

1. Introduction

The folk say that a person competent in a language “knows” the language. What then does that knowledge consist in? It is common in both linguistics and philosophy to think that it consists in “knowledge-that”, *propositional* knowledge about the language. Sometimes this alleged knowledge is the sort expressed by general statements such as syntactic theories (grammars), truth theories, and theories of reference. Sometimes it is the sort expressed by singular statements about particular linguistic facts, statements that express the person’s intuitive judgments about the syntactic, truth-conditional, or referential properties of expressions. Let us call all these views “propositional assumptions” about linguistic competence.¹ My negative thesis is that, with one possible exception, all propositional assumptions are false. The possible exception is that competence involves “tacit” singular propositional knowledge, in some interesting sense of that weasel word. My positive thesis is that, as a first approximation, linguistic competence consists in “mere knowledge-how”.

I have argued for these theses before (1981, 1997, 2006b, 2011). Drawing on these earlier writings, my aim in this paper is to give an assessment of the state of play on the nature of linguistic knowledge.

The distinction between knowledge-how and knowledge-that is, of course, a folk psychological one captured in English using the very imprecise term ‘know’. My take on it has always been, in the spirit of Gilbert Ryle (1949, 1971), along the following lines. (Devitt and Sterelny 1989; 1999: 174-5; Devitt 2006b: 46-7, 50). Knowledge-that is essentially cognitive and propositional. So if a person knows that R is a rule of arithmetic she knows a proposition. Knowledge-how is in the same family as skills, abilities and capacities. Sometimes it is entirely cognitive; for example, knowing how to play chess. Other times, it may be hardly cognitive at all; for example, knowing how to swim or ride a bicycle.² Sometimes, knowledge-how may involve knowledge-that; for example, chess know-how may involve knowing that the rules of chess are such and such. Other times - and this is the important point for us - it is, as the folk would say, “mere know-how” and *prima facie* does not involve any propositional knowledge at all; for example, knowing how to swim.

Paul Snowdon (2003) and John Bengson, Marc Moffett and Jennifer Wright (2009) have made me think that this account is probably *too* Rylean. There is evidence

¹ I take it as obvious that propositional assumptions are widespread in linguistics and philosophy. I have elsewhere given lots of evidence of this (in linguistics, 2006b: 3-7, 95-7; in philosophy, 1981: 95-6; 1996: 52-3n, 172-3; 1997: 268-9).

² As these examples illustrate, the concern here is with knowing how *to* A where A is some activity.

that the folk count a person who can give a full description of an activity as knowing how to perform it even though the person has no ability to perform it. So, perhaps *one* kind of knowledge-how is knowledge-that. But I still want to maintain that another kind is not. There is a common kind of knowledge-how that a person can have simply on the basis of having the ability to perform an activity:³ the knowledge may be *mere* knowledge-how. That is the kind that Ryle had in mind. And it is the kind that I have in mind here.

If we must follow the folk in talking of linguistic competence as “knowledge” – and I think it would be better if we didn’t (2006b: 5 n. 5) - my positive thesis is that we should say, as a first approximation, that it is mere knowledge-how of the Rylean kind. However, I have always preferred to say that it is simply a skill or ability, not involving propositional attitudes (1981: 92-110; 1996: 22-8, 52; 1997: 272-5; Devitt and Sterelny 1999: 187-90). Let us call this “the skill assumption”.

What skill or ability is competence in a language? Accepting, as we should, “intentional realism” and the view that “language expresses thought”, I give the following answer:

the competence is the ability to use a sound of the language to express a thought with the meaning that the sound has in the language in the context of utterance; and the ability (together with some pragmatic abilities) to assign to a sound a thought with the meaning that the sound has in the language in the context of utterance (similarly for inscriptions, etc.). (2006b: 148)

We can move to a more theory-laden view of competence if we adopt the popular, and in my view correct, representational theory of the mind (“RTM”) according to which any thought involves standing in a certain functional relation to a mental representation. Competence is then “the ability to *translate* back and forth between meaningful mental representations and the sounds of the language” (*ibid*). And if we go further to the controversial language-of-thought hypothesis according to which the mental representation is language-like, the translation is “between mental *sentences* and the sounds of the language” (*ibid*). Finally, linguistic competence is complex, consisting of syntactic competence and lexical competence. Thus, going along with the language-of-thought hypothesis for a moment, syntactic competence is the ability to translate back and forth between the syntactic structures of the sounds of the language and the structures of mental sentences. And lexical competence is the ability to translate back and forth between the words of the language and mental words.⁴

Why think that that linguistic competence is just a skill or ability? Briefly, because it has all the marks of one: it has limited plasticity; it is extraordinarily fast; the

³ Bengson *et al* have conducted an experiment that leads them to doubt this (2009: 397). I am not persuaded by the experiment but will not attempt to argue the matter here.

⁴ ‘Represent’ and its cognates are used here with their standard senses in philosophy. However, these terms seem to be used sometimes with other sense in AI, linguistics, and psychology (2006b: 5-7).

process of exercising it is unavailable to consciousness; once established, it is “automatic” with the result that it can be performed whilst attention is elsewhere (2006b: 209-10); it is very likely acquired by “implicit learning” (2006b: 219). But shouldn’t we suppose that in the case of linguistic competence, the skill involves knowledge-that? We should not suppose this unless we have some powerful reasons for doing so. Otherwise the supposition seems gratuitous. Why suppose that simply in virtue of being competent in a language a person must have propositional knowledge about the language? Why suppose that speakers have this sort of “Cartesian” access to linguistic facts? Why not suppose, rather, the modest view that any knowledge of these facts that a speaker may have comes from ordinary empirical reflection on linguistic phenomena?

These rhetorical questions reflect a commitment to what I have called “Pylyshyn’s Razor”: “*Representations are not to be multiplied beyond necessity*” (2006b: 51).⁵ For, assuming RTM, any propositional assumption requires speakers to have certain representations, and Pylyshyn’s Razor demands that we posit these *only if they do explanatory work*. The rationale for this Occamist principle is not an a priori assumption that the world is mostly simple, representation-free, and so on. The rationale is primarily methodological:

If we fail to posit representations where there are some, we are likely to come across evidence that there are some: our explanations are likely to be inadequate. In contrast, if we posit representations where there are none, it may be difficult to come across evidence that there are none, because with enough representations almost any behavior can be explained. (2006b: 52)

Propositional assumptions are very immodest. One would expect, therefore, that they would be well supported by arguments. This is not what we find. Arguments for them, and against the skill assumption, are few and far between and, with one exception, remarkably thin, as we shall see (sec.3). One gets the impression that propositional assumptions are thought to be too obvious to need argument. Thus, Herbert Heidelberger points out, that the propositional assumption about truth conditions seems to be regarded as “uncontroversial...harmless...perhaps unworthy of serious discussion” (1980: 402); Gareth Evans says, “perhaps no one will deny it” (1982: 106).

The exception to my complaint of thinness is a provocative paper by Jason Stanley and Timothy Williamson arguing that “knowledge-how is simply a species of knowledge-that” (2001: 411). Ingenious as this paper is, it is deeply misguided, particularly in its methodology. Or so I have recently argued (2010b). I shall say no more about it here.

⁵ I named this Razor after Pylyshyn because he urges that “one must attribute as much as possible to the *capacity* of the system... to properties of the *functional architecture*...one must find the least powerful functional architecture compatible with the range of variation observed” (1991: 244).

The immodesty of propositional assumptions is a powerful argument against them, but there are others. I shall start with some in section 2. In section 3, I shall discuss such arguments as one can find that have been adduced *for* propositional assumptions. All of these arguments are rather “philosophical” in being distant from empirical evidence. I think that we should give more weight to the relevant sciences. So, in sections 4 and 5, I shall summarize some empirical considerations, drawn from the psychology of skills and from psycholinguistics, that support the skill assumption and undermine propositional assumptions.

2. “Philosophical” Arguments *against* Propositional Assumptions

A: The case against general propositional assumptions starts from the observation that a speaker’s knowledge of her language is so unlike uncontroversial cases of propositional knowledge.⁶ Stephen Stich (1971, 1978) made the point nicely against the linguistic view that a speaker’s competence involves propositional knowledge of the syntactic rules (or principles) described by a grammar. (a) If a person knows that *p*, we expect him to be aware of *p*, or at least to be able to become aware of it when given a suitable prompt; and we expect him to understand expressions of *p*. The ordinary speaker quite clearly lacks this awareness and understanding for most of the grammar. (b) If a person knows that *p*, his knowledge should join up with other knowledge and beliefs to generate more beliefs. If a speaker has knowledge of the grammar it is clearly not inferentially integrated in this way. Consider an example. Without tuition, a speaker is unlikely to have the conceptual resources to understand even the relatively simple claim that ‘NP --> Det + Adj + N’ is a rule of English. If she knows that this is a rule, her knowledge is largely inferentially isolated from her other beliefs.

Stich’s argument would work as well against the philosophical view that a speaker’s competence involves propositional knowledge of a semantic theory; for example, against the view, apparently in early Davidson (1967: 310), that competence involves knowledge of a truth theory.⁷

Stich’s argument is against general propositional assumptions but it works better than one might expect against the indubitably popular Davidsonian singular assumption that competence is, at least partly, constituted by knowledge of the *theorems* of a truth theory, by knowledge of “T-sentences”. The paradigm of a T-sentence,

‘Snow is white’ is true iff snow is white,

⁶Dwyer and Pietroski (1996) argue in the opposite direction. They think that we have such good reasons (of the sort criticized here and in 2006b) for the view that speakers believe linguistic theory that this view should constrain our theory of belief.

⁷ In Davidson’s later works, with his insistence that knowledge of a theory of meaning only *suffices* for understanding (1973: 313; 1974: 309), the bearing of a truth theory on actual understanding becomes unclear.

can beguile us into thinking that this knowledge is easier to come by than it is. If knowledge of this T-sentence is to be part of a speaker's competence we must take the quoted sentence at the beginning to refer to a type of sound (or inscription, etc.). But types of sounds aren't true *simpliciter* but true relative to a language. So the T-sentence should really be written:

'Snow is white' is true-in-English iff snow is white.

Now one could not know this unless one had a *concept of English*. So, it follows from the Davidsonian assumption that every competent English speaker has that concept. But this flies in the face of developmental evidence that the capacity to think about one's language does not normally come until middle childhood, well after linguistic competence.⁸

Furthermore, we are still far from typical T-sentence. The indexical elements drive us to examples like this (Davidson 1973: 322):

'Es regnet' is true-in-German when spoken by x at time t iff it is raining near x at t .

And this is still inadequate: in a suitable context, 'Es regnet' could be made true by rain that is very distant from x . Furthermore, this sort of T-sentence is too simple to deal with the problems of ambiguity, which are more widespread than might appear; for example, the sound /snow is white/ can be true-in-English in appropriate circumstances if a person named 'Snow' is identical to a person named 'White', or if a person named 'Snow' is white-skinned.

In sum, it seems almost as unlikely that competent speakers must have knowledge of T-sentences as that they must have knowledge or rules and theories.

Of course, linguists may not say *simply* that speakers have propositional knowledge of the grammar. And philosophers may not say *simply* that speakers have propositional knowledge of a semantic theory or T-sentences. Rather, linguists and philosophers may emphasize that the propositional knowledge in question is not conscious and "explicit" but only "tacit". Such "tacit propositional assumptions" hope to avoid Stich's criticism. But in what sense of 'tacit' could they be both true and interesting?

We note first that these assumptions are not true in the ordinary sense of 'tacit'. According to that sense, a person's knowledge of a proposition is tacit in that she has not entertained the proposition but would readily accept it if she did. Clearly, the typical speaker does not have this relation to linguistic rules, truth conditions, and the like. First, she lacks many of the concepts necessary even to understand claims about these. Second, even if she had the necessary concepts, the truth of the claims would seem far from obvious to her.

⁸ See particularly, Hakes 1980, Ryan and Ledger 1984, Bialystok and Ryan 1985, Bialystok 1986, Schütze 1996.

But, what if we simply decide to *call* mere knowledge-how “tacit propositional knowledge”?⁹ Then the assumptions would not be interesting. As Lincoln pointed out in the famous story, you do not make a donkey’s tail a leg by calling it a leg.

However, tacit assumptions do become interesting if we take ‘tacit propositional knowledge of *p*’ to refer to a representation of *p* at a *subpersonal* level, a representation in some “module” of the mind, perhaps a “language faculty”, largely inaccessible to the “central processor” in which conscious propositional knowledge resides.¹⁰ We might say “the module knows that *p*” and, on the strength of that, “the person *tacitly* knows that *p*”. But it is important to note that this claim is compatible with the view that the knowledge in question is mere knowledge-how. So, the assumption should be that where knowledge-how involves the representation of *p* in an underlying module it counts as a case of tacitly knowing that *p*.¹¹ And the skill assumption should be read as compatible with such tacit propositional assumptions.

So, henceforth, we should not only distinguish general from singular propositional assumptions but also, explicit from tacit. And if a speaker’s knowledge of her language is seen as tacit, in the sense described, whether that knowledge is singular or general, then that does seem to yield an effective response to Stich’s criticism.

B: Gilbert Harman has proposed a neat argument against singular and general propositional assumptions (1967; 1975). And it has some force even against tacit assumptions. If a speaker’s competence in a language consists in having knowledge-that of its rules or truth conditions then, assuming RTM, she must represent those rules or conditions. Those representations must themselves be in a language. What is it to be competent in that more basic language? If we suppose the more basic language is the same as the original language then we are caught in a vicious circle. If we suppose that it is some other language (“Mentalese” perhaps), then its rules or truth conditions also have to be represented. This requires a still more basic language. And so on. The only way to avoid a vicious circle or an infinite regress is to allow that we can be competent in at least one language directly, without representing its rules or truth conditions. Why not then allow this of the original language, the one spoken?

C: I have raised a related objection (1981: 97-100). It was aimed particularly at semantic propositional assumptions but would work as well against syntactic ones. It is not clear it would work against tacit assumptions. Briefly, a person could not have semantic

⁹ Thus, in an early paper, Fodor counts an organism that knows how to X as tacitly knowing that S if S specifies a sequence of operations that the organism runs through in X-ing (1981: 75).

¹⁰ Although the representation of a proposition in a module of the mind is clearly of great theoretical interest, it does seem to me both unnecessary and misleading to call this “tacit propositional knowledge”. Martin Davies (1987; 1989) works hard to define an interesting technical notion of *tacit knowledge*.

¹¹ This is what Stich (1980) recommends in his peer commentary on Chomsky (1980b) but Chomsky does not accept the recommendation (1980c: 57).

propositional knowledge without having the semantic vocabulary of some language. That vocabulary is in isolable part of a language, just as is the biological or economic vocabulary. A person could be competent in the nonsemantic part of a language without being competent in its semantic part or in the semantic part of any other language. So competence in the nonsemantic part does not consist in semantic propositional knowledge. So competence in the language as a whole does not either.

D: The meaning of a word is presumably constituted by relational properties of some sort: “internal” ones involving inferential relations among words or “external” ones involving certain direct causal relations to the world. In light of this I have argued against a singular propositional assumption in the process of arguing against a priori knowledge (1996: 53, 2011). Take one of those alleged meaning-constituting relations; for example, the inferential relation between ‘bachelor’ and ‘unmarried’. Why suppose that, simply in virtue of the fact that a person understands the word that has that relation, reflection must lead her to *believe that* it does? Even if reflection does, why suppose that, simply in virtue of the fact that the relation partly constitutes the meaning of her word, reflection must lead her to *believe that* it does? Most important of all, even if reflection did lead to these beliefs, why suppose that, simply in virtue of her competence, this process of belief formation *justifies* the beliefs, or gives them any special epistemic authority, and thus turns them into *knowledge*? Suppositions of this sort seem to be gratuitous. We need a plausible explanation of these allegedly nonempirical processes of belief formation and justification and some reasons for believing in them. This argument seems to work against tacit as well as explicit assumptions.

These are a powerful set of arguments against explicit propositional assumptions and should raise questions, at least, about tacit ones. We turn now to arguments *for* propositional assumptions.

3. “Philosophical” Arguments *for* Propositional Assumptions

I begin with two influential arguments for a propositional assumption that come from linguistics.

I: Noam Chomsky is irritated by questions about the “psychological reality” of linguistic principles and rules posited by a grammar (see e.g. 1980a: 189-201). This irritation reflects a very fast argument that we might be seen as being for a propositional assumption. Chomsky points out that a grammar is a scientific theory and so should be treated just like any other scientific theory. And a scientific theory should be treated realistically, for the alternative of treating it instrumentally has surely been discredited. We have good, though not of course conclusive, evidence for a grammar’s truth and so we have good evidence for the reality it concerns. And that reality is a speaker’s knowledge of her language (1986: 3).

The first problem with this argument is its last line. This line expresses the “psychological conception” of a grammar, according to which linguistics is part of psychology. I have argued that this conception is totally mistaken (2003; 2006b: ch. 2;

see also Devitt and Sterelny 1989). Instead I urge a “linguistic conception” according to which a grammar is about a non-psychological realm of linguistic expressions, physical entities forming symbolic or representational systems. The grammar is about the external products of a speaker’s knowledge of her language (or competence) not about that state of knowledge.¹² If I am right, Chomsky’s argument for the propositional assumption is not only fast but dirty.

The second problem with the argument is that, even if the psychological conception were right, the argument would not be sufficient to establish a propositional assumption.¹³ To see this we need a distinction that comes largely from computer science. It is the distinction between rules that govern by being represented and applied and those that govern by being simply embodied without being represented. This is a distinction between two ways in which certain rules might be real in an object, two ways in which the rules might be embodied in it. Neither of these ways should be confused with a situation where an object simply behaves *as if* it is governed by those rules. For that situation is compatible with those rules *not* being embodied in the object at all.

A simple old-fashioned mechanical calculator provides a nice example of something governed by rules that are embodied without being represented. When the calculator adds it goes through a mechanical process that is governed by the rules of an algorithm for addition. But the rules are “hardwired” not represented in the calculator. In contrast, the operations of a contemporary general-purpose computer are partly governed by rules of a program that are represented in its RAM and applied. Yet those rules can govern the operations of the computer only because there are other rules that are unrepresented but built into its hardware that enable the represented rules to govern. And, note an important generalization: any rule that governs the behavior of one object by being represented and applied could govern that of another by being embodied without being represented.

If, contrary to what I have claimed, the fast argument were good it would establish that the rules (principles) described by a grammar were psychologically real: they are present in the minds of competent speakers. But our distinction shows that there are two ways that they might be present: they might be represented or they might be simply embodied without being represented. For the argument to support a propositional assumption it would need to show that the rules are not only embodied but represented. That requires another step.

II: The metalinguistic intuitions of ordinary speakers – intuitions about what expressions are grammatical/acceptable, ambiguous, corefer, and the like - serve as evidence for grammars. Why are they evidence? I take the received Chomskian answer to

¹² My view has received a great deal of criticism (some of it very harsh). Antony 2008; Collins 2007, 2008a,b; Dwyer and Pietroski 1996; Laurence 2003; Longworth 2009; Matthews 2006, Pietroski 2008; Rattan 2006; Rey 2006, 2008; Slezak 2009; Smith 2006. I have recently responded at length: 2006c, 2008a,b,c, and 2009.

¹³ I make much of this distinction (2006b: 45-52).

be that they are evidence because, “noise” aside, they are provided to a speaker by her linguistic competence, an underlying state of knowledge:

it seems reasonably clear, both in principle and in many specific cases, how unconscious knowledge issues in conscious knowledge...it follows by computations similar to straight deduction. (Chomsky 1986: 270)

I call this the “voice of competence” view (recently, “VoC” for short).¹⁴ We can see in this story an argument for a general propositional assumption. The core of a good explanation of why the intuitions of speakers of a language are evidence for its grammar is that speakers have tacit propositional knowledge of the rules and principles of the language. And there is no other explanation. If the intuitions are really derived from this knowledge of the grammatical rules then they must be true and hence good evidence for the nature of those rules. But if they are not so derived, how could they be good evidence? How could they have this evidential status unless they really were the voice of competence?

I have rejected VoC and hence this argument (2006a; 2006b: ch. 7). A problem with VoC is that we are a long way from a plausible account of *how* competence could provide these intuitions.¹⁵ But the main objection to VoC is that we have a better explanation of these intuitions: they are empirical central-processor responses to linguistic expressions. This explanation, unlike VoC, is nicely modest in that it makes do with cognitive states and processes that we were already committed to. On this view, competence provides a speaker with ready access to data, not with any intuitive judgments she makes about the data. Her intuitions can be good evidence because she is likely to be reliable about the simple and obvious properties of these expressions.¹⁶

III: Chomsky dismisses the knowledge-how view of linguistic competence as “entirely untenable” (1988: 9) and usually writes as if he endorses a general propositional assumption.¹⁷ He offers an argument for his position that, unlike I and II above, does not depend on his view of linguistics.

¹⁴ The evidence that VoC is the received Chomskian view is overwhelming (2006a: 482-6; 2006b: 95-7) yet some strangely resist the attribution: Collins 2008a: 16-19; Fitzgerald 2009: 144. I have responded: 2010c. Stich has suggested an analogue of VoC to explain why the referential intuitions of the folk are good evidence for a theory of reference (1996: 40; Stich does not endorse the suggestion.): speakers derive those intuitions from a representation of referential principles. I argue that we should dismiss this analogue just as we should VoC (2006d, 2011).

¹⁵ Carson Schütze ends a critical discussion of the empirical evidence about linguistic intuitions with this observation: “it is hard to dispute the general conclusion that metalinguistic behavior is not a direct reflection of linguistic competence” (1995: 95). In other words, it is hard to dispute that VoC is false.

¹⁶ For some criticisms of my view of linguistic intuitions, see Collins 2006, 2007, 2008a; Culbertson and Gross 2009; Fitzgerald 2009; Mišćević 2006; Pietroski 2008; Rattan 2006; Smith 2006; Textor 2009; I have responded: 2006c, 2008c, 2010a,c.

¹⁷ As I show (2006b: 3-6, 72-81, 96-7). However, I do not attribute the assumption to

Chomsky takes the knowledge-how view of linguistic competence to be that competence is a “practical ability” to *use* the language in understanding and speech (hence, in effect, siding with Ryle about knowledge-how). He objects:

Two people may share exactly the same knowledge of language but differ markedly in their ability to put this knowledge to use. Ability to use language may improve or decline without any change in knowledge. This ability may also be impaired, selectively or in general, with no loss of knowledge, a fact that would become clear if injury leading to impairment recedes and lost ability is recovered. (1986: 9)

Let us start with the differences in ability to speak. Chomsky gives two examples of the sort of difference that he has in mind. The first is the difference brought about by “a public speaking course” (p. 10). But this is beside the point. The knowledge-how for public speaking *requires* ordinary linguistic knowledge-how but *is different from* that knowledge-how, as the folk plainly acknowledge. The fact that a person competent in a language can gain another competence as a result of a public speaking course or, for that matter, an elocution course or a calligraphy course, does nothing to show that *all* of these competences are not mere knowledge-hows.

Chomsky’s second example is of the difference between “a great poet” and “an utterly pedestrian language user who speaks in clichés” (1988: 10). But, once again, the difference is in another knowledge-how - presumably, largely, a difference in thought - and does not show that knowledge of the language is not knowledge-how. To suppose that it is knowledge-how is not to suppose that there are no other skills that depend on it.

Consider next Chomsky’s claim that a person’s ability to use a language can be impaired by brain damage even though her knowledge of the language remains relatively stable. There can be no disagreement about that. But it does not show that the stable knowledge is not knowledge-how because the same can be said of clear cases of knowledge-how. A person knows how to ride a bicycle but cannot do so because his leg is broken; a person knows how to catch but cannot do so because she has blisters; a person knows how to touch type but cannot do so because he has a migraine. Indeed, it is presumably the case that exercising any knowledge-how requires the satisfaction of some internal background conditions.

Chomsky rightly insists that “to know a language...is to be in a certain mental state, which persists as a relatively steady component of transitory mental states” (1980b: 5). But he writes as if taking this knowledge as mere knowledge-how must saddle it with a whole lot of irrelevant features of performance (1986: 10) and must make behavior “criterial” for

Chomsky. Rather, I raise the possibility of another interpretation according to which the principles and rules are “*embodied somehow* without being represented” (p. 7). Despite this, Barry Smith (2006) and Peter Slezak (2009) accuse me not only of attributing the assumption to Chomsky but of basing my whole critique of Chomsky on this attribution. See my 2006c and 2009 for responses.

the possession of the knowledge not merely evidential (1980b: 5). This is not so. A person's knowledge-how can be an underlying steady state abstracted from features of performance. It can be, as Chomsky insists our knowledge of language is, "a *cognitive system* of the mind/brain" (1988: 10) and yet still be akin to a skill or ability. Usually, such an ability gives rise to certain behavior which then counts as evidence for the ability. But the ability may not give rise to the behavior. The behavior is not "criterial".

That was my response to Chomsky's argument in *Ignorance of Language* (2006b: 92-3) and it still seems right to me. However, more needs to be said. It looks as if the ability to *F* cannot be simply identified with knowing how to *F* because, as we have just seen, one can lose the ability, perhaps even permanently lose it, without losing the knowledge-how. We should see the knowledge-how as the necessary underlying part of the ability, "a relatively steady component" that can survive where more overt components of the full ability are lost; to take an example mentioned by Stanley and Williamson (2001: 416), it is arguable that a master pianist who loses both of her arms in a tragic car accident still knows how to play the piano even though she is no longer able to play it. As noted, I have preferred to talk of linguistic competence as simply a skill or ability; that's the skill assumption. However, if we must talk of it as knowledge we should see it as mere knowledge-how (of the Rylean kind). In light of the present discussion, that knowledge-how should be seen as the necessary underlying part of the full skill or ability.

IV: Despite the philosophical popularity of the singular propositional assumption about truth conditions, I have been unable to find anything in the literature that could seriously be called an argument for it. Apparently it is thought to follow in some obvious way from the claim that speakers "know the meaning" of sentences in their language and from the theoretical slogan that "the meaning of a sentence is its truth conditions". Many passages in the literature hint at this.¹⁸ The challenge then is to construct an argument from these hints that does not turn into a travesty. I made an attempt but failed. The argument I constructed seems like a travesty because it involves a naïve view, first, of an ordinary use of the word 'meaning'; second, of the theoretical slogan; and third, of the connection between the ordinary use and the slogan (1997: 270-2). I think that the challenge cannot be met.

V: Dummett seems to think that the following consideration favors a propositional assumption. "The reason why we are impelled to speak of *knowledge* here is that speech must be a conscious activity, since it is *the* rational activity par excellence" (1981: 310-11). Dummett sees this as related to the fact that normally a person knows whether he understands and expression or not (p. 81).

Speech is indeed a conscious activity (setting aside talking in one's sleep), and a person does normally have the knowledge Dummett mentions; but neither of these facts supports a propositional assumption (Devitt 1997: 274). (1) Speech is conscious in that it requires thought. But the required thought need not be about language. And, if it is about

¹⁸ E.g., Dummett 1975: 105-9; 1976: 68-9; 1978: 153-5; McGinn 1980: 20; Wright 1976: 221.

language the thought and speech will exemplify not the ordinary speaker's understanding, but linguistic theorizing. (2) The fact that we normally know whether we understand an expression or not shows that this is a piece of linguistic theorizing of which we are mostly capable. Similarly, we may mostly know such profundities as that 'Snow is white' is true-in-English iff snow is white. However, there is no necessary connection between such knowledge and our ordinary understanding. It is possible for someone to understand expressions of *L* without having any concept of *L*, and hence without the capacity to have any thoughts about his understanding of *L*; see section 2, A, above.

That is, so far as I know, the extent of "philosophical" arguments for propositional assumptions (aside from Stanley and Williamson 2001 which we are not discussing). Given Pylyshyn's Razor these assumptions need a lot of support. Yet the arguments we have considered in this section are strikingly unpersuasive. In section 2, we adduced powerful considerations against these assumptions, at least of the explicit sort. I turn now to more empirical considerations, which I think should carry the most weight against the assumptions.

I noted (sec. 1) that there are good reasons for thinking that linguistic competence is the *skill*, roughly, of moving back and forth between thoughts and their linguistic expression. If this is right we can expect to learn something about it by considering what psychologists have discovered about skills in general. That will be the concern of section 4. Section 5 will briefly consider the psycholinguistic evidence. These sections draw heavily on more detailed discussions elsewhere (2006b: 210-22, 230-41).

4. The Psychology of Skills

The folk distinction between knowledge-that and knowledge-how is commonly thought to be the same as the psychological one between "declarative" and "procedural" knowledge. That distinction originated in AI but is widely acknowledged, frequently applied, and very important in psychology. Thus, John Anderson, a leading cognitive psychologist, writes:

The distinction between *knowing that* and *knowing how* is fundamental to modern cognitive psychology. In the former, what is known is called *declarative knowledge*; in the latter, what is known is called *procedural knowledge*. (1980: 223)

The distinction between declarative and procedural knowledge also plays a major role in cognitive ethology and there too is identified with the folk distinction: "Declarative knowledge is 'knowing that' whereas procedural knowledge is 'knowing how,' or knowing what to do, as in a stimulus-response connection" (Shettleworth 1998: 5; see also McFarland 1991). Psychologists describe the distinction, rather inadequately, along the following lines: where declarative knowledge is explicit, accessible to consciousness, and conceptual, procedural knowledge is implicit, inaccessible to consciousness, and subconceptual. Although declarative knowledge may play a role in learning a skill, there is a consensus that the skill itself is a piece of procedural knowledge.

This psychological distinction is related to two others. First, there is a distinction between explicit (or declarative) and implicit (or procedural) memory. Declarative knowledge involves explicit memory, procedural knowledge involves implicit memory. Explicit memory holds factual knowledge such as that Washington is the capital of America, while implicit memory holds rules that govern processes, “routinized skills,...priming, and classical and operant conditioning” (Bjorklund *et al* 2003: 1059). Second, there is a distinction between explicit and implicit learning. Explicit learning is a “top-down” process that starts from declarative knowledge. Consider, for example, learning to change gears in a stick-shift car by starting with instructions like: “First, take your foot off the accelerator, then disengage the clutch”. In contrast, implicit learning is a “bottom-up” process: we observe, practice, and “just pick the skill up”. A. S. Reber defines implicit learning as follows: “the capacity to pick up information about complex stimulus displays largely without awareness of either the process or the products of learning” (2003: 486). There is much evidence that a lot of skill learning is implicit; see, for example, the evidence cited by Sun *et al* (2001) that “individuals may learn complex skills without first obtaining a large amount of explicit declarative knowledge... and without being able to verbalize the rules they use” (p. 207).

In brief, these related distinctions between two kinds of knowledge, two kinds of memory, and two kinds of learning are well established in empirical science. As one researcher says, the evidence for them “lies in experimental data that elucidate various dissociations and differences in performance under different conditions” (Sun 2003: 698).¹⁹

Consider now the psychologists’ identification of their declarative knowledge with the folk’s knowledge-that. There is a consensus in psychology that declarative knowledge involves a *conscious representation* of what is known. Thus, psychologists think that a subject has declarative knowledge of the rules for a task only if she consciously represents them. So the person who has declarative knowledge that R is a rule of arithmetic must represent that fact in her central processor. If RTM is correct, declarative knowledge can indeed be identified with the folk’s knowledge-that. And this identification is with propositional knowledge *proper*, not merely tacit.

Psychologists also identify their procedural knowledge with the folk’s knowledge-how. Since it is central to procedural knowledge that it is not declarative, I think that psychologists would have done better to identify it with one common kind of knowledge-how, *mere* knowledge-how. For, as we noted (sec. 1), it is that Rylean kind of knowledge-how that is thought not to involve knowledge-that. Still, we needn’t fuss about this: mere knowledge-how is still knowledge-how.

Linguistic competence is a skill (set of skills). So we can immediately draw some conclusions about it from this psychological literature. Skills are procedural not

¹⁹See also Schacter 1999 (p. 394), the many results cited by Sun *et al* 2001 (p. 207), Cleeremans 2003 (p. 492), Mulligan 2003 (pp. 1115-7), Reber 2003 (p. 491).

declarative knowledge. So linguistic competence is mere knowledge-how not knowledge that. So, the literature supports the skill assumption according to which linguistic competence is simply a skill, not involving explicit propositional attitudes. And it counts against all explicit propositional assumptions, whether general ones that take competence to involve knowledge of linguistic theories, or singular ones, linguistic facts. So these empirical considerations confirm the earlier philosophical ones. I think we should conclude that *explicit propositional assumptions have nothing to be said for them*.

But what about tacit propositional assumptions? These take speakers to tacitly know linguistic theories or facts in virtue of representing them at a subpersonal level in a module that is largely inaccessible to the central processor. This tacit propositional knowledge would be a special sort of knowledge-how and so these propositional assumptions are compatible with the skill assumption (sec. 2, A). Since linguistic competence is procedural knowledge, assessing tacit assumptions requires us to look at the nature of that knowledge.

This is where it gets tricky. For, we have a long way to go in discovering that nature (Schacter 1999: 395; Sun 2003: 698). The psychological literature reveals a range of interesting ideas but no rational basis at this time for a sweeping acceptance or rejection of the ideas of one or other theoretical camp. It would be nice if there was a firm consensus on one thing at least: on whether procedural knowledge consists in represented rules or simply rules that are embodied without being represented (sec. 3, I). For, if the rules were represented then that would confirm tacit general propositional assumptions; if not, that would disconfirm those assumptions. But, alas, there is no consensus. There is no persuasive evidence that skills *do* involve representations of the governing rules. But neither is there decisive evidence that the skills *do not* involve these representations. Still, I think the evidence strongly favors the view that skills do not. The evidence is to be found in the literature on motor skills,²⁰ on dynamical systems theories,²¹ on the Gibson-inspired ecological theories,²² on connectionist theories,²³ on instance theories,²⁴ on the implementation of skills,²⁵ and in cognitive ethology.²⁶ The only support for the idea that skills do involve those representations may come from production-systems theories which seem committed to representations of rules in procedural knowledge, albeit representations of a different sort from those involved in declarative knowledge.²⁷ But, I argue, there are reasons for doubting the appropriateness of this apparent commitment (2006b: 215-17). So, I think that the psychological literature counts, even if not decisively, against tacit general propositional assumptions.

²⁰ See, e.g., Brown and Rosenbaum 2003; Mon-Williams *et al* 2003; Wolpert and Ghahramani 2003.

²¹ See, e.g., Kelso 1995; van Gelder 1999; Garson 2003; Carlson 2003.

²² See, e.g., Fowler and Turvey 1978; Kugler and Turvey 1987; Newell 1996.

²³ See, e.g., Rumelhart and McClelland 1986; Masson 1990; Sun *et al* 2001.

²⁴ See, e.g., Logan 1988.

²⁵ See, e.g., Yamadori *et al* 1996; Posner *et al* 1997.

²⁶ See, e.g., Shank 2002.

²⁷ See, e.g., Anderson 1983, 1993; Laird *et al* 1987; Singley and Anderson 1989; Anderson and Lebiere 1998; Masson 1990; Lebiere 2003; Jones 2003.

This point is strengthened by a brief look at the evidence on implicit learning. Language learning seems to be a paradigm of implicit learning: “Natural languages are acquired with substantial contributions from implicit acquisitional mechanisms” (Reber 2003: 486; see also Cleeremans 2003: 492). And the evidence favors the view that what is acquired by implicit learning does not involve anything so cognitive as a representation of rules. Thus, according to Axel Cleeremans, computer models show that “elementary, associative learning processes (as opposed to rule-based learning) are in fact often sufficient to account for the data” of implicit learning (2003: 496). “it is clear that the knowledge acquired in typical implicit learning situations need not be based on the unconscious acquisition of symbolic rules” (p. 497). Stanley *et al* suggest that the knowledge that is exploited in performing a task is a “memory for past sequence of events related to the task” (1989: 571). Mathews *et al* suggest that it is “memory-based processing, which automatically abstracts patterns of family resemblance through individual experiences with the task” (1989: 1098). Reber notes that the bottom-up systems of implicit learning “are rather easily simulated by connectionist architectures” (2003: 487). Mathews *et al* (1988) assume something like a connectionist model. Reber points out that even a sea slug can exhibit implicit learning in Pavlovian conditioning (2003: 489). These discussions clearly count heavily against the idea that skills are governed by represented rules and hence against even tacit general propositional assumptions.

So much for tacit general assumptions, but what about singular ones? These ascribe to speakers tacit knowledge of syntactic and semantic facts. The bearing of the psychological literature on these singular assumptions is much less clear. Still, guided by Pylyshyn’s Razor (sec. 1), I claim (2006b: 221-2) that the literature, including the just mentioned literature on implicit learning, should make us doubt that language use involves representing such linguistic facts; it makes such a view of language use seem too intellectualist. Those doubts are particularly encouraged by the sheer *speed* of language processing. Much of the literature suggests that skills have fairly brute-causal associationist natures.

I shall turn now to psycholinguistic studies of language use. I don’t think that these change this picture.

5. Psycholinguistics

In the last section I noted that it is early days in discovering the nature of procedural knowledge. So it is not surprising to find that it is also early days in the study of language processing. Jerry Fodor once remarked:

Very little is known about how [a device for sentence comprehension] might operate, though I guess that, if we started now and worked very hard, we might be able to build one in five hundred years or so. (1975: 167)

Despite years of ingenious and productive experimentation, the consensus is that we still know little about language processing.²⁸

But what does psycholinguistics *suggest*, at this stage, about propositional assumptions? I argue (2006b: 230-41) that psycholinguistic studies give further support to the view that general propositional knowledge, even tacit knowledge, of rules or theories has no place in the explanation of linguistic competence.²⁹ Singular assumptions are much harder to assess. Still, the studies, particularly the prominence of connectionist models, seem to me to favor a fairly brute-causal view of the speedy automatic parts of language processing over the view that this processing operates on representations of syntactic and semantic properties.³⁰ If so the studies count against the view that we have tacit singular knowledge of linguistic facts. But it is clearly far too early to be confident about singular assumptions: judgments against them must be tentative.³¹

What about language acquisition? The evidence does indeed suggest that humans are innately constrained to learn only languages that conform to Universal Grammar.³² But, I argue (2006b: 244-71), this evidence gives no support to the view that the initial state of competence involves tacit general propositional knowledge of rules or theories. Even less does the evidence give support to the view that the final state does. A person in the initial state is totally ignorant of the rules of Universal Grammar. A person in the final state can be totally ignorant of the rules of her language.

6. Conclusion

It is common to hold “propositional assumptions” about a competent speaker’s knowledge of her language. These assumptions take this knowledge to be either general knowledge of linguistic theories or rules or singular knowledge of linguistic facts. Sometimes this knowledge is thought of as “explicit”, sometimes as “tacit”. I have argued that explicit propositional assumptions have nothing to be said for them. Philosophical arguments in favor of them are thin and unpersuasive whereas those against are powerful. The empirical evidence from psychology is decisive against them, given that linguistic competence is a skill and hence “procedural knowledge”.

²⁸ Some other expressions of this consensus: “we know so little about the actual machinery engaged in human sentence parsing” (Berwick and Weinberg 1984: 35); the relation between the grammar and the parser “remains to be discovered” (Pritchett 1988: 539); “we know very little about the computational machinery involved in language processing” (Matthews 1991: 190-1).

²⁹ See, e.g., Viglio and Vinson 2003.

³⁰ On language production, see, e.g., Dell 1995; Dell *et al* 1999; Levelt *et al* 1999; Stemberger 2003. On language comprehension, see, e.g., Tanenhaus and Trueswell 1995; McClelland 1999; Cutler 1999; Tanenhaus 2003.

³¹ See, e.g., Steedman 2003; Gibson 2003; Pickering 2003;

³² However, Evans and Levinson (2009) have recently made me wonder about this.

Tacit assumptions are another story. If we take tacit knowledge to be something that a person has in virtue of representations in a subpersonal module of the mind, then tacit propositional assumptions about linguistic competence are certainly interesting. However, I have argued that tacit general assumption get no support from evidence about skills, or from psycholinguistic evidence about language use and acquisition. There is no significant evidence for them and, given what else we know, they are implausible.

It is more difficult to assess tacit singular assumptions. Some may be right but I think that we can predict with some small confidence that they are not, that we will discover that language processing does not operate on metalinguistic properties of the linguistic expressions but is more brute-causal. So we can have some small confidence that the assumption that we have tacit knowledge of linguistic facts is false. In any case, tacit propositional assumptions are compatible with the skill assumption. If we think of linguistic competence as knowledge, we should think of it as mere knowledge-how, not involving any explicit propositional knowledge.

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