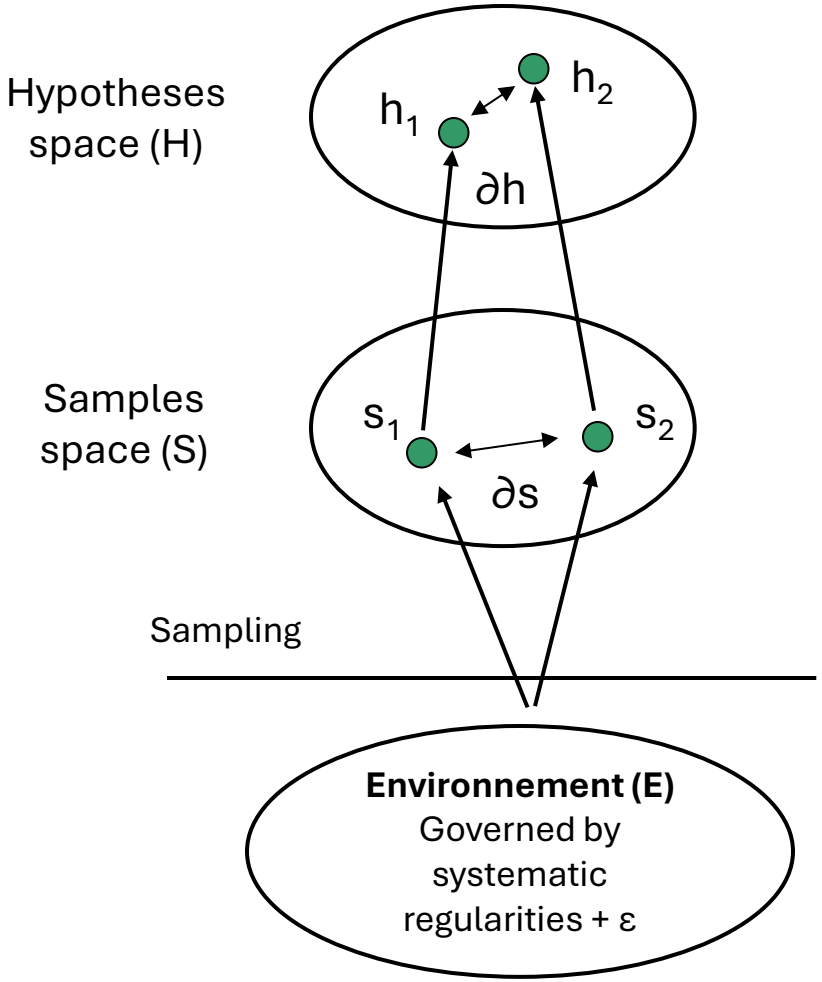
The problem of induction





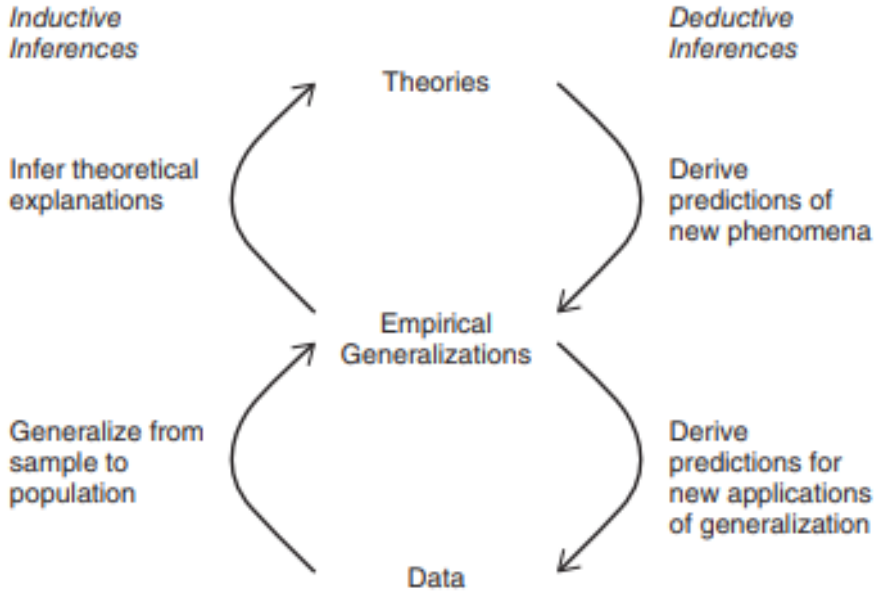
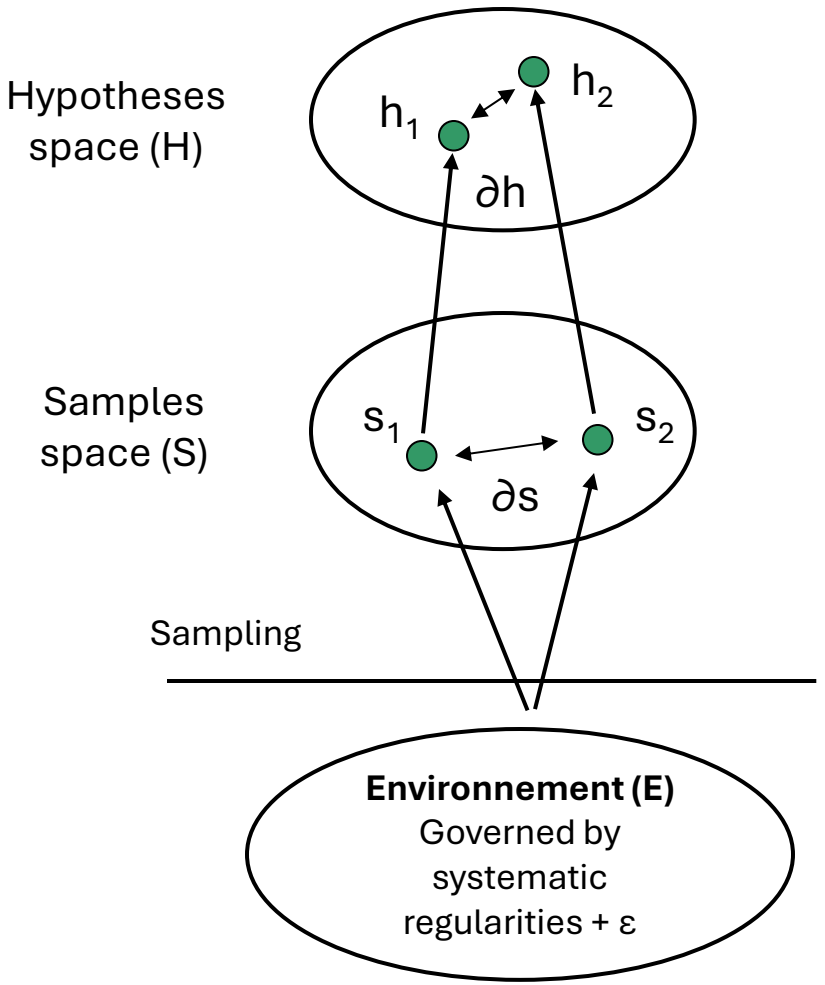


Figure 1.1 Two levels of inferences in science.

Lewandowsky et Oberayern, 2018. John Wiley & Sons, Inc.

Sources of knowledge



Learning by associations between environment and hypothesis:

- Firsthand causal learning: direct association *bee -> sting*
- Mediated learning: indirect association *bee -> X -> sting*

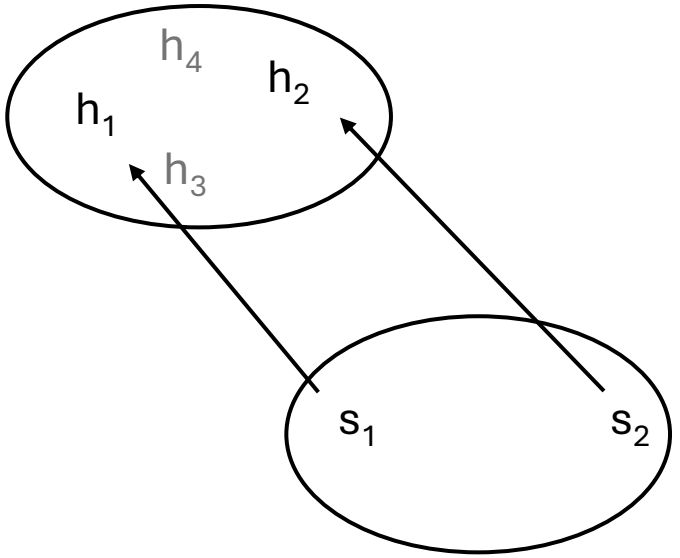
-> Indirect learning introduces uncertainty about X's reliability

Learning can be:

- Goal-directed (e.g., hypothesis-driven)
- Passive (e.g., repeated exposure)

Inference to the best explanation:

- Prefer hypotheses with greater coherence, simplicity, and explanatory breadth.
- Efficiency constrained by a) sampling processes, b) availability of useful candidate explanations (Kedrick & Golman, 2025), and c) inferential processes.



The problem of learning

Dautriche et al., 2021. *Open Mind*.

- Toddlers learn new words only from reliable speakers.
- When a speaker later proves unreliable, toddlers revise previous learned associations.
- Indicates early source monitoring: the learner updates **beliefs about knowledge origin**.

→ Example of **epistemic vigilance** in indirect association

Pearl, 2022. *Language Learning and Development*.

- Children acquire grammar from ambiguous, incomplete input.
- Many possible grammars fit the data; yet all children converge on the same one.

→ **Poverty of the Stimulus** = data are insufficient to identify the correct hypothesis.

- Learning succeeds because learners possess **inductive biases** guiding inference toward the correct structure

-> Either a prior ($P(H)$) favoring the correct hypothesis or a bias in processing the likelihood ($\sigma \cdot P(Data|H)$)

Epistemic vigilance

Tomasello, 2008. *MIT Press*.
Tomasello, 2020. *Episteme*.
Sperber et al., 2010. *Mind & Language*.

The need for satisfying cooperation

- Human language evolved for cooperative communication (Tomasello, 2008, 2020). Facilitates sharing mental states; easier to express *what is* rather than *what is not*.
- Cooperation requires mutual transparency of minds: we share beliefs to align actions.
- But cooperation also opens the door to deception: others can exploit our trust.

The need for truthfulness

-> The more cooperative the environment, the greater the need to monitor truthfulness.

- Truthfulness became a default expectation supporting coordination. Also supported by evolutionary roots: lying is hard as it requires mentalizing others.
- Gullibility is the cost of assuming truth.
- Epistemic vigilance (Sperber et al., 2010) evolved as a counter-mechanism: cognitive systems for assessing the *reliability and sincerity* of communicated information.

Truthfulness first

Ontogenetic calibration

- Children begin as trustful learners: they accept information from others unless deception is detected (Stengelin et al., 2018). They update credibility of source (Dautriche et al., 2021)
- Instance of deception rapidly triggers mistrust, showing adaptive recalibration of: trust, credibility.

Cognitive expression

- Information is first accepted automatically; disbelief is cognitively costly; accepting good-enough (Gilbert et al., 1990).
- People use fluency, familiarity, and coherence as quick cues to truth (Reber & Unkelbach 2010; Pennycook & Rand 2020).
- These heuristics are ecologically rational because most statements encountered are true.

Stengelin, Grueneisen & Tomasello, 2018. *Cogn. Dev.*
Dautriche et al., 2021. *Open Mind*.
Gilbert, Krull & Malone, 2010. *J. Pers. Soc. Psychol*
Reber & Unkelbach, 2010. *Rev. of philosophy and psychology*
Rand & Pennycook, 2020. *Journal of personality.*