

## PH355 – Philosophy of Education 2016

### Week 7 – Carey and Quinian bootstrapping

#### **I it's a cognitive process, but not as we know it...**

Fodor:

- (1) If learning is a process, it's a cognitive process
- (2) The only sort of cognitive process learning could be is hypothesis formation and testing
- (3) Cognitive processes are computational processes, these are processes defined over the manipulation of a system of representation
- (4) You cannot learn what you cannot represent

hence,

There is no such thing as learning a new concept

Constraint on (1): a cognitive process is a process of the cognitive subject, not just of their cognitive machinery (what does the subject do in learning?)

Two constraints on (2) & (3) that bear upon why (4) follows:

You need a representation for the target concept in order to formulate the appropriate hypothesis (concept is presupposed for data)

You need a representation for the target concept in order to have a representation of the test result (learning encounter) that confirms the hypothesis (concept is presupposed as element that stands in relation that confirms the hypothesis – shows that the hypothesis is right/appropriate)

So three issues that inform Fodor's argument:

- A** learning is a personal level process
- B** learning subject cannot gain 'access' to target domain without representation
- C** Subject cannot learn – appreciate application of target word is 'correct' without representation

If a response to Fodor denies any of **A – C**, then presumably it is a response that says that learning is a cognitive process, but not as Fodor conceives of it.

From a philosophy of education point of view, **A** is unavoidable; we're interested in learning as a personal level process. **B** and **C** are negotiable, but challenging.

## II Carey on Fodor – structure of case

Carey's formulation of Fodor's argument: (p.513)

1. All learning mechanisms reduce to hypothesis formation and testing
2. Hypotheses that play a role in learning new concepts must be formulated in terms of available concepts, using the machinery of compositional semantics
3. Primitive concepts are not formulatable (definitionally or probabilistically) in terms of other concepts
4. Therefore, primitive concepts cannot be learned, and thus must be innate
5. Lexical concepts are primitive
6. Therefore, lexical concepts must be innate.

Carey:

Two points,

first – distinguish between definitional/computational primitives and developmental primitives. We can learn (developmental) new definitionally primitive concepts. (cf. p.513)

Second –

'Quinian bootstrapping mechanisms underlie the learning of new primitives, and this learning does not consist of constructing them from antecedently available concepts (they are definitional/computational primitives, after all) *using the machinery of compositional semantics alone*. Thus, I deny premises 1 and 2 of Fodor's argument.' (p.514)

Key issues: do Quinian bootstrapping mechanism characterise learning in a way that conforms to **A – C** above?

## III Carey – key concepts

### *Placeholders*

See discussion of Block at around p.519. E.g. of how we learn concepts in physics: mass, energy, force, momentum, acceleration.

These concepts start off as *placeholders* 'we learn relations among these terms themselves...without being able to define *force*, *mass*, or *acceleration* in terms of concepts that the learner already possesses'

'...the sentences and equations that express the relations among the concepts themselves are initially placeholder structures' (p.519)

So how are placeholder structures created?

And what are they?

Creation of new primitives – coining of new primitives : ‘the placeholder structure is constructed through the combinatorial mechanisms of formal symbol systems but it is learned from others through ordinary processes of language acquisition’ (p.520)

What’s that mean?

E.g. of learning

‘Force equals mass times acceleration’

with a meaning exhausted by knowing what *equals* and *times* mean, plus understanding that the syntax of this sentence in English means that the variables are related,  $F=MA$ .’ (p.520)

So there are resources in core cognition for language acquisition, but what is at play in this case is not learning as such the concepts *force*, *mass* and *acceleration*. They are just placeholders. Placeholder structures are created as part of a ‘tentative abductive leap’.

Then, ‘modeling processes create new, richer, meanings for these symbols’.

Note appeal to ‘abductive leap’ in describing the first element here.

#### IV placeholders – an example

The Lawrence & Margolis argument re natural kinds.

Requires psychological essentialism – ‘psychological fact about our minds that we assume that individuals of a natural kind have an essence even if we have no idea what it is’ (see Carey p.10).

Placeholder for natural kinds. How do we learn *tiger*?

The mental symbol that represents tigers is

*Same natural kind as* [image/prototype/theory of tiger]

The idea of a ‘kind syndrome’ – part of the sustaining mechanism that connects tigers with the mental symbol *tiger*. Kind syndrome as placeholder into which image, exemplar for tigers goes. So machinery is,

Role slot for natural kind concepts (commitment to psychological essentialism)

+ exemplar

gives

new concept (revisable ‘cos both of the ingredients are revisable)

So first use of word *tiger* is as placeholder linked to two things: an abstract role for natural kinds + exemplar. This creates new role – new concept ‘tiger’.

## V placeholders and Fodor's issues A - C

On **A** 'abductive leap'; status of commitment to psychological essentialism; status of the assembly of role slot + exemplar.

On **B** access to domain via representation – role slot – plus exemplar, former does the main work, so already possess concept *same natural kinds as*, so data is, roughly, 'same natural kind as that' but what does the 'that' pick out? What's the content of the exemplar - that cat/that early-phase rug/that threat???

On **C** status of appreciation of 'test' is mediated by same resources as on **B**?

Suppose we take seriously Carey's point that both ingredients in the placeholder for 'tiger' are revisable. So even if the 'that' above was initially taken as picking out an early-phase rug or just a way cats look, rather than the species, couldn't we bootstrap our way out of this mistake and gradually zone in on the species?

But what does all that mean?

Mustn't it mean at least something like this, that the initial use of the exemplar + role slot for natural kind is taken to be mistaken? So the exemplar has to be taken in a different way. But what does 'mistaken' mean here? It can't mean 'false' for placeholders do not carry genuine semantic purport, so they're not properly candidates for semantic evaluation. Mightn't Fodor insist that for semantic evaluability you need concepts and not just placeholders? Also, to give content to the idea that the first attempt at a placeholder is mistaken, it needs to be the sort of thing that can be shown mistaken by other claims. But that means seeing the placeholder structure as the sort of thing that can stand in inferential relations to other combinations. But that is to treat it not as a placeholder, but as a proper representational content with truth-conditions?

To make sense of adjustments in placeholders to get the right focus prior to getting a genuine semantic content, we would need some idea of what kind of evaluation is appropriate and what kind of adjustments are being made to the placeholder structures where these are adjustments that require some sense of correctness and incorrectness of arrangement for these structures, but not the correctness and incorrectness that is due to representational contents.

Recall the second issue re Fodor's claim that we need the concept in order to make sense of hypothesis formation and testing. The second issue concerns the idea of testing – showing the hypothesis false or, if correct, confirming it. Only a concept, or a configuration in a system of representation, can be the right sort of thing to stand in the relation of supporting or falsifying a hypothesis. You need representations to motor the ideas of supporting and falsifying claims. So what is going on in the process of refining placeholder structures if these are structures less than conceptual structures, for we need to be able to adjust them and that means, presumably, adjust them when they need correcting?

## VI Carey's argument re acquiring concept of natural numbers

See earlier selection from book pp.305-329 on module webpage  
Placeholders – meaningless place for numerals 1, 2, 3, like learning nonsense rhyme, *eeny, meeny, miny, mo*.

So, in first instance, placeholder is meaningless, it is not the concepts 1, 2, 3.

She also says it's like a 'numerically meaningless game' (p.325)

So, what's mechanism for modeling on this placeholder use of numerals 1, 2, 3?

Two proposals at pp. 309ff. and pp325ff. Carey favours second, mainly due to empirical evidence.

Both have two components constructed in parallel. They share the same first component:

- (i) numeral list and count routine as numerically meaningless game

Proposal 1 then adds 'analogue magnitude representations, (line lengths, brick lengths, etc.) On proposal 1 numerical list representations are bootstrapped from (i) plus the analogue magnitude representations. (see p.309ff)

Proposal 2 adds 'enriched parallel individuation' – constructing models for simple sets: learning that 'one' is a quantifier picking out a set with one member; stage of misinterpreting 'two' as a general plural word (insensitivity to analogue representation markers); then learning that 'two' is mapped to a 'model in long-term memory'; ditto for 'three'.....; then,

'the child must notice an analogy between next in the numeral list and next in the series of models ( $\{i\}$ ,  $\{j, k\}$ ,  $\{m, n, o\}$ ...related by adding an individual....This...licenses the crucial induction: if "x" is followed by "y" in the counting sequence, adding an individual to a set with cardinal value x results in a set with cardinal value y' (p.327)

Whose induction?

Note, intentional vocabulary in formulating bootstrapping mechanism, but is it the point of view of the learner, or their equipment?

The 'crucial induction' – isn't this the point where Fodor might say, this is in effect just the Obama answer to the question 'How do we learn?' – 'We can!'

## VI description vs. explanation (again)...

Can the Carey case really explain, or does it just describe?

If explain means – provide a model of a computational process whose output has greater expressive power than its input – then perhaps not. The bootstrapping models all have some powerful general principles – induction, abduction, modeling – that run risk of the 'Obama' answer?

An alternative view: what the descriptions of the bootstrapping process does is make sense of something about the phenomenology of the learner that Fodor cannot capture:

There is something that is what it is like to try to make sense of something you don't understand.

Fodor denies there is any such thing, doesn't the detail of the bootstrapping process capture something that needs acknowledging?

Also, note, bootstrapping processes are processes in which we make patterns. We are pattern makers. For Fodor, we instantiate patterns in our thinking, we do not make them.

## **VII**

Some of the modeling in bootstrapping processes is clearly at personal level – that's the point of 'numerically meaningless game'.

So, what is the learner doing? Answer: playing a game.

So what is playing a game?

Putting things into some sort of order, but not necessarily a conceptual order, an order shaped by a representation. What sort of order then?

Capturing some of the data from Carey and making sense of the personal level view of learning.....perhaps we should take the idea of game and the role of play in learning much more seriously?

If so, what is the notion of correctness at play in play?

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