Reference Across Pathologies: A New Linguistic Lens on Disorders of Thought

Abstract: According to a linguistic tradition here termed ‘Cartesian’, language is relegated to an expressive system considered to provide the means to encode or communicate an independently constituted thought process. An alternative vision here termed ‘un-Cartesian’ regards language as an organizational principle of human-specific thought, with the implication that thought of the same type would not become available to a cognitive system without language and that clinical thought disturbances implicate language dysfunction. I here explore the latter view in the context of intra-species variation of the human cognitive type: cognitive disorders that, as in the case of autism and schizophrenia, come with language-related clinical symptoms. If language is the configurator of human-specific thought, cognitive and linguistic phenotypes should illuminate one another. I specifically review evidence for impairment in one universal linguistic function, namely reference. Linguistic meaning is referential meaning: we cannot utter sentences without referring to persons, objects, and events, based on lexicalized concepts that provide descriptions of these referents. Reference in this sense takes a number of human-specific forms, from generic to specific, deictic and personal ones, which empirically co-vary with forms of grammatical organization. As reference in some of these forms proves to be highly vulnerable across major mental disorders, grammar is thereby linked to forms of thought and selfhood critical to normal cognitive functioning. In this way clinical linguistic and cognitive diversity provides an important new window into the foundational question of the thought-language relationship and the cognitive significance of grammar.

1 Introduction

Grammatical organization is universal in human populations, which naturally raises the question of its biological basis and universal principles. Pursuing this
question, the universal grammar project in its twentieth century shape (Chomsky 1965) has largely abstracted from the connections between language and thought, focusing on language-specific principles hypothesized to define an invariant, genetically determined language faculty. These principles are taken to restrict the scope of possible linguistic diversity in human populations that are genetically and cognitively uniform. Insofar as clinical genetic and cognitive diversity has been brought to bear on universal grammar research, the focus has been on conditions isolating language from non-linguistic cognition as well. In particular, aphasia following lesions in left perisylvian cortex is language-specific by definition. Clinical impression here moreover often tends to suggest, not that the thought system becomes pathological, but that patients struggle to get essentially normal thoughts across. Dissociations between language and reasoning in various cognitive domains (Varley 2014), as well as differences in their respective neural correlates (Fedorenko and Varley 2016), have been taken to further support a ‘modular’ viewpoint separating the neural basis of ‘language’ from that of ‘thought’. Specific Language Impairment (SLI), too, is specific to language by name and definition.1

A number of other clinical conditions, however, such as autism spectrum disorder (ASD), Alzheimer’s disease (AD), Huntington’s disease (HD), or schizophrenia (SZ), systematically implicate language changes along with disorders of thought.2 These have comparatively received much less linguistic attention, just as, in turn, little neurological and especially neuropsychiatric attention has turned to language as a neurocognitive variable potentially mediating human-specific forms of rationality and mental health. This neglect is not an accident but at least in part a reflection of our prior foundational conceptions of what language is and what role it plays in human cognition. One such conception is that language is an expressive system dedicated to the communication of the human thought process to others, while not being inherent to this process itself. If in this case the thought process disintegrated clinically, we would naturally seek to identify the non-linguistic neuro-cognitive variables (e.g. memory,  

1 Neither aphasia nor SLI will be treated here in any detail, though both are significant to the un-Cartesian research program outlined below. Note, though, that how aphasia affects cognition is an open question (see e.g. Baldo et al. 2010; for evidence of cognitive impairment; see also Zimmerer et al. 2016). Classical putative evidence for modularity from both Williams syndrome and SLI (Pinker 1994) has also by now been questioned (Mervis and Becerra 2007; Laing et al. 2002; Karmiloff-Smith et al. 2003; Davies et al. 2016; Norbury et al. 2014).

2 Neither AD nor HD will be treated here in any detail either. For recent evidence that language is a fine-grained measure of cognitive change and disease progression in these cases as well, see Ahmed et al. (2013) and Pekkala et al. (2013) for AD, and Hinzen et al. (2017) for HD.
attention, executive functioning, etc.) that might account for this change, an approach that has defined the field of cognitive neuropsychiatry (Frith 1992).

I will here call this expressive view broadly and technically, and partially for dialectical purposes, the ‘Cartesian’ one, and contrast it with an ‘un-Cartesian’ one. The term ‘Cartesian’ is chosen to allude to eighteenth century ‘Cartesian linguistics’ as characterized in Chomsky (1966), which posits an independent universal thought system as structured by logic, which grammar, insofar as it is rational, ‘mirrors’; but also to twentieth century generative linguistics, which separates the study of language and of thought (Chomsky 1965) (for historical remarks see Hinzen 2012; Hinzen and Sheehan 2013: Chapter 1). Functional and cognitive linguists, too, however, regard language as rooted in principles of human cognition that are not in turn conditioned by language, thereby breaking the connection between language and human-specific thought (see e.g. Tomasello 2008). Cartesian in my present terms is also the view that language is not merely a communicative device translating a private code into a public medium, but a ‘supra-communicative’ one that can enhance thought, be it through the provision of words viewed as cognitive ‘artefacts’ or ‘vehicles’ (Clark 1998), or by expressing it as ‘inner speech’ and making us conscious of it (Carruthers 1996, 2002). Of course the Cartesian view also centrally includes the traditional hypothesis that thought is coded in a distinct ‘language of thought’ (LoT) (Fodor 1975; Carruthers 2002), often considered to structure the minds of linguistic and non-linguistic species alike.

Meanwhile in recent generative linguistics, the question of the ‘interface’ between two systems identified as ‘language’ and ‘thought’, respectively, has moved center-stage (Chomsky 1995). The hope has been that principles of the organization of the ‘computational system’ of language (on the ‘language’ side of the posited interface) will in part derive from the way it is embedded in non-linguistic thought systems – the so-called ‘conceptual-intentional’ (C-I) systems of Chomsky (1995) posited on the other side of this interface (illustrating another version of a Cartesian divide). These systems are assumed to be given prior to language evolution in hominins and to have constrained the design of the language faculty externally, with different views on how ‘tight’ this interface is (Chomsky 2007; Jackendoff 2002). In Chomsky (2007), Chomsky identifies a different view said to be ‘more radical’, according to which there is no interface (Hinzen 2006, 2007). Grammar is the organizational principle of the sapiens-specific thought process, which on this view would not exist without speech (or sign). The language-thought dichotomy (for this particular type of thought) thus collapses, thereby erasing a standard chicken-and-egg problem as well. This latter view will here be called ‘un-Cartesian’ and be developed in Section 2 as it has evolved over the last decade (via Hinzen 2007; Sheehan and Hinzen 2011;
Both Cartesian and un-Cartesian views of language can be empirically explored in the context of cognitive disorders, which is the subject of Section 3. If language defines a species-specific cognitive type, then cognitive and linguistic diversity in our species should match in the sense that their respective forms of diversity can be meaningfully and systematically mapped onto each other. Depending on what cognitive dysfunction we see and which cognitive functions language is hypothesized to mediate, linguistic and cognitive types should align. It is clear that neither ASD nor SZ can have complete animal models since language is intrinsic to core aspects of their clinical presentations. Yet the exact ways in which they implicate language has remained unclear and contested. Here the un-Cartesian approach makes a specific prediction based on its central claim that a species-specific form of reference is a core cognitive function of language in humans. Comparative evidence has provided evidence that this particular form of reference is discontinuous with forms of reference in non-grammatical beings, such as alarm call systems in monkeys (Cheney and Seyfarth 1990). These have been suggested to resemble innate human vocalizations like crying, grunting, sobbing or laughter more than speech (Deacon 2006). In particular, both are confined to relatively specific constellations of vocalizations, emotional states, and stereotypic referential contexts. The un-Cartesian research hypothesis is that grammatical organization frees reference from these constellations and bases it on lexicalized concepts that can be freely retrieved and combined independently of external stimulation. This allows cognitive flexibility and creative thought, which can be socially shared due to its linguistic format, representing the beginnings of the idea of an objective world. The core claim of Section 3 will be that available evidence from both ASD and SZ support a link between reference in this sense and core symptoms of these disorders.

Linguistic and cognitive diversity in clinical populations thus informs linguistic theory, by illuminating the foundational question of what language is. In turn, linguistics can shed new light on cognitive disorders, potentially evolving towards a ‘science of cognition’ (i.e. the human cognitive type) rather than

3 Darwin could be seen as falling on the un-Cartesian side of this divide: ‘If it be maintained that certain powers, such as abstraction, self-consciousness etc., are peculiar to man, it may well be that these are the incidental results of other highly-advanced intellectual faculties; and these again are mainly the result of the continued use of a highly-developed language.’ (Darwin 1871: 103) The same applies to his contemporary Mueller (1887), who argued that the new ‘science of language’ dispenses with the need of a separate ‘science of thought’.
merely representing the study of a neurocognitive domain taken to be specific (a cognitive science among others).

2 The cognitive function of grammatical organization

2.1 What powers the generativity of thought?

Human thought, apart from expressibility in language, is ceaseless and has unbounded generativity. It essentially never stops in conscious human mental life, though not all of our mental activities have a linguistic format and this format can have various degrees of explicitness and articulation. Whether the brain is actively engaged in attending to a conversation or in solving some problem, or we simply let our minds wander, thoughts keep coming into our heads from we don’t know where, an ignorance dignified with the term ‘creativity’. Based on a rich storehouse of lexicalized conceptual knowledge (semantic memory capturing our general and multi-modal knowledge of trees, cars, people, hunting, cities, etc.: Binder et al. 2009), this thinking system generates ever-new thoughts flexibly, adaptively and expressed in speech. It thus has to be powered by a neural engine that provides it with the structures it needs and unifies them into thought-sized units. If this engine is separate from the linguistic one that we need independently, it follows that the conceptual resources on which it is based will not be lexemes (lexicalized concepts), and the principle by which such resources are systematically accessed and then combined will not be grammar. Driven to this extreme, the view entails that grammar may make no difference to what kind of meaning can be grasped by a human mind and conveyed in communication.

In this case an ape could in principle (ecological differences aside) think like us, just not say so – be it because he lacks the social motivations to do so, on which language is taken to depend (Tomasello 2008), or because relevant cortical-laryngeal connections enabling vocal control in humans (Deacon 2006; Fitch 2010) are contingently missing, leaving the thought system unaffected. In the latter case, its (his?) predicament would in some ways resemble that of post-stroke patients with brainstem lesions leading to ‘locked-in syndrome’. Like the hypothetical ape, such patients cannot operate speech or sign, but they can have minds like ours, as eye-controlled, computer-based communication technology can in these cases reveal (Laureys et al. 2005). The analogy breaks down immediately, however, when we realize that locked-in patients are speech-less (non-vocal) but not language-less (non-verbal). With eye-controlled
communication technology in place, a mind is revealed that can have a normal linguistic articulation internally. The hypothetical ape’s case is thus different, as he is meant to have Cartesian thought, whereas the locked-in patients have normal verbal minds. For an example of truly non-verbal minds we need to turn to approximately 25% of children at the low-functioning end of the autism spectrum, who fail to develop language in either production or comprehension in any modality, in the absence of physical impairment preventing language learning or articulation, such as deafness or apraxia (Norrelgen et al. 2015; Bal et al. 2016; Tager-Flusberg and Kasari 2013). These children, most of whom also exhibit intellectual disability (verbal or nonverbal) in the severe range, and are unlikely to develop language later, do not have minds like ours: they clearly do think differently, often failing to reach a representational (rather than sensorial) level of cognition altogether (Maljaars et al. 2012).

The hypothetical ape’s Cartesian thought system now becomes surprising. By hypothesis he is dissimilar from the locked-in patient, who has normal linguistically articulated thought, but he is dissimilar from a nonverbal child as well, since his Cartesian thought system is meant to be like ours, while a nonverbal child who has not developed language by school age has a profoundly different cognition. A more likely possibility seems to be that real apes are, unlike locked-in patients, language-less as much as speech-less. They lack the internally structured and articulable thought system itself, which goes with speech or sign and their grammatical structure in humans. In other words, where speech or sign are present, this is not merely contingently so (i.e., a fortunate accident), but speech/sign is foundationally significant for cognition. This would not deprive non-linguistic primates of cognitive activity, intelligence, or rich mental life, as there clearly are forms of perception, affect, categorization, navigation, imagery, reasoning, associative learning, and ‘mental representation’ (Gallistel 2009), none of which depend on language.

On this un-Cartesian view, speech (or sign) defines a species-specific cognitive type – it is the configurator of the *sapiens*-specific mind. Apart from the ‘language connectome’ (Vassal et al. 2016) in the brain – the set of cortical and subcortical regions involved in language processing together with their connections – there is no independent ‘mental’ process of complexity unfolding in it that would correspond to sapiens-specific ‘thought’ – though naturally, as noted, there can be other modes of cognition that do not involve thought in anything like the same sense, such as musical cognition (which lacks referential meaning and content, a defining feature of thought), arithmetic, navigation, or emotion (Fedorenko and Varley 2016). The view entails the predictions that in development and evolution, language will mature *along* with thought, implicating and shaping other cognitive systems such as working memory and forms of
executive control allowing flexible and rational behaviour; and that the loss of the relevant mode of thought will be the loss or disintegration of language.

No unidirectional causal arrow leading from language to thought is here assumed, which would make no sense on this view since language itself requires the form of thought in question and does not ever occur without it (except in pathological cases, which are of interest precisely for this reason). Nor does it entail some super-Whorfian form of linguistic ‘relativity’, which cannot even be articulated on this view, which maintains that there is no independent thought system, which could then in some respects be ‘relative’ to the specificities of a local language. While the un-Cartesian linguist targets the existence of this single thinking/language (‘languaging’) system as an explanandum, the Neo-Whorfian aim is to detect co-variations of this system (identified under the label of ‘thought’) with specificities of the local language. Any such specificity challenges the un-Cartesian account, insofar as we assume that the human cognitive type does not vary across the species and linguistic variation should therefore not affect it. However, the basic un-Cartesian suggestion here has been that the variation in question centers on lexical and morpho-syntactic dimensions of language, not on the forms of meaning that grammar is hypothesized to mediate on the un-Cartesian view (Hinzen and Sheehan 2013: Chapter 5). The claim, for example, is that a range of forms of object and temporal reference are grammatically configured in every language – but not that a given language has to use articles such as English the to implement forms of definite reference; nor that such forms require the existence of a morpho-syntactic category ‘Noun’; nor that the language would have to feature a morphological future tense. Neither does it affect the fundamental grammatical relations between arguments and predicates if Agreement shows up morpho-syntactically on the verb with respect to none, one, two, or more of its arguments.

The un-Cartesian hypothesis would explain why we never empirically find language developing without a particular mode of thought developing

4 Wolff and Holmes (2011) rule out what amounts to a variety of this view from the outset, based on four reasons: (i) people can have thoughts that are difficult to express; (ii) we can understand linguistic expressions that are ambiguous; (iii) words expressing new concepts could never be coined because their meanings could never be imagined; (iv) infants and nonhuman primates can think. Note regarding (i), that in fact we can only identify the thoughts in question after we have found a linguistic articulation for them; regarding (ii), that whether the expressions are lexically or structurally ambiguous, they are in fact disambiguated at the relevant level of linguistic representation; regarding (iii), that imagination is not merely powered lexically but also grammatically (compositionally); regarding (iv), that the relevant forms of thought, if indeed they were to qualify as such under more explicit and rigorous definitions of ‘thought’, are different.
alongside. Even conceptually, though, it is not clear how we could find the one system without the other. Language without the relevant kind of thought expressed in it would be a parody and hence could not be language in the same sense; and thought that was not articulable in a language in some modality would not be thought of the same kind. What could it even mean, therefore, that there is ‘thought without language’, apart from the following three facts, which I take to be uncontroversial here:

(i) Different types of what we might want to call ‘thought’ exist in different species as well as in ours,
(ii) In humans, language does not develop in an instant but unfolds in development over a number of years,
(iii) When we think, we do not necessarily speak or understand speech, as the cases of young infants, locked-in, deaf, or aphasic patients illustrate?

A widely acknowledged and inherent empirical feature of the relevant kind of thought, its intensionality, takes us beyond this conceptual argument, and back to the basic question raised above, of what powers the generativity of thought in the brain, if that is not the language network.

### 2.2 The intensionality of thought as evidence of its linguistic nature

All thought inherently has a content – without it, it would be empty and not be thought. This is one sense in which thought is intentional (with a ‘t‘): it is always ‘about’ some object, person, state, event, possibility, or fact, and properties that these involve. Over and above such intentionality, however, the exact constituents and relations involved in a thought co-determine its identity. For example, if I say to you, ‘This man is my daughter’s primary school teacher’, then I am referring to a particular man and the thought that I here express is clearly different from the thought ‘This man is my wife’s secret lover’. If you told someone that I had expressed the latter thought when I had in fact only expressed the first, you may clearly be wrong. If you are, I would have referred to this particular person only under one of these two descriptions. Both of these thus may refer to the same person, but I may not know that, and even if I do, for the one description to figure in my thought is not for the other to do so as well. This is intensionality (with an ‘s‘), a consequence of the fact that, in humans, reference is mediated by descriptions: it involves lexicalized concepts providing descriptive properties of an object, which may also non-transparently apply to the referent (the person in question is both my daughter’s primary school teacher and my wife’s secret lover) (see Box 1).
Whether or not a description applies is thus not a function of what you or I know or believe, or what descriptions or concepts we choose to apply – it rather depends on the world, in this case on who is the lover of whom. Intensionality requires a complex constellation in which meaning, belief, and world come together in a specific way.\textsuperscript{5} It can only exist when thought is indeed referential and when it is also conceptual/descriptive, i.e. when there are two ingredients that come together in a single referential act, which as such has both an external (i.e., the referent) and an internal (the concept/description) component. Having thoughts with that feature is an inherent aspect of any act of reference involving lexical concepts and hence virtually all thought.\textsuperscript{6} As I will argue in Section 2.6, these units of referentiality necessarily are grammatical phrases, i.e. they are linguistically complex in the way of a determiner phrase such as ‘the man’ in English, which combines a lexical concept (‘man’) with a grammatical functor regulating reference (‘the’). ‘Man’ as such cannot, as a lexical item, refer to a particular person, or distinguish between a particular man, the man I met, any man, or mankind – it is not as such referential, capturing a general lexical concept only.\textsuperscript{7}

Intensionality entails that when we change the lexical or grammatical (i.e. relational) ingredients of a thought, the thought becomes a different one, whether or not we keep reference (the external element) stable. This in turn entails that any generative system that was not language but generated the same thoughts would have to generate exactly the same lexical concepts and relations that we see expressed in normal human speech. Any change in these would correspond to a different thought. In other words, for each and every of the lexical or grammatical (relational) ingredients above, ‘mental’ (non-linguistic) equivalents would have to be found. Positing these should then not be circular

\textsuperscript{5} As Davidson (1982, 1997) classically argues, intensionality is a sign of thought as such, insofar as it indicates that reality is conceptualized and the concepts in question stand ‘in between’ the person referring and the object referred to. The contents of the thoughts are not determined by the objects, and have a specific identity determined by both the object and the concept nonetheless.

\textsuperscript{6} Qualifications concern the cases of pronouns, which involve no lexical concepts at all, and of proper names such as \textit{John} when they have ‘rigid’ reference (reference relatively independent of any descriptive information provided, apart from the fact that the person referenced is taken to be named \textit{John}). See further below and Sheehan and Hinzen (2011), and Martin and Hinzen (2014).

\textsuperscript{7} It is not, as such, a predicate either, as ‘predicate’ is a grammatical notion and this lexical concept does not need to function predicatively in grammar (as seen in kind-referential uses like \textit{Man comes from Africa}).
or redundant, if a language-thought dichotomy is to be defended. What follows
is an argument that no such alternative system exists.

To illustrate the circularity problem, consider a thought involving the con-
cept SMILE (as opposed to any other concept) as an aspect of its identity as a
thought. SMILE as such does not allow us to determine which or whose smile is
intended, or even whether it took place; nor whether this concept will grammat-
ically function in language (or thought) as a noun or verb. This rather concerns
how this concept will function as a part of speech (PoS) on an occasion of its
retrieval, which entails a crucial meaning difference. Thus, if I say (or think)
‘Mary smiles’, then what I say depicts an event placed in time and it expresses a
proposition that is true or false; whereas if I merely utter ‘Mary’s smile’, then
despite the absence of a substantive lexical difference, the grammatical differ-
ence between these two constructions entails that in the second case no propo-
sition is expressed and instead only a certain smile is being referred to as if to an
object. This formal ontology (i.e. event/proposition vs. object) is thus fixed
grammatically, not lexically, showing that grammar is meaningful, though in a
different way than the substantive lexicon, and also that it aligns perfectly with
the formal ontology involved.8

From a Cartesian point of view, one could seek to avert this conclusion by
capturing the relevant difference through a notion of an ‘event’-concept vs. ‘object’-
concept viewed non-linguistically. If such a cognitive distinction would be avail-
able to our minds – though note that referentiality in general is not a perceptual
notion – the grammatical difference in question would not be responsible for the
meaning difference. But this will only be coherent as long as the occurrence of each
of these ‘event’ vs. ‘object’-concepts can be identified independently of the relevant
grammatical distinction. Put differently, the difference between the mental ‘event-
concept’ SMILE and the ‘object-concept’ SMILE needs to be some other difference
than the one that we empirically see between this concept when it functions as a
verb and when it functions as a noun. Surely it is circular to say, with Pierre d’Ailly
in the fourteenth century, that the mental equivalent of a ‘noun’ is a ‘noun-like
concept’ (Covington 2009: 125). It is also clear that there does not need to be any
perceptual or external difference when I use the one construction over the other:
clearly, both could be used in response to exactly the same perceptual input (a
visual scene with a smile) (see Box 2). Grammatical meaning in the above sense

8 This is often denied in the PoS literature, where the common view is that while there is a
semantic basis for parts of speech distinctions, namely the object-event distinction assumed to
be given non-linguistically, this basis does not suffice and there is an additional morpho-
syntactic dimension to the N vs. V distinction that cannot be grounded semantically. See further
Hinzen and Sheehan (2013: Chapter 2).
therefore does not co-vary with either perception or denotation, neither of which can as such determine which construction will be used.\(^9\) This challenge, illustrated here for the simple Noun-Verb distinction, multiplies with any further element of grammatical structuring that influences what thought we are thinking, beyond the lexical material that it contains (ignoring other information that can matter to the identity of a thought as well, such as phonology, prosody or affect).

In sum, the challenge to Cartesian thinking is that any element of a given thought can matter to its identity, but the only system where we see these elements exhibited in the right configuration is the linguistic structure that corresponds uniquely to the thought in question. The suggestion is that human grammar effectively is the single known system that integrates reference and description in the right way, in units of structure (phrases) that necessarily involve them both. The elements in question therefore either are elements of language as it is processed in our minds and underlies our actions, or else they must trivially replicate them at a separately posited ‘mental’ level. If so, the null hypothesis should be that grammatical organization in humans is (rather than merely expresses) the thought system that exhibits the form of referentiality in question, with no independent generative system required.

This in turn illustrates in just what way grammatical organization through phrases and sentences is inherently meaningful, subserving a species-specific referential function and thus contributing a kind of meaning unavailable lexically or non-linguistically. The core cognitive function of grammar is to turn lexicalized concepts, which as such do not refer (but are categories of perceptual experience encoding general concepts encoding semantic memory), into referential expressions (of different types) on an occasion of language use. We may call the result grammatical cognition, insofar as it reflects a species-specific cognitive type from which grammatical organization cannot be subtracted without destroying the cognitive type itself. Note that grammatical cognition by its very nature is ‘social cognition’, not merely because reference is involved but also because it requires words which are learned through sensory-motor integration between information that we hear (from others) and then express. This mode of cognition is thus inseparable from a linguistically re-structured social space in which such learning can take place. This, in short, is the un-Cartesian answer to the question of the cognitive significance of grammar. Below we will review evidence that:

\(^9\) As the Modists put it, not the significatum differs, but the modus significandi.
(i) The same form of referential meaning is not known to be available to non-grammatical species, and it matures in humans along with grammar.

(ii) It is available to all neurotypical humans and mediated grammatically in all languages in systematic ways.

(iii) It is systematically disturbed in mentally disordered populations, where an associated disturbance in the thought system and social cognition are also seen.

### 2.3 The demise of ‘concepts’

If SMILE is a concept, then ‘object’ or ‘event’ in the sense of the above discussion are not further such concepts. Rather they correspond to two possible ways in which given lexical concepts can be made referential on an occasion of their use, depending on the grammar that is put in place. This ‘grammaticalization of meaning’, which results in forms of reference and a formal ontology of thought, therefore does not add further concepts. Grammar is not a mapping from conceptual space into conceptual space, but from given concepts to something novel, namely reference. Yet, what kind of semantics is there prior to the point in evolution or development where concepts have come to occur as lexical items in grammatical structures? What about meaning at the ‘root’ level, before there even are PoS distinctions (Harley 2014)? Why could the meaning of a word not be a pre-linguistic abstract ‘concept’, existing independently of language and its grammaticalizations? Or do we only see such concepts where we also see them used in grammar?

Such pre-linguistic concepts would be non-lexemic by definition as well as factually, since non-linguistic species do not lexicalize the categories they form based on their experience, in the sense of creating freely available and shared sound/form-meaning pairs that can be activated independently of sensory experience for thinking and talking purposes. Nor would such concepts be used referentially, on the assumption that evidence for (declarative) reference in a human-specific sense in non-linguistic species or pre-linguistic humans is extremely limited (see further Section 2.5). The non-linguistic concepts in question would thus function very differently from lexemic concepts in humans, lacking two of their hallmarks, which raises the question why the same technical term should be used for both.

Our primary evidence for a productive form of concept combinatorics, moreover, comes from the case where these concepts are grammaticalized, as in a structure like (1):
(1) brown cow

Here what we see are two lexemes, one in the role of a modifying adjective, hence denoting a property, another in the role of head noun, determining the referent of the phrase as a whole. This is why the meaning is what it is: a cow that is brown, not a cow-type of brown, which is what would be denoted by (2):

(2) cow brown

It could be argued, then, that the alleged ‘concept combinatorics’ illustrated in (1) is in fact a word combinatorics and requires grammar. Evidence is required for positing the same combinatorial process in the absence of the lexemes that we here see, their grammaticalization, and their referential use. What would be the advantage, then, in humans, of positing such a ‘mental’ combinatorics, when the lexemic one suffices, and if on the ‘mental’ level the exact same distinctions would have to be re-stated? No matter how open we are towards the idea that non-human species can think, it is (i) not lexemes they combine, and (ii) there is little or no evidence for either grammar or compositionality.10 Even in humans, concepts in the sense of lexemes do not in fact themselves combine with others – i.e. directly. Rather we see them appearing as PoS, which (outside of the NP-internal structures depicted in (1)-(2) above) are in turn first combined with a grammatical ‘edge’ created by a functional morpheme, as in (3), unlike in (4), where no such functional material intervenes in lexical combination:

(3) [The man] [walks [a dog]]

(4) [man [walk [dog]]]

10 Suzuki et al. (2016) have recently claimed the ‘first unambiguous experimental evidence for compositional syntax in a non-human vocal system’ in Japanese great tits (Parus minor). But the evidence concerns composite behaviour, not compositional meaning, and involves no evidence for headedness, an inherent aspect of any word combination in humans. As for Arnold and Zuberbühler’s (2008) evidence for ‘meaningful combinatorial signals’ in primates (Putty-nosed monkeys), it involves no compositionality insofar as the meaning of individual calls is not preserved, as the authors note. Schlenker et al. (2016) show that the formal tools of modern semantics allow giving an alternative compositional semantics of the same data. If so, these tools cannot distinguish between monkey and human meaning, the latter intentional, intensional and declarative inherently, the former inherently action-related and premised by specific constellations involving threats and arousal. My thanks to Joana Rossello for discussions on this issue.
Grammar thus appears as the specific glue between human concepts that makes them combine productively.

As stressed earlier, none of this means that there is no meaning pre-linguistically.\textsuperscript{11} In particular, content words in the human lexicon such as MAN, EDIBLE, WARM, etc. can be used to classify perceptual data as falling into abstract stimulus-classes. In this sense they correspond to perceptual categories. Members of these categories statistically exhibit certain perceptual features (e.g. HAIRY, BIPEDAL in the case of MAN), and they form hierarchical relations, giving rise to a semantic field or network. I will here assume that these categories are either associatively learned from patterns of stimuli occurrences and rewards, or they are innate categories, including foundational abstractions such as ANIMATE, NUMBER, AGENT, OBJECT, INTENTION, CAUSE, etc. (Gallistel 2009). The latter are rich and profoundly abstract in content, in part relational (e.g. CAUSE), not specific to humans, and they structure the experienced world before reward-driven learning starts, laying the foundation for a particular type of experience as such. But they differ from lexemes (like the words \textit{seven}, \textit{intend}, or \textit{cause}), which are not stimulus-determined in the way that percepts are and structure our thinking independently of what we perceive at the moments when these thoughts occur. Although words are given to us and we are bound to use them with the meanings they have, the sentences containing them are something that we choose to configure on a given occasion, and we are accountable for this, unlike in the case of percepts. Any object that we think about, we can also think about under different lexemes, or not at all. Sentences can be false, and we use them being sensitive to that. False perceptions exist, but differ from false assertions.

In short, non-human species have brains that can compute, represent, and perceptually classify, but lexical concepts are no more required for this than reference is. Neither is speech (or sign), on which lexemes depend in humans. Even if lexemes existed in a non-human species, this would only give us content of one particular kind: the kind of content through which stimuli fall into particular classes. Moreover, combining these with a generic and formal operation such as the Merge operation of current Minimalism (Chomsky 1995, 2007) would not as such contribute any \textit{additional} meaning. So Merge as such plus the lexical content in question will not give us the distinctive kind of content that sentences as opposed to words carry (grammatical meaning), unless we were to add an additional and independent principle. We could add semantic

\textsuperscript{11} Nor that at one stage of language evolution, a ‘proto-syntax’ might not have existed dispensing with the kind of ‘shell’-structure seen in (3), which embeds phrases in functional layers (see Jackendoff 2002; Progovac 2015; on ‘syntactic fossils’).
compositionality in particular, defined so as to yield propositional meaning from lexical content of the MAN, EDIBLE, WARM type. But this would presuppose propositionality, since the compositional mapping depends on a function defined so as to yield the propositions in question from lexemic input (Davidson 2005). Designating some lexical items (i.e. verbs) as functions and defining them as mappings from objects to the propositional meanings in question is circular. No ontology of objects of reference is even expected to arise in this fashion, as lexemes only have general meaning and even compounding, as in HOUSE BOAT, only ever yields another general concept. In short, grammar as an independent principle behind human-specific forms of meaning is required. If we helped ourselves to another type of lexical item, namely function words such as the, and define a suitable compositional meaning for these as well, then such items already express grammatical functions – they do not correspond to perceptual classifications.

In sum, grammar and the kind of meaning it encodes cannot come from the lexicon or from pre-linguistic cognition, if these systems lack lexicalization; but also not from lexicalization, since lexicalization without grammar does not add up to referential and propositional meaning. If these pre-linguistic systems did contribute this different type of meaning, on the other hand, then they would already master something that we de facto only see occurring with language (and grammar). The material cultural records of non-sapiens hominins (Tattersall 2008) however do not suggest that these species could think the same thoughts and had concepts as we express in language. ‘Thought’ is a species-specific category. It varies as species do (Penn et al. 2008), even within the genus Homo, and more certainly beyond it.

If a new type of content or thought arose with language, pre-linguistic thought systems would not be able to ‘read’ this kind of content, just as vision cannot read propositional information, though some top-down influences also exist. If an interface between pre-linguistic thought and language (Chomsky 1995) is posited, therefore, the prediction would be that structures built linguistically would arrive at the semantic interface, which the systems on the other side of this interface could not use – it would be like a strange and foreign code. To the extent that the intrusion of language into the hominin brain changes what thoughts it can think, language design cannot then to that extent be rationalized as a way of meeting ‘conditions’ imposed externally at some interface by extra-linguistic semantic systems (Chomsky 1995). Hence either the grammaticalization of meaning (in the present sense, i.e. the fact that meaning becomes structured grammatically) makes no difference to what meaning or content is available to a mind, in which case notions of interfacing thought systems plus a notion of a meaningless syntax will suffice. But then we have no
explanation for how propositional meaning arises, which non-linguistic species do not possess, if we understand that to be the kind of meaning expressed in sentences. Or grammaticalization does make such a difference. Then there is a kind of meaning that only arises with and within grammatical structures – grammar is *transformative* for what kinds of meaning there are. In that case there will of course be interfaces with non-linguistic perception, learning, and affect, but extra-linguistic thought systems will neither externally condition nor ‘read’ the deliverances of this new type of cognition.

An independent mental world of concepts in humans that are not lexemes does not only seem unnecessary and redundant, but it is unclear what its neural correlates could be. Binder et al. (2009) set out to identify the ‘semantic system’ in the brain that underlies our understanding of word meaning. Results were based on a meta-analysis of 125 studies investigating verbal semantic processing based on a stimulus presentation in meaningful words as opposed to externally and stimulus-driven processing of percepts deprived of conceptual, word-based meaning (e.g. pronounceable pseudo-words). Results indicated an extensive and widely distributed network in the brain minimally overlapping with the complementary perceptual/external one. Together, these two make up much of the human cortex. Where would non-verbal mental concepts be, equivalent to word meanings yet different from them in being language-independent?

Turken and Dronkers (2011), comparing Binder’s network to their own auditory ‘language comprehension network’ based on a functional connectivity profile of the left posterior middle temporal region, find both networks ‘largely consistent’. Binder et al. (2009) further consider their network ‘strikingly similar’ to the default mode network in the conscious resting state (Raichle et al. 2001), suggesting that the brain’s default mode (prior to an interruption through external task demands) could itself be highly linguistic in nature, involving the ongoing retrieval of conceptual knowledge. Both this default network and Ferstl et al.’s (2008) ‘language comprehension network’ in turn comprise classical ‘theory of mind’ regions. Neuroanatomical and functional investigations of language in the brain have moved beyond the localizationist flavor of early neurological models based on lesion studies, revealing a widely distributed neuronal network held together by a complex set of white matter tracts connecting structurally and functionally remote brain regions as required for sensory-motor and conceptual integration (Price 2000; Vassal et al. 2016; Duffau et al. 2014). Language processing also implicates both hemispheres (Mohr et al. 1994) and cortical-subcortical loops critical to its functioning (Lieberman 2007). Why posit a network of non-linguistic concepts or thoughts, if a sensory-motor system implicating grammar and a conceptual-lexemic one (semantic memory) sufficed for the functional thought system that we see in humans?
2.4 Language as triangulation

This, of course, depends on our view of what language is and encompasses. Only then can we tell whether an extra system is required. To start with, language is an integrative system. In every utterance we ever make, multiple neurocognitive domains are involved and integrated in a unified and coherent fashion, such as memory, executive function, perception, attention, meaning and affect. Also involved is selfhood, since people producing utterances act as persons not robots, and more specifically as first-person referents for themselves. Even where the grammatical 1st Person is not explicit in overt speech, utterances entail the knowledge ‘I say/think that…’, which is to say that speech contents and acts are subordinated to a self as identified in the 1st Person. Persons who experience what they say as ‘he says/thinks that…’ would have a disturbance of the self, corresponding to a symptom of schizophrenia: the delusion that one’s thinking is carried out by someone else (Schneider 1959; Crow 2010; see further Section 3.2). Acts of reference marking a given referent grammatically as 3rd or non-Person (‘he’, ‘the man’, ‘it’, ‘the world’), too, make reference to Person implicitly, as any such act is enacted by a 1st Person for a 2nd, with 3rd Person singled out as neither 1st nor 2nd. Moreover, who is being referenced by ‘John’ or ‘the table’ depends on who is uttering it and identifying himself in the 1st Person while doing so. When Bill said ‘John left the table’, he may be taken to have referred to a person known to him and the interlocutor as ‘John’, as well as to an event of leaving a particular proximal table known to both, anchored in time as something that took place and was completed prior to the point of speech. As a result of that, the utterance is true or false, and true only if the relevant person and event both exist and stand in the grammatical relations to the 1st Person and the hearer that are grammatically specified.

Person specifications thus act as a system with all three grammatical Persons co-present in the form of a ‘triangulation’ as depicted in Figure 1: A 1st-Person self, connecting to a 2nd Person via the baseline of speech, puts forward a thought in language about the world viewed as independent of both speech agents. Note that the meaning of ‘1st Person’ is crucially not that of ‘the speaker’, in the sense that ‘I say...’ and ‘The speaker says...’ have different meanings, even if I am the speaker. In the second case, ‘The speaker’ can refer to me, but it need not (any speaker could be referenced), while in the first case, it must. Thought taking place outside of this triangulation, if it deserves the name, is different in nature, and can have different baselines.

12 See also Davidson (1982, 1997), who on the other hand does not relate this triangulation to distinctions of grammatical Person, which are crucial here.
That reference is grammaticalized in humans as stated earlier can now be seen to follow from the necessary involvement of grammatical Person specifications in acts of reference alone. Note further that grammatical Tense has no meaning outside of the actual speech events in which it is specified, anymore than Person does. An inherent aspect of the triangulation, therefore, is speech. Interpreting Tense requires witnessing the speech act, as and when it takes place, since grammatical Tense encodes a relation between the event that the speech act is about and the time of the act. Since specifying values for both Person and Tense is a grammatical requirement on the well-formedness of any sentence, and they both interact with core dimensions of grammar such as structural Case, grammar is inherently integrated with speech. Without fixating temporal reference and Person, no thought content can be fully determined either. Thought content, too, therefore, depends on speech, which is not an accidental and fortuitous extra appended to an otherwise already functional thought system.

2.5 The unfolding of the triangulation

In neurotypical humans, communicative acts exhibiting reference in this triangular sense first shows up cross-culturally when infants start to spontaneously produce declarative pointing gestures from around 10 months of age (Cartmill et al. 2012; Butterworth 2003), such as an index-finger point to an object accompanied by exchange of eye gaze with a 2nd Person whose attention the infant draws to the object and shares. Such intentional acts of gestural communication
are often characterized as non- or pre-verbal (Tomasello 2008; Csibra and Gergely 2009). However, infants starting to behave in this fashion are not only genetically linguistic but, in comprehension, infants’ vocabulary is well underway by this time. Even in production, their gestures are often accompanied by either babbling or the first one-word utterances, e.g. ‘dog’ when pointing to the respective animal, and their gestures are prone to elicit verbal responses from their caretakers. The size of children’s vocabulary and the number of different kinds of objects pointed to at the babbling stage moreover correlate (Iverson and Goldin-Meadow 2005).

The co-presence of words in declarative gestures suggests that the objects that the child points at are identified as being of a particular kind, i.e. as falling under a certain description or general concept as captured by the word uttered. In fact, infants point more when the adult’s response is informative about the object, rather than merely consisting in sharing attention to it (Kovács et al. 2014). The concept of joint attention (JA) as such does not capture this predicational dimension of the pointing act, which appears more related to language. In comprehension, too, there is evidence that one year olds understand declarative referential acts involving deictic words together with a symbolic description, and to be appreciated in this way, the deictic and the descriptive elements not only have to occur concurrently but also to originate from the same source (person), in a single integrated referential act (Gliga and Csibra 2009). In sum, general concepts lexicalized as words are in place when reference begins, and they are predicatively combined with the declarative gestures (Cartmill et al. 2014; Cartmill et al. 2012; Goldin-Meadow and Butcher 2003), forming integrated units involving both reference and description in different modalities.13

Studies have also revealed longitudinal correlations between different types of declarative co-speech gestures and later forms of grammatical complexity in infant speech. Children first produce words combined with pointing gestures that ‘reinforce’ the gesture – for example, pointing at a dog and saying dog – and only later produce words that ‘supplement’ the information contained in the gesture – for example, pointing at a dog and saying eat. The individual onset of reinforced co-speech-gestures predicts the individual onset of determiner phrases in speech, while supplemented co-speech-gestures predict the individual onset of sentences in speech (Iverson and Goldin-Meadow 2005; Cartmill et al. 2014; Özacaliskan and Goldin-Meadow 2009; Goldin-Meadow and Butcher 2003). As noted, verbally ‘reinforced’ gestures already exhibit the format of a

13 Reference remains bimodal even in its fully grammaticalized form: noun phrases like ‘that man’ cannot be felicitously produced in their non-anaphoric uses without an accompanying co-speech gesture.
proto-grammatical configuration, since we can clearly distinguish the pointing gesture itself, as the referential part of the communicative act, from the word uttered, the predicative part (the concept applied to the object referred to). This is the same duality that we later see mono-modally in determiner phrases (DPs), where we see an ‘edge’ regulating the reference and an ‘interior’ where a lexical-descriptive content is located:

\[(5) \quad \text{[DP a/the [NP DOG]]} \]

\[ \text{edge} \quad \text{interior} \]

In short, a language-specific triangulation is falling into place by the time reference starts. In fact, its earliest manifestations are seen long before the first referential gestures are produced or understood. Auditory learning starts in utero, and sensitivity to phonological properties of the ambient language is not only reflected in the newborn’s perceptions and preferences, but their very first natural vocalizations: even crying is an aspect of language development (Mampe et al. 2009). Newborns also exhibit a preference for listening to speech as compared with complex non-speech analogues that control for critical spectral and temporal parameters of speech (Vouloumanos and Werker 2007). Attention is preferentially ‘tuned’ to language, ensuring that from the beginning language is there to structure the infant’s learning and social interaction, drawing its attention to the communicator long before its visual capacities mature.

It is not merely that very young infants like speech more than other complex sounds, but that from very early on they are sensitive to intrinsic properties of the kind of system that language is and the meaning it carries. 6-month old infants, even when they do not understand anything that is said, have an abstract understanding of the fact that in such speech (but not non-speech, e.g. coughing), information is communicated about an object, and hence involves reference (Vouloumanos et al. 2014). In another study, 4-month olds were demonstrated to have referential expectations for speech but not backwards speech, even when they fail to understand the conceptual content of either of these (Marno et al. 2015). In this way the deictic space involving a baseline of language connecting two persons and a referential content is being set up from the day humans are born. There is no time when humans only ‘think’ and then eventually they also have language; or when they have ‘social cognition’ but no ‘linguistic cognition’.

Finally, reference as first manifested in (declarative) pointing and as correlated with grammar is also absent in non-grammatical beings. This has been widely argued to be true of chimpanzees, who understand gaze and head
movement, following an experimenter’s line of sight even when it projects outside their perceptual field, but do not point declaratively or understand declarative pointing as human infants spontaneously do (Butterworth 2003; Tomasello 2008; Tempelmann et al. 2013). Animal communication in the wild can exhibit forms of functional reference, but as noted with crucial differences to human reference. An animal alarm call does not seem to involve meaning in the sense of a predicative concept providing generalizable information about the referent as an instance of a kind: it has a functional meaning consisting in a course of action to be taken in a predatory incident witnessed by the caller. Moreover, it is not lexicalized in the same way as words are, which combine with others and can be retrieved independently of stereotyped stimulus contexts causally triggering their use (Fitch 2005: 205, 212; Bickerton 2009: 44–47, 68–69; Cheney and Seyfarth 1990; Deacon 2006). While communicative gestures in the great apes are more clearly intentional and flexible, they are neither combinatorial nor triadic, intensional, or discrete, regulating social interaction but failing to convey shared referential and predicative content of the type that even first words in humans exhibit (Tomasello 2008).

2.6 The grammaticalization of reference in humans

In the ‘edge’ of the referential template in (5), material without substantive lexical content is added to the NP. This material functions so as to regulate the way in which the content expressed by the NP is used to refer: the phrase ‘the dog’ can (occurring as part of an utterance) function referentially in a way that DOG as such, i.e. as a mere lexeme or general concept or category, cannot. Without creation of an edge, then, lexemes cannot function referentially or implement referential distinctions: non-grammaticalized, DOG as such cannot distinguish between a dog I saw, this dog, the dog I met, some dogs, dogs in general, dogs that I like, dog as mass (as in ‘I ate dog’), or dog as a species. Reference in this sense, although it depends on a lexicon, thus falls on the grammatical side and is technically a grammatical concept, which we cannot locate in any non-linguistic ‘conceptual-intentional systems’. As noted, languages differ in the morpho-lexical resources with which they implement such referential distinctions. But the more the possible forms of reference are indeed grammatical in nature, the less we would expect that the same lexical resources need to be available in order for the same grammatical functions to be carried out.

Grammar is not only required for reference in the present sense, but grammar never seems to function so as to do anything else. Nothing but making a given lexical concept referential in some way can happen in the grammatical
process. This process has reached its outer limits when a truth-evaluable structure has arisen and a sentence is uttered functioning as a speech act with illocutionary force. In (6), the gradual ‘grammaticalization’ of the lexical concept dog is depicted:

(6) a. I had (some) dog (cf. I had beef)
   b. I like dogs
   c. I want to be a dog
   d. I saw (some) dogs
   e. I once had a dog
   f. I saw the dog (again)
   g. I like this dog
   h. I like him (*dog)

In (6a) we see the lexical concept DOG becoming an argument with a possibly empty determiner/edge and the only possible interpretation ‘I had (some amount of) dog-meat’. Then, with plural Number specified, we see its denotation individualized, though reference is still generic, namely to all instances of the kind ‘dog’ (b). Then reference is to an arbitrary instance of a property (being a dog) (c); then to some particular instances referred to with an existential commitment (d); then to a specific such instance (e); an instance that has been mentioned before using the strong determiner ‘the’ (f); and finally, to a dog present in the speech context proximal to the speaker and pointed out with a deictic gesture (g, h). In each of these types of noun phrases, nothing other ever happens than that the same lexical concept is made to function referentially in one of a number of grammatically possible ways, with an increase in referential strength as we move from the most lexically mediated or descriptive form of reference to the most grammatically mediated or deictic forms.

Specifically, as the edge expands – from an edge that is necessarily lexically zero to one that has a referentially weak, indefinite determiner, to one with an obligatory ‘strong’ and definite determiner, to one with a deictic determiner or pronoun that can occur without the lexical restriction, and finally to a deictic pronoun that must occur without such a restriction – we see reference getting more specific, and stronger, i.e. less dependent on a lexical description or predicate.\textsuperscript{14} In the middle range of this hierarchy (i.e. c-e), the NP-restriction

\textsuperscript{14} Sheehan and Hinzen (2011) incorporate proper names into this hierarchy through an adaptation of the Longobardian idea that in rigid reference, the NP itself occupies the edge position (see Longobardi 1994, 2005). The weak/strong distinction along the hierarchy in (6) is related to
providing descriptive content is first still necessarily satisfied for the act of reference to succeed: If I utter (c), for example, then the use of the lexical description ‘dog’ is essential to what I say; if I utter (f), on the other hand, and whatever I refer to turns out not to be a dog, reference can still have succeeded (Donnellan 1966): it is only a presupposition that is violated, and the definite description can be used referentially without the description being satisfied. Demonstratives can already occur without a description altogether, and deictic pronouns must so occur. Reference thus becomes less lexical and more grammatical as we go along this hierarchy. Speaking of a hierarchy of reference is justified insofar as reference first is inherently predicative and cannot be individually specific, then can be specific but cannot yet be definite, then becomes definite and eventually deictic, until finally no predicative or descriptive component is left.

This account depicts grammar as a device of extended deixis, which expands the deictic possibilities of the index finger as used by one-year olds to the whole spectrum of humanly possible forms of object reference, beyond which there appear to be no other such forms. By creating a nominal edge and making it stronger/expanding it, a given lexical concept is embedded in deictic space. As we go beyond the nominal phrase, we first extend deictic embedding in space to embedding in time, which happens as verbs are added to nouns and objects become part of events with a temporal location specified relationally with respect to the time of speech through Tense. Finally, the events become part of propositions, which now can engender forms of reference that correspond to expressions being true or false. The essential divisions in a grammatical derivation, therefore, as depicted in (7), correspond to a set of transitions from one formal ontology of meaning to another, each of which inherently contains the previous one as a part (8):

(7) [Clauses [Tense/Verb phrase [Noun Phrase]]]

(8) [Proposition [Event [Object]]]

Grammar in this way sets up a framework for thought. There is no thought of the human-specific kind without a formal ontology of this sort. What we refer to and think about is always specified for its formal ontological status: whether it is an

15 As Donnellan put it: ‘the speaker presupposes of some particular someone or something that he or it fits the description’ (Donnellan 1966: 288).
object, event, proposition, etc. One way of re-stating the un-Cartesian hypothesis is thus that there is no such formal ontology in thought other than the one we see arising empirically as grammatical complexity is built in acts of reference on an occasion of language use. Grammar not only provides for a framework in which thought can take place, but it also exhausts the space of possible thought, which does not have an ontology other than or additional to the one we see correlating with grammar. Since the limit of grammar is the configuration in which a truth value can be assigned, and beyond this there is no known additional formal ontology, the limit of grammar is also the contingent limit of thought.16

Fixing reference, then, is what the grammatical process converges towards, making use of predication; it is also the distinctive meaning that goes with grammatical organization, i.e. the content of grammar. But reference is not ultimately fixed in phrases, either. It also depends on grammatical relations.17 Thus in (9), and (10), the exact same phrases are present in (a)-(d), respectively, yet their referentiality differs in each case, playing the role of sentential predicate in (a) and being necessarily low-scope in (b), while being referentially specific in (c) when the same phrase is the grammatical subject of an episodic matrix verb, and becoming quantificational when the same phrase is in the scope of a generic operator:

(9)  a. I am [a man]
    b. Jenny would like to be [a man]
    c. [a man] entered the room
    d. [a man] always does the dishes

(10) a. I am [the man]
    b. Jenny would like to be [the man]18
    c. [the man] I saw this morning had a hat
    d. [the man] always does the dishes

Since the same referential possibilities transpire with ‘a man’ and ‘the man’ depending on the grammatical relations involved and these differences are systematic, the cause cannot be a lexical ambiguity in ‘a’ and ‘the’. Rather, it is grammar that contributes the meaning changes in question. Hinzen et al.

16 This aspect of the un-Cartesian hypothesis is a strongly Wittgensteinian theme that is especially developed in Hinzen and Sheehan (2013: Chapter 9).
17 These crucially include structural case as argued in Hinzen (2014b).
18 Said, for example, by a casting agent distributing roles in a play.
(2014) argue that the same conclusion follows for other core semantic phenomena such as intensionality, which is configurational as well, occurring when and only when a clause appears in the right grammatical relations. These alone determine whether a given clause is interpreted intensionally (with respect to a mental state) or extensionally (with regards to the world). In the same direction, Sheehan and Hinzen (2011) argue based on cross-linguistic facts that factivity, too, i.e. the interpretation of a clause as referring to a fact presupposed by the speaker to exist, has an inherent grammar, aligning with configurational rather than non-grammatical facts. On this model, the possible forms of reference available in the clausal case form a hierarchy as well, paralleling the nominal hierarchy in ranging from indefinite forms of reference (thought contents expressed by clauses subordinated under fully intensional verbs such as ‘believe’), to definites (fact-referring clauses creating reference presuppositions), and finally rigid ones (truth value-denoting matrix clauses).

If so, with grammar and the layers of complexity it inherently generates, a formal ontology of meaning falls into place that spans the space of possible thought and reference. It remains to specify one last instance of this, namely reference to objects that are also persons.

2.8 Language and person

The opening shot of modern philosophy was Descartes’ insightful classical dictum (11):

(11) *Cogito ergo sum* (I think, therefore I am)

Crucially, he could not have made the same point saying (12):

(12) *Cogitat ergo est* (He thinks, therefore he is)

In fact, he could not have said that even of God, since as Descartes reasoned, everything other than our own thinking is less certain for us than it, including God’s thinking. So the grammatical 1st Person is crucial, and in discussions of personhood in philosophy it has been ever since. Consciousness is often virtually identified with 1st Person thought (Chalmers 1996). The relevant concept of Person, however, is clearly here not the *lexical* one, which is related to a perceptual difference, in humans, between humans, who we perceive as persons, and (most) non-humans, who we do not so perceive (unless they are talking and personified, as in cartoon strips). The lexical concept PERSON is in
this respect like ANIMATE: a foundational abstraction structuring human experience. As such it has no relationship to the grammatical notion of 1st Person, which is the one relevant to the distinction invoked in discussions of personhood and consciousness since Descartes. The un-Cartesian proposal is that the use of the 1st Person in this second sense is not merely a contingent feature of external linguistic expression but essential to the phenomenon of consciousness and human-specific selfhood itself (Martin and Hinzen 2014; Hinzen and Schroeder 2015). In short, the grammatical distinction in question is a cognitive distinction, which in turn is critical to selfhood. Only objects that we refer to using grammatical Person distinctions are persons and exhibit normal selfhood in a neurotypical, sapiens-specific sense. It’s not that we first are persons, and then either language comes along or not. Rather, whether it does and how it is used matters to whether we are persons in the same sense. Note that both ASD and SZ precisely are characterized as selfhood disturbances (see Section 3).

This strong claim could be challenged on a number of grounds, for example by specifying the meaning of the word ‘I’ without circularly re-using the notion of 1st Person. To my knowledge, however, such attempts have not only not been made but a large literature centering on the notion of ‘essential indexicality’ (Perry 2000) indicates why such attempts are bound to fail. ‘I’, even when uttered by Tom himself, never means the same as ‘Tom’, ‘the speaker’, ‘this body’, etc., even if these are used by Tom himself. That none of these forms of reference can substitute for ‘I’ without a change in meaning was classically observed by Kaplan (1977), who looking into a mirror may notice (13) while (at least for a moment) failing to notice (14):

(13) This guy’s pants are on fire

(14) My pants are on fire

Crucially, there is self-reference here in both cases, which therefore is clearly not the point. The point is that we need self-reference in the right grammatical Person: the shift in Person from (13) to (14) indexes a cognitive distinction and an epistemological difference. This is how the point has not been analyzed, however, to my knowledge, due to the Cartesian view that the observation just made simply concerns the contingent way in which the relevant mode of self-reference happens to be expressed in language. Yet an analysis of the alleged non-linguistic ‘thought’ process that would not invoke the grammatical distinction in question would be hard to give. This result is expected given that ‘I’ invokes more grammatical complexity (specifically, deixis and the grammatical Person system) and less lexical descriptive content than any 3rd Person form of
reference.\textsuperscript{19} It is therefore unexpected that 1st Person forms should be replaceable by the 3rd Person ones, without a change in meaning. ‘He’ in particular involves a specification of Gender and ‘this man’ uttered by myself specifies me as being a man. ‘This body’ merely specifies a physical object, reference to which does not equate to 1st Person thought, as the case of pronoun confusion in ASD illustrates (see below). There is thus no escape from the 1st Person when the relevant epistemological distinction is to be made. That reference to oneself as ‘I’ involves no description and is minimally lexical and maximally grammatical in this sense also explains the traditional epistemological observation that such reference is immune to error: There can be no error, when no description is involved that can be wrong.

There is a rationale for essential indexicality, then, which is grammar. Grammar is not only required for 3rd Person reference to objects, but for personal reference as well; and forms of the latter are ‘essential’ because there is a grammatical difference between personal and non-personal forms of reference, which correlates with a difference in the grammatical meaning and complexity involved.

\textbf{2.9 Section summary}

Acts of reference in humans depend on units of referentiality integrating a referential edge with a lexico-conceptual interior. As grammar builds complexity, these units become parts of others, with grammatical relations established between them that provide a \textit{formal ontology} for thought. Core phenomena of semantics, namely referentiality, deixis, formal ontological distinctions, intensionality, and factivity, \textit{co-vary} with grammar: they are \textit{configurational}. The core cognitive function of grammar is the conversion of lexically contentful but referentially inert general lexical concepts into expressions that are referential in a number of grammatically possible ways, on an occasion of their use. A three-fold grammatical Person distinction involved in all acts of reference makes this referential space specifically triangular. Once a human-specific deictic space is spanned in this fashion, there is arguably no need, room or evidence for an independent thought system in humans. This hypothesis opens a research program which draws its motivation from a variety of sources:

\textsuperscript{19} As shown in Martin and Hinzen (2014), the morphological complexity of the Romance object clitics mirrors this increased grammatical complexity.
Evidence for the configurational nature of reference in a human-specific sense, including all forms of reference from generic to personal;

The apparent absence of any of these forms of reference in species lacking grammar;

The fact that all concepts in humans (where they are lexicalized) function referentially (when they are grammaticalized) and none do in non-linguistic species (where they are not lexicalized);

The intensionality that the relevant type of thought exhibits in addition to its intentionality, and the absence of a system other than language that provides appropriate structures for contents of this kind.

The developmental co-presence of a language-mediated form of thought from the day humans are born.

Disturbances of reference in disorders of thought under conditions of genetic variation within our species, to which we turn now.

3 Two disturbances in the human cognitive type

3.1 Autism Spectrum Conditions (ASD)

3.1.1 Symptoms of ASD and their relation to language

ASD is a neurodevelopmental disorder involving a fundamental change in how neurotypical individuals communicate, socially interact, and behave. Rather than leading to a generalized cognitive impairment or mental retardation, however, it involves a shift in ‘cognitive style’ or the balance between our normal cognitive functions. This shift can feature exceptionally enhanced lower-level perceptual abilities, hypersensitivity, focus on local detail or parts of objects at the expense of wholes, difficulties with generalization and abstraction, and lack of sensitivity to the context in which perceptions occur (Happé and Frith 2006; Mottron et al. 2006). Related to this autistic perceptual endophenotype is a characteristic insistence on sameness, as classically noted by Kanner (1943):

‘A situation, a performance, a sentence is not regarded as complete if it is not made up of exactly the same elements that were present at the time the child was first confronted with it. If the slightest ingredient is altered or removed, the total situation is no longer the same and therefore is not accepted as such’ (Kanner 1943: 246).

In other words, the child does not generalize across situations, disregarding perceptual differences that in typical development (TD) would not compromise
sameness relative to a particular description (e.g. something being a breakfast, a car, or greeting, etc., even though different foods are eaten, the car looks differently, or a different sentence is uttered as a greeting or to a different person). As Fay and Schuler (1980) insightfully captured this phenomenon:

‘If there is one pervasive theme in the study of the language of childhood autism it is the permanence of the initial learning situation. How can speech be brought into line with adult models if the only associations are first associations that are tenaciously stored and recycled as if they were cast in concrete?’ [pp. 77–78, Italics as in original].

In Fay and Schuler’s terms, language comes to denote, but not connote, with words used more rigidly as proper names in context-specific ways. The resulting more ‘perceptual’ cognitive style can be paired with profound impairments in forms of cognition that are intrinsically social in a way that a particular sensory modality such as vision cannot as such be. This includes frequent problems with eye contact, gaze following, joint attention (JA) and shared intentionality. As noted, language is inherently a form of social cognition as well. Remarkably, however, language is rarely mentioned in this connection in the autism literature, where difficulties with communication and social interaction are standardly not regarded as linguistic difficulties but as causing these where they exist (e.g., Boucher 2012). Language, however, as argued here, mediates sociality of a particular type, and it is this very type that appears relevant to autism symptomatology. Language crosses between individual minds, while still conveying the potentially different contents of each of these. While the thought contents are individual ones, their truth is independent of the minds in which they occur. Language thus both mediates and transcends belief. It transforms cognition by providing a layer of information processing not dependent on perception, yet inherently integrated with it, enabling a new form of learning from communication as well.

Any lexical item of the substantive lexicon used in such communication, moreover, has general meaning. A parent calling something a toy refers to it as an instance of a kind. Drastic perceptual differences between toys become irrelevant when the issue is whether they are toys. With regards to that description, they will count as the same, no matter whether the toy of the initial learning situation was yellow or not. Language cannot, therefore, be processed without the abstraction from perceptual and contextual detail that creates such characteristic difficulties in ASD. This concerns events no less than objects and persons, since events, too, like a dog’s chasing a cat, can be made up of very different-looking and sounding dogs, cats, and chasings, while they nonetheless all fall under the linguistic description dog chasing cat (de Villiers 2014). At the same time, although words transcend perceptual context and content, any
linguistic utterance, despite involving general concepts, is always contextual too, in that no sentence can be fully understood without also grasping the speaker’s intention and knowing the situation in which the sentence is uttered. The sentence *Peter sent me a kiss* means nothing in isolation: Who are *Peter* and *me*? What does it mean to send a kiss? What kind of kiss? When was it sent? Why is this relevant?

If language has (i) reference as integrated with description, (ii) generality and also contextuality, (iii) it is inherently social and shared, and (iv) it is an ingredient in virtually any human social interaction, it is natural to expect that disturbances in the unfolding of this capacity can have profound consequences for a child’s apprehension of the world and cognitive development at large, in other words that language can be a causal factor. It makes sense in particular that a more perceptual, context-confined, rigid, and non-social cognitive style may result. Language should be a prime focus in theories of autism for this reason, quite apart from its practical significance as a prime reason for initial referrals and its role in predicting long-term outcomes in affected children (Rutter 1970).

### 3.1.2 Theories of ASD

Language had been such a focus until the 1980s, where language impairment was an inherent part of ASD diagnostic criteria. This ceased to be the case with the recognition that language levels can differ widely across the spectrum, with many children, teenagers and adults coming out as ‘language-normal’ according to standardized clinical measures and lacking a history of language delay. Since autism symptomatology without language impairment cannot be due to language impairment, non-linguistic cognitive deficits have to be invoked. But autism symptomatology lies by definition in the domains of communication and social interaction. Therefore, it logically follows that deficits in these domains in this case must concern communication and social interaction in *non-linguistic senses* of these terms. But while language might indeed dissociate from communication and social interaction – a global aphasic could communicate a lot using gestures and drawing, apart from socially interacting normally, while a psychopath or mass murderer could be deviant in communication and social interaction yet be linguistically normal – it does not appear that, in the case of ASD, the communication problems are mainly or only in the non-linguistic domains. On the contrary, people with ASD find various ways to communicate, though they are not always the ones we expect from linguistic beings; and idiosyncratic and socially inappropriate behaviours can have
communicative functions (Brady and Keen 2016). If problems of communicative and social interaction do involve problems in the social use of language, however, then such individuals can be ‘language-normal’ only if we define ‘language’ so as to exclude its communicative and social use from this definition, which is circular.

Be that as it may, none of the major current theoretical approaches give language a central cognitive role for understanding the neurocognition of ASD. Instead, these approaches can be grouped as revolving around hypothesizing deficits in one or more of three broad neurocognitive domains:

(A) Social cognition in a non-linguistic sense, particularly including mentalizing/mind-reading (‘theory of mind’, ToM: Baron-Cohen et al. 1985; Frith 2001) and joint attention (JA; Mundy 2016) deficits;

(B) Perceptual processing (‘weak central coherence’, WCC: Frith 2003; Happé and Frith 2006; enhanced discrimination paired with reduced generalization: Plaisted 2001; ‘enhanced perceptual processing’: Mottron et al. 2006);


According to the classical ToM hypothesis, people with ASD have difficulties in representing the mental states (beliefs, desires, etc.) of other people. WCC posits a processing bias resulting in failure to extract global form/meaning from perceptual inputs. EF is an umbrella term intended to denote a range of higher-order cognitive abilities necessary for flexible and adaptive action in the service of novel goals, including such abilities as planning, decision making, working memory, cognitive flexibility, set-shifting, impulse control and inhibition. As things stand, (A) to (C) have long histories by now and their respective virtues and problems have been widely discussed. What has not been discussed widely is their possible connections with language functioning. Such connections can be fruitfully explored for (B), since generality and abstraction are essential to the meaning of language and the information conveyed therein as noted: this is an elephant uttered by a parent in the zoo means that any animal looking like the one pointed at is an elephant. The question Do you want that dinosaur? could ask whether the child desires a particular kind of dinosaur. The command Don’t grab the food like that! asks to refrain from a specific action just undertaken, but also an infinity of other actions falling under the same general description. At the same time, reference in language can be to specific objects viewed as wholes, using descriptions identifying their natures and conditions of identity (e.g. car, not set of spinning wheels). For possible connections between language and components of executive functioning, see e.g. Akbar et al. (2013), Boucher and Mayes (2011), Paul et al. (2008). Here, however, I would like to focus on (A).
Language as present socially from birth and before not only establishes a social bond and selectively guides attention, but when developed, it is also one of our primary tools to figure out what people are thinking. Our conclusions on what they think cannot be separated from our understanding of what they say, and we use reasoning encoded verbally to generate hypotheses about what goes on in their minds. Does he think I lie? Might she want to come with me? Does she like me? Does he mean me? Language in this way takes us beyond what we could extract perceptually from facial expressions or behaviours, also serving as a corrective measure for perceptual inferences by counterbalancing them with verbal reasoning. Using language in these ways is not an optional extra, moreover, but language used in other ways (e.g. for behaviour regulation, as it primarily is in low-functioning ASD: Maljaars et al. 2011), is a clinical phenomenon.

(Explicit) mind-reading, moreover, is defined as a meta-representational ability, where one propositional representation (e.g. ‘I lie’) is embedded in another (e.g. ‘he thinks I lie’). This ability mirrors the process of subordination that is an inherent aspect of the grammatical process, in which phrases get embedded in others, first intra-clusally and then inter-clusally, giving rise to different grammatical meanings as a result. Sentences with clausal complementation of verbs ipso facto feature meta-representational content, since they encode thoughts about thoughts (or representations of these, as in reporting what someone said). With grammatical Person distinctions thrown in, the result is a meta-representational tool that not only covers one’s own first-personal mental states but also those of others, including what we think they might think from their own first-personal perspective. ToM, by contrast, does not as such entail either propositionality or a threefold Person distinction. Where the meta-representation that it necessarily involves would come from, if not from language, is also unclear. As a psychological construct, ToM remains described by its broad function and formally unspecified in terms of the generative mechanisms it is based on. How exactly does ‘representing the mental states of others’ work? Describing the lexical and grammatical structure and function of a sentence like *He thinks I am lying* would address this exact question.

In line with this perspective, language and ToM have long been shown to be developmentally linked, in both preschool TD children (de Villiers 2007), older children with ASD (Lind and Bowler 2009), and deaf children (de Villiers and de Villiers 2012). Training studies (in TD: Hale and Tager-Flusberg 2003; Lohmann and Tomasello 2003) as well as longitudinal studies (in TD: Astington and Jenkins 1999; de Villiers and Pyers 2002); and ASD (Tager-Flusberg and Joseph 2005) moreover provide some evidence that language may influence false-belief reasoning rather than vice-versa. A prime suspect for the linguistic component
that has the relevant impact on mentalizing has been clausal complementation (de Villiers and Pyers 2002; Paynter and Peterson 2010; Tager-Flusberg 2000; Tager-Flusberg and Joseph 2005; Lind and Bowler 2009). One could also point to a lexical difficulty in ASD with processing mental state verbs, i.e. that these ‘children do not understand linguistic terms referring to thinking, pretending, etc.’ (Baron-Cohen 1989: 586). Understanding such terms however appears to be closely linked to understanding how they grammatically function, namely by taking an embedded clausal complement describing the content of the thinking, pretending, etc.

A now widely accepted distinction, furthermore, is that between ‘explicit’ and ‘implicit’ mindreading. The former is slow-developing, cognitively demanding, and most importantly for our purposes here, verbal. It is the kind that ‘allows us to deliberate about mental states and to express our thoughts about mental states in words’ (Heyes and Frith 2014). Implicit mindreading, by contrast, of the type that is found already at 7 month olds, is a different and nonverbal mechanism, which operates rapidly, automatically, and efficiently, and unlike explicit mind-reading makes no demands on executive functioning abilities such as working memory and inhibitory control (Bull et al. 2008; Qureshi et al. 2010). On this two-systems account there is no single mentalizing system which is continuous across the developmental trajectory, until explicit ToM tasks are mastered. On Heyes’ (2014a, 2014b) specific view, the implicit system is no mentalizing system at all, depending instead on domain-general neurocognitive mechanisms that mediate automatic attentional orienting alone (see Butterfill and Apperly 2013, for another candidate). If so, there is only one true mentalizing system and it is verbal. In contrast to earlier nativist theories of mind-reading, moreover, which attributed mind reading to a genetically inherited, evolved and specialized mechanism, its acquisition may be due to a process of cultural learning in which language tuition plays a critical role (Heyes and Frith 2014). We ‘learn about the mind through conversation about the mind’, which teaches children ‘mental state concepts – what it is to “think” or to “feel” something, to be “happy” or “doubtful” – and gives them a format in which to represent these concepts’ (ibid.). Clausal embedding provides a crucial format in which such teaching and learning takes place.

In sum, while it is arguable that an underlying disturbance in language functioning is consistent with central aspects of all three main neurocognitive deficits posited in current theories of ASD, a promising and more specific hypothesis is that language mediates a species-specific form of reference based on general, lexicalized concepts used predicatively; and that without this mechanism properly developing at different levels of grammatical complexity, thought and experience will deviate in the autistic direction making mind-
reading more difficult in particular. This makes predictions for what kind of linguistic anomalies we should find in the autism spectrum: they should concern language as the mechanism as which it is described here, designed to convert lexicalized concepts into referential acts straddling different levels at which language serves to make sense of the world.

### 3.1.3 What studies of language in ASD to date reveal

It has often been noted that language difficulties in ASD do not merely involve delay but also deviance, i.e. an atypical *course* of acquisition: language is *construed* differently by children who face these difficulties (Eigsti et al. 2007; Boucher 2012). According to recent estimates, a sizable 25–30% of children on the spectrum never develop an idea of language at all (Norrelgen et al. 2015; Bal et al. 2016; Tager-Flusberg and Kasari 2013). Even in high-functioning autism (HFA), where there has been no language delay or where language has reached normal levels by school age, language can remain affected when measured at the level of discourse, pragmatics, and higher-order semantics. Thus children with HFA without any language impairment as measured by standardized tests can show such impairment in a story generation task (Norbury et al. 2014; Banney et al. 2015). Even in people with a diagnosis of Asperger’s, language can be abnormal behaviorally in prosody, volume, pragmatics, rate, and comprehension (Noterdaeme et al. 2010) and be processed differently in the brain (Radulescu et al. 2013; Moseley et al. 2016). The same even applies to ‘optimal outcome’ cases of adults no longer meeting diagnostic criteria for ASD (Suh et al. 2014). Boucher (2012) identifies an ‘ASD-typical’ language profile holding *across* the spectrum as emerging:

> ‘across group studies of the least affected to the most affected school-age children and adults with ASD, with mainly quantitative differences in the degree to which any facet of language is affected’.

The very existence of such a general profile makes it doubtful that this profile would be caused by co-morbidities present only in a subgroup. In particular, while the canonical linguistic profiles of ASD children with lower verbal abilities and of SLI children can overlap in preschoolers at some level of description, they come to diverge by school age (Geurts and Embrechts 2008). By this time, initial phonological and syntactic difficulties shared between the groups appear to give rise to the higher-order semantic and pragmatic difficulties more prominent in the ASD group. More impairment in receptive than expressive language in the same group is also atypical of SLI. A study of 120 children with ASD by Jarrold
et al. (1997) also found no evidence of different language profiles in any diagnostic subgroup on the autism spectrum. Eigsti et al. (2007), too, in a study of 16 children with ASD matched on lexical level and non-verbal mental age with children with developmental delays and typical development, found an even distribution of grammatical impairment across the ASD group. This impairment, unlike non-verbal IQ, also correlated with a cognitive measure, namely reference to non-present objects or events. There was no impairment in lexical competence, in line with other evidence that higher order receptive and expressive language is more impaired than single word vocabulary (Tager-Flusberg and Joseph 2003).

What then is the ‘ASD-typical’ language profile as stabilizing by school-age? Boucher (2012) identifies it as:

(i) Affecting receptive language more than expressive language, with productive syntax unimpaired, although the use of words and phrases can be idiosyncratic;
(ii) Articulation is largely preserved;
(iii) Morphemic anomalies present early can persist into adulthood;
(iv) Relatively normal performance on vocabulary tests, but higher-order semantic processing of words in context is anomalous.

Crucially, however, the terms used in this profiling are technical. It turns out that ‘syntax’ is here used to largely capture putting words in the right order, where the present approach predicts no difficulties. The term ‘morphemic anomalies’ is used to capture the use of ‘truncations, omissions, or substitutions especially of “closed class” words such as conjunctions, articles, or pronouns’ (Boucher 2012: 224). These are the hallmark of grammar on standard linguistic theory and the present approach centrally predicts difficulties here. They are critical to grammatical meaning involving deixis and Person in particular. As for ‘semantic processing’, this is affected primarily in higher-order domains, transpiring in the meaningful use of language at a grammatical level. Overall, this profile points in interesting directions with regards to the present proposal and it is certainly consistent with the idea of a disturbance in a language-mediated form of thought across ASD. In the remainder of this section I will try to make this point linguistically more specific, focusing on the notion of reference.

Among the earliest language disturbances identified by Kanner were echo-lalic language (immediate or delayed), stereotyped or idiosyncratic language, language used as stimulans, neologisms, pronoun reversals, etc. (Kanner 1943, 1946). All of these are descriptively disorders in how language is normally used, namely referentially, using descriptions and Person distinctions appropriate for a hearer to identify the referent. Descriptively, the choice of a neologism, deviant
use of grammatical Person distinctions, use of language as stimulation or as a way of taking turns communicatively without saying anything, all disturb this process of reference as mediated by grammar in different ways. Related to this, Bartolucci et al. (1980) documented different but consistent patterns in the use of grammatical functors (inflectional morphemes) in ASD, which they interpreted as indicating a deficit in Person and time deixis, thereby highlighting deficits in the higher (definite/deictic/personal) ranges of the hierarchy of forms of reference described in Section II above. By now, experimental findings about disturbances in the grammatical Person system have also been replicated in several studies. Very recently, Shield et al. (2015) found that native signing children with ASD prefer to self-refer via their name-sign in a picture-identification task, where pictures depict either the experimenter or the child. In American Sign Language (ASL), personal pronouns are indexical pointings to self or other. They therefore clearly pick out their intended referents. If the cause of well-known difficulties with pronouns in spoken language in ASD was merely pragmatic, they should therefore disappear here. Moreover, there was no general pointing impairment, and the experimenter’s question (‘Who is this?’) contained an indexical point to the picture, thus modeling the very form that the answer should contain. Name-signs moreover are costlier to produce and less used than proper names in spoken languages in direct address. Despite this, the name-sign, a grammatically 3P form, was preferred, consistent with a pattern found earlier in hearing children with ASD in Jordan (1989), Lee and Hobson (1994) and Mizuno et al. (2011). The overall production of pointing signs was also strongly correlated with the level of ASL comprehension, as would be predicted from their intrinsically linguistic nature.

In a recent corpus study, Dascalu (2014) further investigated the different types and distribution of all occurring non-standard forms of self-reference in two French autistic children aged 4 and 5, respectively. These forms included (i) the use of ‘il’ (he) for ‘je’ (I), (ii) ‘tu’ (you) for ‘je’, (iii) own proper name, (iv) ‘il’ plus own name, (v) own name plus ‘il’, and (vi) null form (dropped subject). Of these, overwhelmingly, both children overused (i), i.e. ‘il’ (3P) for ‘je’. Crucially, the reverse – replacement of expected 2P or 3P forms of reference by the 1P pronoun ‘je’ – was not found (though it may be expected in cases of echolalia). This, together with the data from the naming studies above, documents an asymmetric Person shift away from 1P to non-1P forms of self-reference, with a preference for 3P- or non-personal forms. Crucially, on the other hand, self-reference as such is not affected: The child saying You want milk intending to self-refer is not confused over who wants milk. The difficulty lies with grammatical Person, not with reference or communication as such, in a non-grammatical or purely semantic sense. The significance of a reference deficit centered on 1P is
further supported by (i) significant impairments in autobiographical narrative (which is 1P; Brezis 2015); (ii) better understanding of 3P rather than 1P false-beliefs (Williams and Happé 2009); (iii) use of 1P clitics as a distinguishing mark between an ASD and SLI cohort, who otherwise had very similar grammatical profiles (Durrleman and Delage 2016); and relative more difficulty with 1P perspective taking than 3P (Mizuno et al. 2011).

In their pronoun study, Lee and Hobson (1994) asked: Could the anomalous use of personal pronouns reflect not just linguistic competence but also the psychological experience of selfhood? The formulation is consistent with an un-Cartesian stance, which invites the thought that a disturbance in the grammatical Person system as reflected in personal pronouns is a disturbance of selfhood, precisely insofar as 1P forms of self-reference are essential to such human-specific forms of selfhood (Hinzen and Schroeder 2015).

While it is logically possible that disturbances affecting personal pronoun use is caused by a non-linguistic disturbance of selfhood, it transpires that pronoun misuse is the tip of an iceberg of problems with linguistic reference in general, however. Modyanova (2009) found, in a procedure where children with ASD had to act-out ‘now turtle touches a/another/the/that apple’ after another animal, Fishy, ‘had touched an apple’, that performance on ‘a’ and ‘another’ caused no problems for children with ASD, while acting out ‘the’ and ‘that’, which requires touching the same apple, did: the children were at chance. In no subgroup on the autism spectrum was performance on ‘that’ worse than on ‘the’, as a pragmatic account would have predicted. Difficulties with anaphoric definite noun phrases and pronouns have been highlighted in several studies of narrative in ASD (Baltaxe and D’Angiola 1996; Banney et al. 2015; Norbury, Gemmell and Paul 2013).

Disturbances of Person thus transpire in the context of a more general difference affecting 3P forms of reference as well, and primarily ones that are ‘high’ on the referential hierarchy. In line with this, long-standing data show that declarative pointing as such is impaired in ASD. Children with ASD use such pointing less than TD children or it takes anomalous forms (Goodhart and Baron-Cohen 1993; Camaioni et al. 2003). Hobson et al. (2010) found that the autistic children in their study could easily point, but only in this group were there participants who misused the deictic expressions ‘this’ and ‘here’ to refer to a location that was distal to themselves, or made atypical points with unusual precision, lining-up with an eye. Participants with autism were also less accurate in comprehending deictic terms, and ostensive referential signals. Hobson and Meyer (2005) in turn found that in a task where children had to communicate where on the body a sticker had to be placed, the autistic ones succeeded in the communicative task, yet never pointed to a place on their own body, as TD
children did. As noted, while pointing is often classed as a ‘non-verbal’ communicative behaviour (Tomasello 2008), it is highly correlated with language development and arguably the first appearance of a form of reference inherently linked to language development in humans. Communication for purposes of behavior regulation and social interaction, by contrast, is not so linked. Maljaars et al. (2011) in a study of 26 children with verbal low-functioning ASD, found that these children communicated overwhelmingly for behaviour regulation purposes rather than social interaction or JA; nonverbal children with ASD did so to an even higher degree. It does not seem implausible to suggest that contrary to what current diagnostic criteria suggest, children with ASD do not have a communication problem as such: their problem is in a human-specific form of communication, namely language. In line with this, Balboni et al. (2015) report that it is largely speech-related skills, not social interaction as such, which distinguished a group of low-functioning preschoolers from a matched group with neurodevelopmental disorders.

Several studies also found a predictive relationship between JA and development of language production in ASD (Mundy et al. 1990; Drew et al. 2007), suggesting that JA and language skills are developmentally linked. While declarative pointing and language use requires JA, the reverse is not the case: JA could be present together with imperative communication only, and attention as such, whether joint or not, does not entail any capacity for declarative reference. It would be difficult, therefore, to see our referential capacity as grounded in our JA capacity.20 Since newborns are exposed to language from birth, on the other hand, and have a preferential bias for speech over non-speech, and parental speech guides the baby’s attention even when visual skills are barely developed, it may be promising to regard language as providing a foundation on which JA skills in humans are built from the beginning, predicting deficits in JA when language does not fall into place normally.

Supporting this line of argument is evidence for basic disturbances in speech perception in ASD, which could have resounding effects for what contents are learned from communication in speech and the establishment of the deictic frame. Alterations in speech perception (Alcantara et al. 2004) and the preference of speech over non-speech (Klin 1991) have been documented and neurophysiological methods have revealed a ‘profoundly different stimulus-processing manner in autism’ partially specific to speech sound analysis (Kujala et al. 2013), which predicts subsequent effects on the processing of grammar and meaning, and hence learning and understanding. Speech (or sign), the vehicle of linguistic communication, which preferentially captures

20 I owe this observation to Joana Rossello.
newborn infants’ attention from birth (Vouloumanos and Waxman 2014), does not attract autistic children as much. Typically developing 6-month-old infants grasp the abstract role of speech in communication before having knowledge of words (Vouloumanos et al. 2014), which enhances their development, whether of language or thinking. By contrast, even siblings at high risk for ASD at 12 months do not pay the same attention to speech as typically developing children (Vouloumanos and Curtin 2014). Deficits of prosody are also common (Peppé et al. 2007).

Using positron emission tomography, Boddaert et al. (2004) reported underactivation of Wernicke’s area in children with ASD listening to speech during rest, as compared with a matched group of non-autistic mentally retarded children. In a striking novel research paradigm, Eyler et al. (2012) found deficient left hemisphere response to speech sounds and abnormally right-lateralized temporal cortex response to language in a large sample of sleeping 1-year olds later diagnosed with ASD, demonstrating that abnormal language processing is part of the ASD signature long before it can be formally diagnosed by standard means. In adults with HFA, Just et al. (2004) using functional magnetic resonance imaging reported atypical activation and connectivity patterns in language processing, with the left inferior frontal gyrus (Broca’s area) underactivated and left superior temporal areas (Wernicke’s) overactivated (see also Verly et al. 2014; Moseley et al. 2016). Stigler et al.’s (2011) meta-analysis interprets this pattern as indicating over-reliance on the meanings of individual words rather than the meanings formed during grammatical processing. The same authors note evidence for an unusual use of visual imagery in the processing of linguistic meaning (see also Mills et al. 2013). Mizuno et al. (2011) specifically reported anomalies in the processing of personal pronouns in adults with HFA, involving the functional collaboration of frontal (right anterior insula) and posterior (precuneus) nodes.

In sum, although extant empirical research on language patterns in ASD has for the most part not been driven by specific hypotheses on how language should matter to the neurocognition of autism, and language impairment is widely regarded as secondary to a primary impairment in social interaction, available findings are highly interpretable in terms of deviant language development failing to allow normal cognitive and social development.

3.1.4 Section summary

Language delays, unusual language use and absence of language in ASD have left little doubt that language is a key piece in the autism puzzle. But while a whole
range of reference anomalies in autistic speech have been found at the more grammatical end of the referential hierarchy discussed here, they have largely not been described in linguistic terms or regarded as primary. Against an independently motivated conception of language as mediating reference and yielding propositional forms of meaning embedded in a triangular deictic frame, the language anomalies found speak to a theory of ASD to which language would be basic. Of particular significance in this regard is an asymmetric Person shift from the grammatical 1P to non-1P, which may yield new and more objective insights into what has been described as a ‘selfhood’ disturbance. Moreover, a language capacity that does not properly develop will deprive us of the power of one of our prime mind-reading tools; but also of an adaptive combinatorial flexibility that makes action guided by thought rather than stimulation and frees us from restrictions to contexts and interests. With language being intrinsically shared and social, moreover, the lack of this tool will diminish an essential social bond that in typical development unfolds from birth and before.

In the final section of this paper I will make a case for a related conclusion in the case of the schizophrenia spectrum. It is worth recalling in this regard that SZ in fact was considered as the same disorder as autism for much of the twentieth century, with autism as its childhood-onset version (for current evidence and views on their interconnection see Ellis et al. 2016; Chisholm et al. 2015).

3.2 Language in schizophrenia (SZ)

3.2.1 The symptoms of SZ in their relation to language

Three so-called ‘positive’ symptoms are diagnostically essential for SZ according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) (American Psychiatric Association 2013: 295.90):

(i) Hallucinations
(ii) Delusions
(iii) Formal thought disorder (FTD)

Of these, FTD is clinically a virtual synonym for ‘disorganized speech’ (speech that lacks coherence and is hard to follow), and language is thus written into its clinical presentation. That said, on a closer look, the other two symptoms crucially involve linguistic dimensions as well. Thus while it is well known that hallucinations neither need to be auditory nor verbal in SZ, auditory verbal hallucinations (AVHs) are clinically particularly prominent.
Already Bleuler (1911: 79–84) noted that elementary auditory hallucinations (e.g. hearing shooting or the wind blowing) were relatively rare. If they occur they were often interpreted as involving reference to the patient (e.g., the shooting occurs to rescue him), hence they really represent what are now termed referential delusions (‘the shooting occurs because of me’). Crucially, reference is nothing we can strictly speaking hear, and as we have argued here, it is a linguistic category inherently. Bleuler further notes, consistent with a recent large study (Baethge et al. 2005), that the most common auditory hallucinations are those of language: ‘music is rarely heard’. He also notes that many hallucinators ‘cannot tell whether they hear the voices or whether they only have to think them; they are “lively thoughts”, which are nonetheless still called voices by the patients themselves; then again they are “loud thoughts”, “toneless voices” (...)’ (Bleuler 1911: 90). What cuts across these phenomenological differences is precisely that language is perceived (whether or not sound is), in the sense that the thoughts in question have a linguistic articulation, come with a content that is given by this articulation, and that such thoughts/voices often appear as acts of linguistic communication to the recipient (even though the communicative situation is highly unusual). In short, AVHs are clinically central to SZ, and purely descriptively they involve a false perception of speech.

As for delusions, these occur formally as assertions, which a patient holds on to despite their often obvious falsehood, e.g. ‘The Mafia wants to kill me.’, ‘I am the Emperor of Antarctica’, ‘I have a power plant in my stomach’, or ‘I am Jesus’. These delusions couldn’t be the ones they are if they were not internally linguistically articulated in the way they are, containing the lexical concepts and grammatical relations that they do. Prior to delusions, delusional mood can occur, as when patients report that ‘Everything looks unreal’ or ‘Everything seems already set up for you like in a theatre’ (Fuchs 2005). These are distinguishable from delusions proper in terms of their linguistic form (neither of the two examples just given could clinically be classed as delusions proper, based on their form). Even for delusional moods a loosening of conceptualization (e.g. people are seen as if on a stage) is required rather than merely one of visual perception (‘theatre’ is not a purely visual concept). Disturbances in salience attribution (Kapur 2003) or lower-level perceptual deficits (Uhlhaas and Mishara 2007) occur and are linked to delusions, yet cannot mean that for a delusion to fully arise and to be identifiable as such, it does not have to take a linguistically articulated, specific propositional form – a perception as such could not be a delusion.

Based on this we can now further note that it is certainly not the words that are anomalous in delusional utterances (i.e. kill, the, Mafia, etc.). Rather, what is
anomalous is how the words are put together, i.e. their grammatical combinations and the meaning resulting from this (i.e. what events are referenced and which people are said to do what). Such utterances are linguistically normal only if we consider grammatical combination as having nothing to do with the meaning inherently resulting from such combinations. Consistent with this approach, sentences used in delusional utterances are not only unusual, but they do not actually mean anymore what they do when uttered in mental health. There the utterance ‘I am Jesus’ e.g. could easily be made, but it would have a metaphorical or ironic use, or if not, it might be the assertion of an actor who points to himself as acting on a screen. When uttered as a delusion, on the other hand, this sentence ceases to have any of these meanings. Rather, the patient is confused about which 3P form of reference (in this case, ‘Jesus’) identifies himself as picked out in 1P – a confusion in deictic anchoring: ‘and a unique failure of the constraints on the use of 1P mentioned in Section 2.8. In fact, we don’t know any more who the patient is referring to: himself or Jesus – a distortion of the deictic space. Similarly, in mental health, the assertion that ‘I have a power plant in my stomach’ could only be metaphorical; and if ‘The Mafia is trying to kill me’ is not a delusion, then the speaker is referencing an event in context conceivably describable as ‘trying to kill’ someone and as providing indirect evidence for such an assumption. In the delusional case, no such event can be identified as being appropriately referenced, and no police investigation is triggered. Moreover, while in mental health any such utterance can be negated, questioned, or embedded (e.g. ‘I sometimes think I am Jesus’), embedding necessarily deprives a proposition of its delusional status. Delusions are therefore necessarily unembedded utterances; and what cannot be embedded cannot be questioned, potentially explaining the status of delusions as unquestionable truths (Hinzen et al. 2016b).

In sum, while in delusions grammatical sentences are generated that have propositional meanings and normal uses in mental health, these come to lack such meanings and uses when they occur clinically. In this way, while language is as absent from diagnostic criteria in the case of SZ as in that of ASD today, it is virtually written into all the positive symptoms of SZ. It is relevant to negative symptomatology as well, as clinical terms such as alogia (poverty of speech) or poverty of content suggest. Hinzen and Rossello (2015) therefore propose a re-description of positive symptomatology as given in Figure 2. While FTD is primarily a disorder at the level of speech production, AVHs reflect anomalous speech perception, and delusions represent a disorder at the level of content.

A different question is how language as a neurocognitive variable could explain symptoms and hence contribute to a neurocognitive theory of SZ as well. To this we turn next.
3.2.2 Language and neurocognitive theories of SZ

People with SZ often exhibit a broad range of neurocognitive deficits, in such domains as attention, executive functioning, memory, language, social cognition, processing speed, and perception (Reichenberg 2010). Moreover, as Reichenberg notes, ‘any specific neuropsychological deficit in schizophrenia occurs in the context of a background of a very severe general intellectual impairment’, making specific deficits difficult to isolate. Strikingly, on the other hand, a significant proportion of patients with SZ have a normal neuropsychological test profile. Reichenberg et al. (2009) compared neuropsychological functioning across SZ and schizoaffective disorders and found the prevalence of normal test performance to range between 16% and 45% in SZ. All four diagnostic groups in this study (SZ, schizoaffective, bipolar, and major depressive) moreover had comparable neuropsychological profiles, with differences largely quantitative, making it difficult to associate such profiles with SZ-specific symptoms. There is also an explanatory problem: How or why should deficits in any of the above specific neurocognitive domains or else a general intellectual deficit give rise to ‘reality distortion’ symptoms such as hallucinations and delusions?

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**Figure 2:** The three positive symptoms as a breakdown of the linguistic frame of thought (Hinzen and Rossello 2015). Human language organizes speech perception, production, and content into a co-dependent triangle. As the baseline of speech between the speaker and hearer breaks, symptoms result, which differ depending on which corner of the triangle is most affected.
Where evidence for a specific neuropsychological deficit has been found in SZ, their empirical association with reality distortion symptoms has in fact been tenuous. Thus ToM deficits have by now been widely attested in SZ and they appear disproportionate to the general level of cognitive impairment seen in SZ (Sprong et al. 2007). Moreover, it seems intuitively plausible in this case, as Frith (1992) argued, that a difficulty in ascribing mental states to other people may lead deluded patients to attribute faulty intentions to others’ actions. Some of these might thus appear as acts in which an agent (say, the TV presenter) communicates obliquely with the patient (a referential delusion); or agents may appear to have malevolent intentions towards the patient, leading to persecutory delusions. However, ToM deficits, while widely attested in SZ, have not been found to either associate with reality distortion symptoms as a whole or with delusions or hallucinations specifically.21 Doubts concerning the plausibility of the explanatory connection arise as well. Why does the patient not reject the mistaken beliefs in question? Why do they harden into delusions shielded against pervasive counterevidence? Why does the patient seem unable to appropriately evaluate what we tell him in response? How would the account extend to delusions such as ‘I am Jesus’, which are not related to perceptual events in the way that referential delusions are?

In a referential delusion, moreover, the problem is not in attributing mental contents as such: not the content of what the TV presenter says as such is misrepresented (e.g., a car accident took place), but rather how this particular thought content is embedded in the deictic space that includes the patient, who in this case happens not to be the TV presenter’s addressee (2P) or the 3P agent in the reported event that he may delusionally think he is. But as noted in Section 3.1.2, the ToM construct does not per se have anything to say about grammatical Person distinctions – as such, it is a psychological construct denoting the ability to represent mental states in others. The deictic dimension that is critical to referential delusions therefore has to be added to the ToM mechanism, in a way that was neither intended nor necessary when ToM was first applied to ASD, where the issue was ‘mind-blindness’ (Baron-Cohen 1989) rather than deictic confusion. Since language in its normal use also is a mechanism for unlocking minds, allowing us to attribute contents as well as deictically

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21 Ventura et al.’s (2013) meta-analysis (154 studies, combined N=7175) found that ‘the correlations between reality distortion and the domains of social cognition ranged from near zero to moderate’ (see also Freeman 2007; Walston et al. 2000; McKenna and Oh 2005: Table 5.5, p.122).
anchoring them, it is again not clear which benefits the postulation of this as a language-independent mechanism adds to normal language functioning.22

The obvious question, however, is why a theory hypothesizing a linguistic dysfunction affecting the thought process should fare better. The answer is, firstly, that as argued above, language dysfunction is virtually written into the core symptoms defining their clinical presentation – so they are directly relevant to them, and an explanatory relation that makes one particular neurocognitive variable relevant to a particular symptom does not have to be worked out. As argued above, this relation to language is clear for FTD and AVHs and it follows for delusions the moment that we accept that it is intrinsic to any linguistic utterance to have a specific kind of propositional content, which delusions uncontroversially lack (they are not taken to be candidates of truth by hearers, and not reasoned with as such candidates by the patients). Delusional assertions thus fail to be a problem with language, only if we do not consider such content as an inherent aspect of language. Language without such content, however, is not language in the same sense, but a clinical condition.

The linguistic theory also does not face the specific problem of explaining how a neuropsychological deficit as seen in neurological disorders would give rise to a reality distortion. Rather, it is based on the hypothesis that language is a cognitive system mediating a species-specific form of rational thought. That form necessarily includes a notion of truth associated to sentences uttered in a specific deictic frame, which perception or associative learning does not afford. With a notion of truth goes a notion of reality (and of thought as independent from it), turning language into the cognitive system that precisely and apparently uniquely generates the sense of reality that we see distorted in reality distortion. A dysfunction of language is therefore a significant candidate for entailing a reality distortion, of which hallucinations and delusions are clinical manifestations.23

22 Association with reality distortion symptoms is a problem that befalls another major theory of delusions, which appeals to probabilistic reasoning bias (‘jumping to conclusions’) (for discussion see Hinzen et al. 2016b). The ‘dysexecutive’ theory of reality distortion faces a similar problem (Dibben et al. 2008). While association of neuropsychological deficits with disorganization and negative symptoms are generally more promising, dysexecutive accounts of FTD are also far from conclusive (Dibben et al. 2008; McKenna and Oh 2005: Chapter 4).

23 While phenomenological accounts of SZ often emphasize perception of higher cognition as the primary locus of disturbance (Uhlhaas and Mishara 2007), some phenomenologists themselves, notably Merleau-Ponty (1964) in a work originally titled ‘The origin of truth’, have stressed that language is an independent cognitive principle correlating with our sense of truth, which cannot be subsumed by perception.
This account connects with the earliest conceptualization of SZ through Bleuler (1911), who identified a ‘disturbance of association’ with a characteristic ‘loosening of associations’ as being fundamental to the syndrome he defined. Association was a broad concept for Bleuler, who used the term ‘law of association’ as being essentially the same as ‘law of thought’, both of which he tested via word association experiments, i.e. linguistically (Jung 1919: 4–5). He did not, however, make the law of association formally explicit. On the un-Cartesian hypothesis, this mechanism is grammar. It is, I have suggested, the only known and formally characterized principle for systematically combining lexical concepts so as to result in propositional meanings. As noted in Section 2.4, this process integrates all cognitive abilities. A disturbance in this linguistic process could therefore implicate a disintegration of our cognitive capacities in their relation to each other, resulting in different symptoms depending on which aspect of the architecture of language in the brain is most affected.

If language, on the other hand, merely were an expressive device, then even if a thought disorder only manifested as language disorder, as FTD does clinically, this would imply nothing about its inherent relationship to language. In line with this, Titone et al. (2007: 93) express a widely accepted view when they note that ‘the thinking anomalies associated with psychotic conditions are not, fundamentally, speech or language disorders (...). Rather, when language is used in an idiosyncratic way, it represents the outcome of a deviant thought process’. But no independent evidence for this claim is here provided, and it clearly depends on a prior Cartesian conceptualization of language. An independent reason is required for endorsing the Cartesian conception, when language de facto is inherent to symptoms.

In short, at a theoretical level SZ may represent the disintegration of a faculty that, in the case of ASD, may never properly develop in the first place, as reflected in the different times of onset of the two disorders. As in the case of ASD, we will now review findings on language in SZ in the light of the account above.

3.2.3 Studies of language in SZ

Linguistic studies of language in FTD were invigorated through Chaika (1974), who suggested investigating speech production disturbances in FTD without the
prejudice of regarding these as epiphenomena of a thought disturbance, i.e. as empirical phenomena of interest to the linguist in their own right. That, however, makes a language disturbance not necessarily explanatory for what clinically is a disturbance of rational thinking. Indeed, few clinical investigations of language in SZ have proceeded based on any particular predictions for how or why language functioning would matter to this disease. An independent linguistic theory is required that connects language and thought and makes predictions for the forms of disintegration of thought that we will see when language disintegrates. Un-Cartesian linguistics is such a theory. A core disturbance in how grammar organizes meaning would, on this view, in particular predict again that reference is distinctively disturbed.

Reference however has not so far been systematically investigated from a linguistic point of view in SZ. Instead, language function has been investigated at its various levels of internal organization, using standard distinctions from linguistic theory such as syntax, semantics, and pragmatics (e.g. Covington et al. 2005), with all of these regarded as separate, while reference necessarily straddles all three of these levels. Specifically, regarding syntax as understood in a purely formal sense, the finding has been a pattern of reduced complexity and errors (Morice and Ingram 1982; Morice and McNicol 1986). But such a pattern does not appear to be specific to FTD or other symptoms of SZ; nor would it explain the disintegration of the thought process seen in FTD. Focusing on FTD, Oh et al. (2002) found sentence-level (rather than lexical) ‘semantic anomalies’ to be specific to FTD, where the notion of such a semantic anomaly corresponds to the idea that, when contemplating a single sentence only, the hearer has no idea what particular utterances mean (e.g. The pond fell in the front doorway). Other authors have set their hopes on discourse-level deficits that might explain why speech in FTD can be so hard to follow. Rochester and Martin (1979) in particular capitalized on ‘cohesive devices’ that tie sentences together, particularly emphasizing pronouns, which in FTD patients showed significantly more instances of ‘unclear reference’. This finding was replicated (Harvey 1983; Chaika and Lambe 1989), and problems with pronouns specifically have been noted more widely to characterize SZ (e.g. Frith 1992: 99; McKenna and Oh 2005: 112–114), though formal studies are scarce. Barch and Berenbaum (1996), too, highlighted ‘incompetent references’ in FTD defined as impairment in demonstrative and personal reference, i.e. reference at its deictic end.

Going beyond pronouns, Docherty et al. (2003) found ‘confused references’ and ambiguous word meanings – a problem at the level of description – to be associated with FTD, while she found other referential problems across the spectrum and even in unaffected first degree relatives (Docherty et al. 2000, 1998). Docherty et al. (1996) established six types of ‘communication
disturbances’ that distinguished a SZ group from healthy controls. All of these, it transpires, suggest a problem with referential definiteness, either at the level of abnormal vagueness (indefiniteness, i.e. insufficient descriptive specificity when such specificity is required), confused references (several candidates for what is being referenced), missing information references (proper names or definite descriptions are used without prior mention of the referent), uncertain definitional meaning including neologisms and paraphasias, and unclear meaning due to structural unclarity or formal ungrammaticality. An anomalous lack of definiteness is almost a defining property of a subtype of FTD, ‘poverty of content’ (‘empty philosophizing’), which contrasts with the incompetent use of reference at the higher end of the referential scale, where reference is definite and comes with existence presuppositions. Note also that delusions are definite virtually by definition: ‘I might be the emperor of Antarctica’ or ‘Some religious organization is trying to kill someone’ are even formally not as such delusions, though they may express delusional moods; neither is ‘Some person has a power plant in their stomach’.

It thus seems fair to say that the notion of reference – and particularly problems with referential definiteness and deixis including pronouns (which tend to be definite) – has already played a significant role in thinking about language in SZ and FTD in particular, though this was often under other labels such as ‘cohesive devices’ or ‘communication disturbances’. The substrate of such disturbances however effectively is the grammar of noun phrases under their normal referential use, some of which simply have cohesion and communication as their natural functions. It also seems likely that the referential disturbances in question do not merely represent pragmatic problems in handling these referential devices, as such problems can typically be repaired in discourse. Thus I might say to you that ‘Peter is ill’, presuming that you know who I refer to as Peter, and provide further information when the presupposition is seen to fail. Irony, metaphors and metonymies can have similar effects, temporarily derailing the discourse and making it more diverting. When I say that Peter is a butcher, and I know he is in fact a surgeon, reference is not to a butcher but to Peter, who may in some ways be similar to a butcher. Problems in figuring out reference in these cases are not deep, unlike in autism, where they can be (Happé 1995). As the referential intention of the speaker gets clear, the problem disappears. A deluded patient’s referencing her seven husbands, on the other hand, will lead to a doctor’s puzzled question who these are, when she met them, how she thinks this is legally possible, etc., and answers to such questions will typically lead nowhere. The speech, it turns out, truly has no content in the normal referential sense and the referential intentions cannot be figured out or be made sense of.
The problem of referencing in delusions and FTD is thus likely deeper than a pragmatic one and points to a more fundamental problem in the referential use of language. This problem could further connect with problems of reference inherent to AVH, where the voice hearer becomes a grammatically second person or third person of the voice’s speech, when in fact he is no such addressee or topic, and he does not himself take part in the conversation with what is effectively a disembodied speaker. To illustrate the problem for FTD, Moya (1989) transcribed clinical interviews with 46 severely thought disordered patients, of which one opens as follows:

Patient: ‘They call me the Moorish queen. Me, I go with the Moors.’

Doctor: ‘Let’s see, you go with the Moors?’

Patient: ‘Yes, of course, the ones that are in the heavens. This is the pure truth.’

Later in the conversation, after a long pause, the patient reopens the conversation uttering out of the blue: ‘The moors are miners’. Later she clarifies that they are ‘Normans’; and ‘sell umbrellas’. The same patient does not know why she is in the hospital or who brought her there; she references herself in the wrong (male) gender under the name of the saint San Francisco Javier, which she claims was her name in a previous life, while she also claims to ‘be of the Highest’ (‘soy del Altísimo’), who upon being assassinated by someone transferred his soul to (or became – it is not clear) her. Meanwhile the doctor asks who ‘they’ are who she thinks brought her here; who the Moors are; where they are; how the Highest was assassinated and by whom and when; etc. Reading through such transcripts is to witness a continuous quest for what is actually being said or intended. We don’t know who or what is being referenced under the descriptions given, while at the same time patients typically have no insight that reference is not clear. The pattern depicts language use free-floating of referential and deictic anchors – a pattern distinctively different from the avoidance and rigidity of deictic distinctions seen in ASD. In his linguistic study of such severely thought disordered speech, Moya (1989) argued that problems in reference tracking typically arise with definites, proper names, and pronouns, which is where a requirement for reference resolution primarily arises, and in time and place deixis.

While misuse of pronouns and other definite nominals reflects failures of reference at the grammatical and high end of the spectrum, the disorder can affect reference at the descriptive or lexical end as well, as in the case of paraphasias and neologisms (e.g. adjacentment in the place of wall, drown in the place of sink when referencing a boat, or un bulle when there is no such Spanish word). In paraphasias, e.g. John petitioned his friend for dinner,
referencing can be intact (the referential intent can be clear), but description is loosening; in neologisms, it can be lost; in clanging, it can be chosen only because of a sound association with a previously mentioned word. These anomalies appear to arise primarily as words are used in discourse, i.e. referentially, and not in, say, naming tasks. In other cases, normal words are chosen, but they are combined grammatically with others in illegitimate ways, e.g. *The pond fell in the front doorway* (Oh et al. 2002). Tangential answers, too (like a patient replying ‘You didn’t bring your prosthetic legs’ when asked by a doctor how he is doing), can be captured by saying that the patient’s referencing is unconstrained by what the question references. Chaika (1974) captured the phenomenon of derailment by noting that any association can determine the topic of the next sentence uttered – hence discourse is not in fact organized according to topics, but lexically-associatively. ‘Topic’ is a grammatical notion, reflecting the notion of a ‘sentence subject’ as compared with the sentence ‘predicate’ (the ‘comment’). It corresponds to what can become of a referent as it outlasts the sentence in which reference to it is made. Referents that do not make it to topics thus could reflect a dysfunction of normal reference.

Another notion that has captured the attention of researchers is that patients with FTD exhibit a ‘failure to make use of context’. This would explain why they can show a bias towards the strong or preferred meanings of a word even when the grammatical context would normally make us infer that another meaning was intended (Chapman et al. 1964). However, Chapman et al.’s finding not only failed to be consistently replicated (McKenna and Oh 2005: 105–106), but it also was not related to FTD. Later, Kuperberg et al. (1998) provided indirect evidence for a problem with context. In this latter study, patients with FTD, more so than patients without and controls, were less sensitive to the context in which a word appeared, yet here the relevant notion of context was that of the grammatical context (‘co-text’), though the study was of comprehension, while FTD clinically primarily appears to be a production problem. This finding is equivalent to a disturbance of grammatical meaning – propositional meaning resulting from the processing of words in their grammatical frames, as opposed to lexically or associatively. In line with that, Kuperberg (2010) further analyzed deficits in the comprehension of patients with SZ under the notion of a shift in the ‘dynamic balance’ between lexical-associative processing of language and grammatical meaning, with a shift towards the former. On this model there are ‘two streams of processing, one drawing upon semantic relationships within semantic memory and the other involving the use of combinatorial mechanisms to build propositional meaning’. In mental health, semantic memory and grammatical meaning interact to build rational contexts in which new utterances and perceptions take place and are interpreted. The failure of grammatical control on meaning, accompanied by (or
maybe triggering) over-activity of stored semantic word-level associations, predicts disturbances in the use of context. As argued in Hinzen (2015), grammar defines a form of meaning that is non-contextual: the utterance *She’ll fly to Paris tomorrow* means what it does, irrespective of whether the speaker is smiling while speaking or wears red shoes — a matter of context which may well determine how we react to his utterance, but not its meaning as determined by its grammar. Where grammar fails to control meaning and hence to demarcate it from context, anything can become part of linguistic meaning and everything can become context, as the content/context boundary becomes blurred: Propositionality is lost.

Overall, half a century of investigations of language in SZ leave the impression that a principled notion is missing that would relate language to symptoms, but not that data are lacking that might support such a notion. In particular, in terms of problems in linguistic meaning, the problem is not lexical but grammatical — and it concerns the meaning that grammar is hypothesized to mediate on the un-Cartesian hypothesis, and more specifically the conversion of lexical concepts into referential expressions of various types, which may then disintegrate at different points in the process giving rise to different symptoms. A direct and testable prediction of this hypothesis is that reference will disintegrate more at the higher (more grammatical) end of the referential spectrum, with pronouns more affected than lexical nouns.

### 3.2.4 Section summary

Unlike in ASD, language anomalies in SZ are essentially written into the clinical definition of core symptoms in the case of AVH and FTD. In the case of delusions, the same conclusion depends on their propositional rather than perceptual nature and exploits the notion of a change in (or absence of) the (propositional) meaning that is inherent to language in its normal use. Moreover, any explanation of ‘reality distortion’ will need to invoke a cognitive principle giving rise to a notion of reality or truth in the first place. Language, in establishing a non-associative and non-probabilistic form of meaning in a triangular shape, is a prime candidate for this cognitive principle. This is by no means to exclude potential lower-level deficits in such domains as associative learning, perception, attention, or salience processing. However, in over half a century of investigations of language in SZ, rich evidence has emerged on specific disturbances of reference, largely in the higher regions of the referential hierarchy, but of a more fundamental kind than we saw above in the case of ASD. In particular, while self-reference as such was not affected in ASD, it clearly is in delusions; moreover, in FTD reference can disintegrate at a purely
third-personal level as well, losing its deictic anchors and a content-context distinction, while in ASD the disorder appears to push in the opposite direction, towards too rigidified forms of reference that lack the flexibility of normal language use in its ordinary deictic frame.

4 Conclusions

Human beings engage in acts of reference of a kind not seen in other species, using grammar and words as an inherent aspect of their peculiar mode of thought. Evidence reviewed here suggests a dysfunction of language at the level of its referential function in both ASD and SZ (for evidence for the same conclusion in Huntington’s disease, see Hinzen et al. 2017). Critical reflection has to be devoted to the prevailing assumption that clinical language dysfunction needs to be either language-specific or else be the secondary consequence of a primary ‘cognitive’ impairment, a disturbance of ‘thought’. A focus on the core process of converting lexical concepts into grammatical and propositional forms of meaning through grammar could contribute to defining and differentiating cognitive phenotypes that exist within our species.

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Box 1: The intensionality argument

1. Thought involves descriptions, of which the speaker may not know that they apply to the relevant referent.
2. Thoughts become different thoughts with any change in these descriptions, keeping the referent constant.
3. Any mechanism generative of human thought therefore needs to generate the exact right descriptions.
4. Language is the only such mechanism known.

Box 2: One significatum and two modes of signifying: Illustrating grammatical meaning

A. “Mary smiles”
B. “Mary’s smile”
Caption: A *significatum* (what a representation is about) does not determine how we refer to it, via a Noun Phrase (NP), as in A, or via a verb phrase (VP) embedded in a sentence, as in B. This grammatical difference is not accompanied by a lexical one but entails a meaning difference: In (A) an event is being referred to with Aspect and Tense and embedded in a proposition with a truth value, while in (B) reference is to an object, with no truth value entailed.
Hinzen presents a rich and potentially far-reaching account of the constitutive role of grammar in the formation of distinctively human thought, and further ventures a connection between grammar and various pathologies of thought: if thought (in the appropriate sense) just is linguistic structure, then a pathology of the former should be a pathology of the latter. My concern will be for the theoretical moves Hinzen makes in Section 2 of the paper by way of the articulation and defence of what he calls the un-Cartesian conception of the relation between language and thought. My principal interest will be to raise some conceptual and empirical doubts about the very idea of the un-Cartesian conception.

Let a Cartesian conception of language-thought be one that identifies two distinct domains, with language serving to express or otherwise interface with an independent system of thought. Such a conception is most cleanly exhibited by the idea of a *language of thought* (LoT), which encodes propositional content as expressible in natural language, but which is supposed to be constituted independently of natural language, i.e., LoT has its own grammar and semantics (*locus classicus*, Fodor 1975). Hinzen, however, appears to intend the Cartesian conception to cover any position that distinguishes between thought and language, for the un-Cartesian conception is just one that renders humanly distinctive propositional thought as being essentially organised in terms of grammatical combinatorics defined over lexicalised concepts, i.e., ones specified via grammatical categories (noun, verb, etc.).

My first concern is that such a demarcation of the Cartesian position is somewhat too blunt, lumping together otherwise significantly distinct positions. Imagine a position – the standard position of generative linguistics, no less – that sanctions a language-thought divide or interface, but still recognises that propositional thought is largely structured by linguistic combinatorial technology. That is to say that the thought side, as it were, does not constitute a generative system of independently determinate thoughts, but rather extra-linguistic principles and procedures that serve as essential factors in the determination of full propositional
content associated with linguistic forms as tokened on an occasion. We may wrap
up such factors by calling them **pragmatics** insofar as they are extra-linguistic
factors that go to fix the content of utterances on their occasion of use. By
Hinzen’s lights, this standard generative view is Cartesian, but I really don’t see
why it should be, since it does not necessarily sanction language-independent
propositional thought. The problem here is that while, officially, Hinzen takes as
Cartesian any account that recognises a thought-language distinction to the extent
that thought is not simply a linguistic effect, what is actually being rejected is any
language-independent generative system of thought, which is, effectively, just
LoT. Yet LoT is in no sense a basic ingredient of the standard generative linguistic
conception, a point I shall return to presently.

What generates some of the opacity hereabouts is a lack of a clear char-
acterisation of both sides of the putative boundary between thought and lan-
guage. We may presume that language is lexicalised concepts plus combinatorial
syntax (including labelling, if separated from syntax proper), but it is unclear
what ‘thought’ is supposed to designate. If by ‘thought’ one means propositional
processes subject to compositional semantic valuation (truth and validity), then,
as indicated, one may reject a sharp boundary on the basis that the composi-
tional structure of thought is largely inherited from language, but still hold that
propositionality proper in the guise of semantic evaluation is only deliverable in
general via extra-linguistic processes. On such a picture, propositionality is a
post-syntactic domain, as it were, with syntax being essential to it but not
determining it. Such, at any rate, is what I take the standard generative concep-
tion to be, which is not Cartesian, at least not if a LoT model is the paradigm,
where both the structure of thought and its semantic evaluability are extra-
linguistic properties.

On this standard conception, grammar or syntax may be viewed as having
two basic interfaces relevant to meaning. Firstly, extra-linguistic concepts/infor-
mation is lexicalised, or formatted in such a way as to be amenable to syntactic
operations. Secondly, syntactic structures made up of combined lexical items
interface with interpretive systems that assign determinate contents as a func-
tion of information salient to the utterance on an occasion. This is the domain of
what I just called pragmatics. Crucially, this second interface trades in extra-
linguistic information in the sense that the linguistic structure alone is not
determinate of the thought expressed; indeed, no thought at all need be expres-
sible by a bare linguistic structure. In the target article, Hinzen does say some-
thing about the first interface, but nothing about the second, although he may
be read as simply denying the phenomenon (cp., Hinzen 2015). As it is, what
Hinzen does suggest on both counts strikes me as dubious relative to the kind of
phenomena the dual interface model as sketched is designed to accommodate.
First, then, consider the relation between extra-linguistic concepts and lexicalisation. In Section 2.3, Hinzen suggests a general division between extra-linguistic concepts. On the one hand, there are those that cover ‘abstract stimulus-classes... correspond[ing] to perceptual capacities’. Under this group falls MAN, EDIBLE, WARM, etc. On the other hand, there are ‘foundational abstractions’, such as ANIMATE, NUMBER, CAUSE, etc. Lexicalisation is effectively a means of subsuming such concepts under grammatical categories (‘parts of speech’) such that they attain an off-line life, to be freely accessed and used in combination with other lexicalised concepts, and, crucially, they acquire a referential function with characteristic intensional effects, i.e., the thought expressed is individuated precisely by the lexicalised concepts. A problem with this picture is that if we take nigh-on any lexicalised concept, including colour terms, then its content is not a stimulus-class at all. For example, let MAN, as Hinzen avers, be stereotypically associated with being hairy and bipedal, but neither feature is constitutive of the concept, as legless shaved men would readily testify. Yet lexicalisation, on Hinzen’s story, is simply a formal mechanism, so if concepts start out with wholly perceptual content, how come they shed such content when lexicalised? Being accessible independently of the exercise of perceptual capacities cannot be the answer, for there is no inconsistency in the thought that some lexical items have a perceptual content while being freely accessible. The matter concerns the content of the concepts, not what processes and operations may deploy the concept with whatever content it has. The fact is that our concepts appear to lack perceptual or stereotypical content, and lexicalisation cannot explain that fact if we take it to be defined over extant perceptual/stereotypical concepts.

The issue is pressing, of course, for not all content is shed by lexicalisation. That is, the lexicalised concept \([N \text{ man}]\), say, is not a mere variable. It picks out men, whatever they are, as opposed to trees or bananas. Similarly, for the abstract notions. If, say, we have the extra-linguistic concept NUMBER, then it is unclear why \([N/V \text{ number}]\) doesn’t simply inherit its content from the prior concept, and if it doesn’t, what on earth is the difference? In short, extra-linguistic concepts appear to have a rich content which is both independent of perceptual capacities and inherited by the lexicalised concepts. Here is another consideration that militates for this general view.

Nigh-on every lexical item (at least the open-class items) has contentful features that are syntax-insensitive, or inactive, in the sense that a difference in content does not affect their distribution, but only affects their interpretation at the level of what a speaker/hearer would understand, if anything (Grimshaw 2005; Borer 2005). From such a perspective, the class of all unergatives, say, would be linguistically synonymous. There is a difference between, say, *Bill slept*
and *Bill sneezed*, but it is not a difference to which grammar or syntax is sensitive. Similarly, lexical items appear to encode quite complex properties that affect interpretation, but which are structurally inert (Pustejovsky 1995; Chomsky 2000; Asher 2011). The item *book*, for instance, has numerous aspects that are made salient for interpretation as a function of the further items to which *book* may serve as an argument or head. The cases in (1) differ in the interpretation of *book* between concrete particular and function/purpose:

(1)  
   a. Bill burnt the book  
   b. Bill memorised the book

It is perfectly acceptable, however, to form the copredicative structure where *book* is simultaneously construed as concrete particular and content, even where the number of books is counted differently:

(2)  
   Bill memorised every book in the library then burnt them

Suppose the library contains six copies of Kant’s first *Critique*. For (2) to be true, Bill need not have memorised each copy (if the copies are the same, it is not even clear what that means), but all six copies must be consumed by flames. In short, the lexical item *book* appears to carry content pertaining to function or purpose (a book contains information to be read/memorised/etc.) and substance (a book can be a material object). This complexity, however, appears not to be underwritten by or even reflected in the grammar. There is, for example, nothing grammatically untoward about construing (1a) as pertaining to an e-book (cp., *#Bill burnt the theorem*), or construing (1b) as pertaining to a bare concrete particular with mass and dimension (cp., *#Bill memorised the elephant*). The problem with such construals is only that they are trivially false or nonsense, not that they are grammatically defective.

I think Hinzen is clearly right that lexicalisation formats extra-linguistic concepts in such a way as to make them accessible to syntactic combination, with concomitant intensional effects. What also seems to be clear, however, is that extra-linguistic concepts have a rich structure independent of both perceptual capacity and grammatical categorisation. At any rate, it is unclear where lexical content is supposed to derive from on the un-Cartesian conception, given that such content is neither perceptual nor merely grammatical, but appears, rather, to be inherited from the extant concepts sans any grammatical organisation. Of course, nothing I have said so far entails or even suggests that the extra-linguistic concepts may be combined into complex thoughts; so thought (in the operative sense) might well be a function of grammatical structure. On the other
hand, if we do have extra-linguistic concepts of the apparent richness of BOOK, then grammar has no decisive role to play in fixing the concepts available to us. What the grammar does is format concepts into items with combinatorial options. So, it might take a grammar for a speaker to use book referentially with intensional effect in the sense Hinzen intends, but what might be being referred to by such a use is just what the concept allows one to think about independent of the grammar. I’m not sure if such a position counts as Cartesian or un-Cartesian, but it is what I recognise as being the standard generative view, which is one Hinzen seeks to resist.

The second interface I mentioned above is one where combined structure relates to extra-linguistic information, principles, and procedures. There are many different kinds of phenomena that could be discussed. The general pattern, however, appears to be that linguistic structure alone radically underdetermines the thought expressed or even the thought expressible. If that is so, then grammatical organisation can’t suffice for thought, as the un-Cartesian would have it. I’ll focus on Hinzen’s particular examples pertaining to referential determinateness in his Section 2.6; first, let me marshal some familiar cases restricted to the nominal domain to exhibit the general pattern I just mentioned.

Consider:

(3) a. Every student passed the exam
    b. A red pen is on the table
    c. Sam’s love is a splendid thing
    d. Sam’s rescue impressed the onlookers
    e. Sam’s car is pink

A standard use of (3a) would be interpreted as restricted to a particular domain of students, such as the ones who took the exam, or the students of the class, faculty, university, etc. It could be used to speak of every student punkt, but such a use is not only hardly mandatory, but anomalous outside of specific and peculiar contexts. There is much dispute about quantifier domain restriction, whether, in particular, it is a syntactically licensed effect. No-one imagines, however, that any specific domain restriction is a linguistic effect. Whether a speaker is talking about the students in the class or the faculty, say, is not a matter for language alone. So, here we have a range of potential thoughts that go beyond what language determines. Still, it might be thought that (3a) does fix a thought all by itself, albeit one a speaker never has occasion to entertain. (3b) poses a problem for this weakened determination claim. Without an answer to ‘Red how?’ (3b) fixes no thought at all. A pen might be coloured red (as appropriate for a pen) or write in red, but be coloured black. A pen may also
merely look red, given the lighting, or be classified as red due to the draw it belongs in. None of this information, however, is grammatically fixed, or even licensed. All by itself, therefore, (3b) does not determine any thought at all. The same effect holds for genitive DPs as featured in (3c-d) with an interesting twist.

It will be noted that (3c) is not ambiguous with respect to the thematic role of Sam, i.e., Sam must be construed as the agent (a lover) rather than patient (a lovee). On the other hand, (3d) is thematically ambiguous with respect to Sam, which can be construed as designating either the agent or patient of the rescuing event. Here it seems as if the argument structure of the respective verbs is inherited by the deverbal nominal forms with varying flexibility as observed; that is, with (3d), an extra linguistic factor determines which thought is expressed on an occasion in a manner (3c) does not admit. Turning to (3e), however, we see no argument-structure constraints on the interpretation of Sam, for car has no argument structure. Sam’s car may be used to refer to nigh-on any car specifiable as related to Sam (the car Sam owns or cleans; the one that knocked her over or the one she dreams of, and so indefinitely). There appears to be no linguistic determination of any stable content for the DP.

The kind of observations here exemplified is by no means restricted to the nominal domain, but hold across open-class categories. The general moral, as advertised above, is that linguistic structure does not fix the domain of thought. It does not follow that thought lacks any linguistic structure. To the contrary: it is perfectly consistent to reject, say, LoT for much the same reasons as Hinzen offers— it effectively duplicates the kind of structure natural language independently offers—but still to think that language alone fails to determine thought.

The general moral applies in the particular case of reference determination of DPs (Section 2.6). Hinzen presents a scale of reference determinateness going from a bare singular dog with an obligatory mass construal, through a bare plural dogs with an obligatory generic reading, up through the introduction of various determiners marking increasing definiteness. The scheme is problematic in at least two respects for the kind of reasons already adduced.

First off, the bare plural is not obligatorily generic; it also has an existential construal. Which construal the bare plural takes depends on the predicate being either stage- or individual-level. Compare:

(4)  

a. Dogs are in the garden [= Some dogs are in the garden] 
   b. Dogs are four-legged [= Generally/normally dogs are four-legged]

It is unclear whether this difference is linguistically determined or not, but the bare plural, at any rate, appears to be linguistically invariant, at least by the mechanisms Hinzen appears to sanction (the difference can be marked,
course, via type-shifting or the employing of covert operators). Worse, the bare plural also has a feature placement use even with an individual-level predicate where, say (4b), is used to pick out the four-legged things in the scene. Again, such a use appears to carry no grammatical signature.

Moving up the putative scale, we find variance with the definite and indefinite articles. *A/the dog* has existential/unique interpretations as well as generic ones. Which is subject to extra-linguistic factors. Compare the cases in (5):

(5)  
   a. *A/the mini is black and yellow*  
   b. *A/the bee is black and yellow*

As a function of our worldly knowledge of minis and bees, we naturally read (5a) as being about some particular mini rather than minis as such, for minis are not so generally coloured; conversely for (5b), which is off-the-bat read generically given the colour patterning of bees. Of course, the cases also have the reversed construals, context and speakers’ intentions willing. The linguistic structure appears to remain invariant throughout even though the associated thoughts are quite distinct. It thus becomes opaque what thought as such either of the cases is supposed to determine independent of extra-linguistic processes.

Although Hinzen does not discuss the above kind of phenomena in the target article, he does elsewhere, if not the exact same phenomena (Hinzen 2015). There he claims that grammatically fixed meaning is complete, in the sense that pragmatic factors cannot override what the grammar alone determines; rather, pragmatics takes over, as it were, only where grammar relinquishes control. This seems correct, as all of the examples discussed above testify. The problem is that the grammatically fixed meaning does not necessarily determine any thought at all, even if it sometimes does determine thoughts that are somehow inappropriate or bizarre without pragmatic supplementation.

One might be tempted to think that the whole issue hereabouts devolves onto a niggly dispute of where to draw the line between language and the systems with which it interfaces. Yet this issue is not merely niggly, if one goes to erase the language-thought barrier in the manner the un-Cartesian intends; for if the data goes the way I suggest, both as regards the lexicon and post-syntactic pragmatics, grammar itself appears not to be in the business of determining thought, even if it does offer a ready structure for it that cannot be trumped by extra-linguistic factors.

If my reasoning is on the right lines, then thought pathologies might well implicate grammatical deficits, but might equally be sourced to extra-linguistic processes.
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Hinzen lays out the platform of un-Cartesian linguistics, and the ramifications threaten widespread beliefs about the relations between language and thought. The theoretical story is compelling but my commentary will address my concerns as a laborer in research.

A coherent account is presented by which human language makes possible lexemes, combinatorial concepts, propositional attitudes and intensional reference, and these together constitute human-like thinking. The further claim is that there is nothing either before them in ontogeny or like them in a nonlinguistic mind. Only humans with language can think in these ways. But theoretical coherence is not sufficient without empirical testability. The nature of thinking with and without grammar must be specified further. In particular, symptoms of such thinking must be identifiable without using language as the evidence.

The first issue concerns a signature of thinking with lexemes. The nature of concepts is one of the most fraught questions in the cognitive sciences. Categories exist in the world, and organisms recognize them as perceptual classes, but human concepts are not just perceptual classes (Ahn et al. 2001). How concepts develop is much debated (Mandler 2004; Carey 2011). Though infants may be able to tell one object apart from another at a very early age, and even form perceptual classes of like kinds (Quinn et al. 1993), there is a signature change at around the age of the first words. Xu and Carey (Carey and Fei 2001; Xu 2007) introduce the philosophical term sortal to capture an awakening around that time that permits infants to represent entities (ball, truck, Mama) as countable individuals, even while out of sight. That is, only at around 11 months can infants form an abstracted concept of an object that allows, among other things, the sharp separation of one entity (say a ball) from a different one (say a truck) while they come and go from behind a screen. Prior to that point it is as if infants seeing each toy register “Aha! A sortal!” without finer discrimination that would allow the computation that “there is at least a car and a ball behind the screen”. It is tempting to conclude that the change in children’s thinking at this time is a reflection of the language faculty coming on board to represent concepts that are relevant for language, namely the beginning of Hinzen’s lexemes.

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Unfortunately for this idea, monkeys can apparently pass the sortal task, thus without a language faculty (Uller et al. 1997). Does this mean that language is merely a “help” to sortal differentiation for human infants? In my view the results need re-examination. For example, might the sortal task for monkeys be too weak, given that it focuses entirely on their persistence in retrieving different foodstuffs? If monkeys are not interested in monitoring the identity and numerosity of other kinds of objects, does that not tell us something significant about the divide from human infant intelligence?

Lexemes are by definition part of human language, and there is nothing equivalent to them without language. Only a creature that could name the sortals, or be affected by their names in computing their numerosity, could be said to have lexemes. I would prefer to find a signature difference in the reasoning that human infants versus monkeys can engage in by virtue of lexemes.

Take another example. Verbs are also lexemes. Another fascinating finding about infants late in the first year is that they are starting to recognize the essential properties of actions in scenes. Gordon (2003) showed groups of infants repeated scenes of one of two nonverbal events: hugging, and giving. Then he asked if they would dishabituate to the videos when something changed: a teddybear that was in the actor’s hand. In the event of hugging, the teddybear was an accidental accompaniment, an adjunct, not part of the thematic roles. Infants did not respond to its removal. But in the giving scene, the teddybear was the object being given, so part of the thematic roles, and infants dishabituated, recognizing that it was no longer the same event. Could this prove to be another signature of infant cognition guided by developing lexemes? I predict that the effect would not occur at all with another species, though one would need to choose the events carefully to be of relevance. This could be wrong, but the theory needs such predictions.

A second issue of empirical interest is that of concept combinatorics without language. Lexemes have the essential property that they combine grammatically, as in “brown cow”, and the grammar dictates what the combination will mean. The crucial question then is whether any system other than the human language faculty can handle concept combinations, and if so, what the limit is.

Procedurally, a common procedure in cognitive science is it to ask adult participants to engage in verbal shadowing while they simultaneously engage in another form of reasoning or concept formation. Since verbal shadowing essentially ties up the language faculty, one can see if the “rest” of the human mind can do the task without it. To the extent that there are interference effects on
some kind of thinking but not others, one can infer that the thoughts require access to the language faculty (e.g. Hermer-Vazquez et al. 1999).

Dual task investigations in my lab have looked at implicit concept formation under verbal shadowing. In implicit concept formation, a participant merely watches pairs of static stimuli until one of the pair animates. Over trials, participants begin to look in anticipation at the one that will animate. An eyetracker tracks anticipatory eyegaze to investigate whether adults can acquire a rule governing the similarity across a class of events, with no explicit instruction. The target stimuli of relevance here are a class of transitive, reversible events sharing a common description such as “Dog Bump Car” (de Villiers 2014, 2016). The stimuli portrayed were all different dogs and cars, and their opposites: events of “Car Bump Dog” are not the target.

Crucially, to discover the rule linking the trials one must notice which is the agent and which is the object. Fundamental sentence structure is involved, namely the differentiation of hierarchical position of subject and object. It is usually assumed that this fundamental distinction would be established in the absence of language, then language mapped onto it. *Surface* language must entail a mapping, because languages differ in word order: SVO, OVS, SOV, etc. The question Hinzen’s work inspired me to ask was, is there anything non-linguistic at all about such concepts, or is language critically involved in this conception of event classes? In three different studies with different transitive events (de Villiers, 2014, 2016), adults who are not shadowing start looking at the targets in anticipation after three or four trials. However, adults engaged in verbal shadowing could not learn the rule after 30 trials.

The core of the theory concerns infants. The assumption in developmental linguistics is that the preparation even for sentences is being laid conceptually in the first year of life. But un-Cartesian linguistics posits that “There is no time when humans only ‘think’ and then eventually they also have language” (p. 21). Infants younger than a year have human minds, and language faculties. Is that enough to impose meaning on scenes, or does some surface grammar need to be developed?

Toddlers at 1–2 years have not yet solidified the surface forms for their language, but head direction is likely to be one of the first parameters to emerge (Wexler 1998). On the other hand, maybe the first sentences mark the point that linguistic representation for events arises, and first sentences very, very rarely take the form of reversible transitives. In fact, comprehending the way sentences refer to any of these reversible events appears to be a two-year-old achievement (de Villiers et al. 2016). The appropriate language then might not be present before age 2.
Shukla (2016) has tested infants and toddlers from 12–24 months on the “Dog Bump Car” task in an eyetracker (without shadowing!), and there is no sign that they can recognize the rule tying the events together. Of course it is necessary to prove that infants and toddlers can form implicit rules at all in this paradigm before deciding on the interpretation of the failure, and work is underway to test that they can attend successfully to more perceptually based rules. If they can, it seems plausible to conclude that the conceptual distinction between one set of transitive events and its opposite is actually only possible with the emergence of grammar. Monkeys and apes should not be able to do this even with operant training, but no one to date seems to have tried. The limited work on event recognition in the great apes suggests it is not easy.

In my lab we have pursued the question: what is unique about the concepts for which access to the language faculty is required? Jung and Hummel (2013) have suggested “relational concepts”, as have Gentner and Kurtz (2005). With the same dual task paradigm, what kind of implicit rules can adults form while shadowing? Nordmeyer (2011) demonstrated that it was easy for adults even with their language faculty tied up to recognize the difference between (extremely varied) natural kinds (stone, banana, waterfall, tree) and artifacts selected to resemble them perceptually (dime, shoe, fountain, statue). Margulis (2014) demonstrated that shadowing adults could very easily distinguish two sets of faces, each tied together only by family resemblances among their features (the Smiths versus the Joneses).

However shadowing adults fail everything that has anything remotely propositional about it. They not only fail to recognize “Dog Bump Car” versus “Car Bump Dog”, but they fail to form the class of “Not p’ versus ‘p” (Nordmeyer 2011), and they fail “black cat and white dog” versus “black dog and white cat” pairs (unpublished). Floyd (2014) demonstrated that English speakers who were not shadowing could separate out a class of telic events from their atelic counterparts quite readily, rather surprising as the linguistic marking of telicity in English is scattered and unreliable. Nonetheless, the rule was there to be recognized by at least the mature language faculty. When adults were engaged in shadowing they failed to spot the similarity across trials.

In sum, there are ways to discover whether minds are sensitive to equivalences at the level of “concept combinatorics”. We have not found one yet that can be recognized even with an implicit measure like looking time, when the language faculty is tied up. But the empirical work must be extended beyond a single procedure, and new techniques are needed.

The third comment relates to the representation of Theory of Mind. For twenty years I have argued along un-Cartesian lines that propositional attitudes are inseparable from their linguistic representations (de Villiers and de Villiers...
2000). Newton and de Villiers (2007) showed that tying up the language faculty with verbal shadowing rendered typical adults incapable of predicting the right ending for a nonverbal false belief task. We took the strong and less popular (read: hard to publish) position that this kind of thinking was inextricably linguistic, even after development.

But I have trouble with this passage (Section 2.1), “The Un-Cartesian hypothesis would explain why we never empirically find language developing without a particular mode of thought developing alongside. Even conceptually, though, it is not clear how we could find the one system without the other. Language without the relevant kind of thought expressed in it would be a parody and hence could not be language in the same sense; and thought that was not articulable in a language in some modality would not be thought of the same kind.”

My question has been the reverse: has there ever been evidence of a particular mode of thought developing without language developing alongside? Is the passage warning me against such pursuits? In Theory of Mind research, much effort has been made to devise behavioral tests for whether animals (say chimpanzees, crows) or pre-talking infants, or severely language delayed children, can reason about another’s false beliefs. None of these individuals can articulate their thoughts in any modality. The question is, if they pass the behavioral tests can it be said to be “thought of the same kind”? In our work with language-delayed deaf children, we reached the conclusion that the thought development marched alongside language development: you couldn’t pass nonverbal false belief tasks if you didn’t yet have false belief type (propositional attitude) language (Schick et al. 2007; de Villiers 2005).

But others have reached the opposite conclusion, based on experimental evidence using looking time or anticipatory gaze, that infants as young as 7 months, or at least toddlers, can reason about another’s false beliefs in the absence of any grammar (Baillargeon et al. 2010). Several attempts at compromise have been proposed, as Hinzen describes: perhaps there is a difference between implicit and explicit false belief understanding (Apperly and Butterfill 2009)? On the un-Cartesian view, it would be difficult to argue that these two forms of reasoning were connected. Or, perhaps infants are succeeding on the gaze tasks through some lesser, behavioral-type understanding that does not reach the standard of “reasoning”, that latter being only in the purview of language? One of the puzzles for me is why some of our very smart but language-delayed 8 year olds were not as clever as other researchers’ toddlers seem to be. Does this capacity die away?

There has recently been a sea-change in the view of the empirical results from the infancy research, with major questions being raised about replicability, and a collection of non-replications being amassed across many different
laboratories (Rakoczy and Kulke 2017). It is too early to tell what will come of this. Tremendous ingenuity has been employed to test the reasoning of non-verbal infants, and the prospect still exists that one can devise tests without language as the medium to test if thinking is the same. If we do not try, then the following statement becomes untestable: “There is no time when humans only have ‘social cognition’ but no ‘linguistic cognition’.” (Section 2.5)

My fourth comment is about the central claim of the paper that reference is a grammatical concept. Hinzen argues that children with autism reveal what it is for reference to go awry in development, and that persons with schizophrenia reveal its disintegration. The theory makes bold claims about both clinical disorders being centrally breakdowns of the human language system. But the empirical research to date has not focused on the kinds of questions that un-Cartesian linguistics poses.

The phenomena that are illuminated by Hinzen’s analysis of reference must generate new research investigations on children with autism, for example. But empirical issues abound here: on this account there would be little to study in that percentage (25%) of children with no language. For those higher functioning children who do have language, the focus of psycholinguistic work has increasingly been on pragmatics, as the children frequently “pass” conventional tests of vocabulary and grammar. Hinzen makes the case for re-examining grammar, reference, and intensionality using more sophisticated tests. Might we say that children with autism fail to automatically “see” the world through language? For instance, what would be revealed in children at risk for autism on the sortal and event tasks described earlier?

The case of language breakdown in schizophrenia is a tantalizing one. Language appears to have come unmoored from its normal reference. Grammar no longer controls the meaning of sentences, and hence the sentences of such a patient can be interpreted by listeners in an infinite number of ways. Fifty years ago, R.D. Laing took the language of psychotic patients as metaphoric expressions, as genuine but poetic expressions of despair at the human condition. Hinzen would say that the expressions gain that meaning from the listener, not the speaker. Humans are interpreters par excellence: parents hear entire philosophies in the single word expressions of their toddlers; psychoanalysts like Freud can find “disguised” cues to the deep roots of neurosis in patients’ dream reports; the paranoid delusions of a schizophrenic can sound like a finely woven theory, until the listener recognizes how it departs from normal narrative; religious individuals impose linguistic messages even on nature around them.

The prediction being explored is that in the language of people with schizophrenia, the difficulties will be most apparent in those areas of reference that need the most grammatical support. The biggest problem here is how to test it.
Analysis of speech can only go so far, but performance on careful tests of comprehension may be hampered by other aspects of the patient’s condition. Consider two phenomena at the very limit of my own grasp. One is indexicality, especially in how pronouns behave in embedded contexts (Roberts 2015). The second is intensionality, namely referential opacity in complements. There are well-constructed scenarios for production and comprehension that have been used to study children: if any phenomena will uncover the disintegration of reference in its most grammatically constrained form, these will.

Admittedly, my agenda for the first three points fails here: it is not clear that there is any such thing as intensionality outside of language. Hinzen may well say the same about the rest: there is also nothing like lexemes, nothing like syntactic combination, nothing like belief statements. I have suggested that we can find ways to test the conjectures of un-Cartesian linguistics wherever possible by specifying exactly how language changes forms of reasoning, and doing so will only sharpen the theory.

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Do Grammatical and Cognitive Phenotypes Illuminate Each Other? Reflections on Un-Cartesian Linguistics and the Language-ToM Interface

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1 Introduction

How language and thought interact is a hot topic of debate, and one that is refreshingly revisited by Hinzen in his paper entitled ‘Reference across pathologies: A new linguistic lens on disorders of thought’. The work is situated within the ‘un-Cartesian’ linguistics research program, which seeks to illustrate that the organizational principles of grammar directly configure human-specific thought (Hinzen 2007; Hinzen 2012; 2013; a.o.). The un-Cartesian program may at first glance seem reminiscent of other approaches arguing for an influence of language on thought, however it differs from them in important ways. In contrast to linguistic determinism, for instance, it posits “(n)o unidirectional causal arrow lead(ing) from language to thought” (Section 2.1). In contrast to Neo-Whorfianism, un-Cartesian linguistics is concerned with the underlying grammatical principles common to all languages, thus cross-linguistic variations are not expected to give rise to cognitive variations. To sum up, for Hinzen, thinking is ‘languaging’ (Section 2.1) and any human language should arise together with human concepts, such as reference and propositional meaning. In light of this, Hinzen predicts both inter- and intra-species variations: These concepts should be absent from non-linguistic primates and, crucially, also be affected in instances of grammatical impairments within humans. Grammar, under this un-Cartesian lens, now becomes clinically relevant for cognitive disorders.

In this contribution, I will focus on a particular aspect of cognition and its relation to language, namely the ability to think about the thoughts of others, also known as theory of mind (ToM). ToM has been centre-stage of much psycholinguistic research trying to shed light on the role of language in conceptual reasoning (de Villiers and de Villiers 2000; Carruthers 2002). Hinzen remarks: “As a psychological construct, ToM remains described by its broad
function and formally unspecified in terms of the generative mechanisms it is based on. How exactly does ‘representing the mental states of others’ work? Describing the lexical and grammatical structure and function of a sentence like *He thinks I am lying* would address this exact question” (Section 3.1.2). Indeed the implication seems again to be that ‘languaging’ would be required for a functional theory of mind. Much recent work, including my own (Durrleman and Franck 2015; Durrleman et al. 2016; 2017), has been inspired by this idea. There are nevertheless remaining questions and challenges for such an approach that arise in the face of intriguing findings on young neurotypical infants, primates, and children with autism, which I will briefly explore here.

### 2 Theory of mind in infants

The tests most frequently used to ensure that a metarepresentational ToM is in place are ‘false belief’ tasks such as illustrated below (Dennett 1978; Wimmer and Perner 1983). These assessments ensure that subjects are not merely reporting reality, but rather conceiving the contents of another mind (which is crucially in conflict with reality):

Maxi puts his chocolate in the kitchen cupboard and leaves the room to play. While he is away (and cannot see) his mother moves the chocolate from the cupboard to a drawer. Maxi returns. Where will he look for his chocolate, in the drawer or in the cupboard? (Wellman et al. 2001)

Typically developing children have been consistently shown to succeed in responding accurately only around the age of 3 or 4 years (Sodian 2006). It appears that for children to understand that Maxi has a different belief to theirs, one that will cause him to look for his chocolate in the empty cupboard, they must also have a certain level of linguistic sophistication. Indeed nonverbal infants and primates, although they may have some grasp of intentions, desires and fears that are part of a common knowledge (Cheney and Seyfarth 1990; Meltzoff et al. 1999), nevertheless seem to fall short of ascribing a belief in this context (Call and Tomasello 1999; Krachun et al. 2010). Crucially, a close developmental link has also been reported to emerge between children’s ToM skills and their grammatical abilities (Astington and Jenkins 1999; de Villiers and Pyers 1997; Ruffman et al. 2003). In particular, mastery of sentential complements such as ‘The boy says/thinks that the chocolate is in the cupboard’ has been argued to be the cognitive tool *par excellence* for them to accomplish belief reasoning (de Villers 1995; de Villiers and de Villiers 2000). This same finding
has also been reported for children with Autism Spectrum Disorders (Tager-Flusberg and Joseph 2005; Lind and Bowler 2009; Durrleman and Franck 2015; Durrleman et al. 2016), as well as children with other conditions affecting their linguistic development, such as Specific Language Impairment (Miller 2001; 2004; Durrleman et al. 2017) and deaf children of hearing parents (Schick et al. 2007). As would be predicted by Hinzen’s un-Cartesian approach, the grammatical ability to embed propositions which “can engender forms of reference that correspond to expressions being true or false” (Section 2.6) does seem to relate to the understanding of the content of other minds, even when this is assessed by means of experiments themselves involving minimal language (Durrleman et al. 2016; 2017; Schick et al. 2007).

However the view that these complex linguistic abilities are inextricable from such ToM reasoning has become less obvious in recent years. Ingenious experimental research has now shown that children as young as 18 months can be successful on a ToM task during which they need to apply belief-reasoning to determine the goal of an adult, and accordingly help him to achieve it (Buttelmann et al 2009). In this study, the infants observed an adult place a toy in box A which was either moved in front of the adult to box B (thus this adult had a true belief about its location), or moved in the adult’s absence (thus he had a false belief about its location). In the first instance, when the adult truly knew the box was empty and still struggled to open it, the child would help him with the task of opening an empty box. In contrast, when the adult falsely believed the box contained the toy and tried to open the empty box, the infant no longer assisted him in that specific task, and instead opted to help him to open the other box, i.e. the one containing the toy. In short, already at a stage when the relevant embedded structures for false-belief reasoning have yet to be attested in children’s speech, children were capable of imagining the

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1 Children even younger than this show what has been called ‘implicit ToM abilities’ given tendencies in their spontaneous anticipatory looking patterns during a mind-reading task (e.g. Onishi and Baillargeon 2005). However these tasks may tap into a different system to ToM tasks requiring an explicit response from the subject, as Hinzen himself points out (Section 3.1.3), given that implicit mentalizing may rather depend on domain-general neurocognitive mechanisms (Heyes 2014a, 2014b). In light of this, I focus here on explicit ToM tasks, where explicit means that the subject has to take conscious action to respond, i.e. by answering verbally (e.g. as in classic ToM tasks such as that of Wimmer and Perner (1983)), or by helping someone out (e.g. as in Buttelmann et al. 2009; Buttelmann et al. 2017). We clearly cannot argue that the only true assessment of the mentalizing system must be obtained via a verbal response if we wish to elucidate the relation between ToM and language, because an obvious criticism would be that the ToM task contains a language confound which is itself responsible for the emerging links, and thus can indicate nothing fundamental about language being implied in ToM.
propositional content of another person’s mind to determine his goal, so as to assist him to achieve it.

Now it has been claimed that infants may in fact already have grammatical competency far beyond what can be concluded based on their verbal productions, so one may well argue that this is simply how ToM tasks can be succeeded in infancy. Indeed Hinzen notes that “There is no time when humans only ‘think’ and then eventually they also have language; or when they have ‘social cognition’ but no ‘linguistic cognition’” (Section 2.5). While there is indeed work suggesting an earlier sensitivity to grammar than previously believed (see e.g. Gleitman et al. 2005; Gertner et al. 2006; Yuan and Fisher 2009; Noble et al. 2011), it remains to be empirically determined that the specific, rather complex structures often associated with false belief reasoning (i.e. complement clauses) are already in place during such early phases. Indeed adherents of the language-ToM relation previously appealed to the delay in the acquisition of these structures so as to explain why children under 3 years could not succeed at false belief tasks. It would seem to be an important research aim for those working within the un-Cartesian enterprise to show indisputably that the complex structures implied in belief attribution are in fact already in place, in order to clearly account for these findings of ToM success in such young infants. This would more clearly allow maintaining their view that there can be no dissociation between ToM and its corresponding linguistic expressions.

3 Theory of mind in primates

Possibly a more challenging feat than accounting for ToM in infants might be explaining ToM in primates. As mentioned earlier, according to un-Cartesian linguistics we would not expect primates to show successful propositional attitude ascription, required during false belief tasks, as they arguably do not only lack the ability to externalize the relevant language (as might be argued for infants), but differ from humans precisely in their lack of a language faculty. In very recent research, however, again conducted by Buttleman and colleagues (2017), a mix of chimpanzees, orang-utans and bonobos participated in the same nonverbal assessment of belief reasoning as the infants in the previous study, and these great apes reportedly also responded by unlocking the box containing the object significantly more in the false-belief condition than in the true-belief condition. Moreover, the authors ensured that this behavior could not be the result of the apes attributing a state of ‘ignorance’ to the protagonist, rather than their actually imputing a false belief, because apes were also observed to behave
differently in ignorance and false-belief conditions. Taken together, these find-
ings would appear to indicate that apes capitalized on knowledge of an experi-
menter’s false belief to decide how to help him, and thus had to represent this
somehow. It seems that Hinzen’s approach predicts this sort of belief reasoning
to be impossible without grammar, as beliefs imply propositional meaning. Can
the un-Cartesian perspective be reconciled with the current findings on apes,
who although they clearly do not have a grammatical system, nevertheless seem
to be able to successfully represent the content of other minds?

Another view is one where the grammar of complementation is a useful tool
for belief reasoning, but not the only one available under the sun. Language
provides representational resources that can be solicited to encode and reason
(Dennett 1993; Gentner 2003; Vygotsky 1934/1962), and surely language would
be privileged for this purpose by humans, given its prominence in their minds,
although other tools from our kit may also be applied for certain instances of
encoding and reasoning (Gentner and Goldin-Meadow 2003). As an analogy,
consider spatial orientation, which may also be enhanced by verbal tools (Pyers
et al. 2010), including by specific grammatical elements such as prepositional
forms (Feist and Geitner 2007), but may instead be achieved by means of visual
tools, such as maps. Similarly, ‘languaging’, as well as alternative mechanisms,
may be recruited for the task of representing and reasoning about beliefs (see
e.g. work on mental files, Perner et al. 2015), both by very young infants and
primates. The latter are surely not as sophisticated in their mind-reading abil-
ities as older humans, given that they have fewer tools in their kit to accomplish
these tasks, but some form of mind reading implying propositional meaning
seems accessible to them nonetheless. Alternatively, how can the un-Cartesian
approach of an indissociable relation between referential meaning and grammar
propose to account for this recent experimental research shedding light on an
apparent dissociation between (detectable) grammatical abilities and ToM in
both young infants and primates?

In the next section we turn to the case of cognitive disorders, with a focus
on Autism Spectrum Disorder (ASD), which is frequently associated with ToM
deficits and related cognitive and social difficulties. Presenting ASD through an
un-Cartesian lens, Hinzen comments that: “a language capacity that does not
properly develop will deprive us of the power of one of our prime mind-reading
tools” (Section 3.1.4). He develops the perspective “that without this mechanism
properly developing at different levels of grammatical complexity, thought and
experience will deviate in the autistic direction making mind-reading more
difficult in particular” (Section 3.1.2). Grammar is thus taken to play a primary
role in ToM and social anomalies commonly evident in individual with this
disorder, and as such a “focus on the core process of converting lexical
concepts into grammatical and propositional forms of meaning through grammar could contribute to defining (their) cognitive phenotype” (Section 4). We will briefly review findings that, although partially suggestive of links between grammatical and cognitive traits in ASD, nevertheless call into question a strict, un-Cartesian association between grammar and ASD symptomatology.

4 Theory of mind in autism spectrum disorder

Difficulties in ToM are often attested in children with ASD and, as mentioned above, have been linked to various aspects of their linguistic development, including certain aspects of grammar. Complement structures may be delayed in some children on the spectrum (Durrleman and Zufferey 2009, 2013), and when they are mastered they appear clearly to boost ToM task success and thus have been argued to allow even children with core difficulties in the realm of ToM to explicitly figure out the correct response to ToM tasks (Tager-Flusberg and Joseph 2005; Lind and Bowler 2009; Durrleman and Franck 2015; Durrleman et al. 2016). ToM deficits in ASD have also been related to difficulties with other grammatical elements, namely deictic pronouns. Children with ASD often misuse these pronouns, either by inverting the first and second person (Kanner 1943), replacing them with proper names, or omitting them altogether (Jordan 1989; Lee et al. 1994; Shield et al. 2015). The underlying deficits in perspective shifting associated with ASD (Baron-Cohen et al. 1985; Happé, 1995; Yirmiya et al. 1998; Naito and Nagayama 2004) have been claimed to relate to deictic pronoun difficulty, both in production (Durrleman and Delage 2016) and comprehension (Hendricks, Overweg and Hartman 2017). The reasoning is that pronouns of the 1st and 2nd person shift in meaning depending on speaker-listener roles (Lee et al. 1994; Tager-Flusberg 1994; Wechsler 2010), and thus their mastery would be inextricably intertwined with corresponding perspective shifting abilities. This view would explain why difficulties spill over beyond grammatical forms such as pronouns, to also encompass gestures such as waving. Indeed some children with ASD have been reported to wave with their palm faced inward, arguably because this is what they see from their own perspective when someone waves at them (Ohta 1987).

Hinzen notes that problems in developing the grammatical mechanisms of clausal subordination and pronouns would explain deviations in mind-reading abilities associated with ASD. Regarding pronominal difficulty more specifically, Hinzen (Section 3.1.3) claims “a disturbance in the grammatical Person system as reflected in personal pronouns is a disturbance of selfhood, precisely insofar
as 1P forms of self-reference are essential to such human-specific forms of selfhood (Hinzen and Schroeder, 2015). Again, according to this un-Cartesian view, grammar is the lens through which other difficulties associated with the autistic condition can be explained, such as a selfhood disturbance. Hinzen comments on the crucial significance of language in the neurocognition of ASD, saying “although (...) language impairment is widely regarded as secondary to a primary impairment in social interaction, available findings are highly interpretable in terms of deviant language development failing to allow normal cognitive and social development” (Section 3.1.3). While both sentential complements and pronouns in individuals with ASD have indeed been related to their challenges with mentalizing, as mentioned above, situating linguistic difficulties at the heart of their cognitive and social difficulties is nevertheless challenged by the following observations:

Firstly, studies assessing grammar within this condition have often identified subgroups with spared grammatical profiles (Kjelgaard and Tager-Flusberg 2001; Roberts et al. 2004; Durrleman and Delage 2016; Tuller et al. 2017), indicating that ASD, with its prototypical cognitive and social difficulties, can arise in the absence of detectible grammatical impairments. This linguistic heterogeneity seems difficult to reconcile with the un-Cartesian view that ASD “systematically implicate(s) language changes along with disorders of thought” (Section 1). One may of course argue that grammatical impairments are present throughout the spectrum despite being undetected, but then the responsibility lies in the hands of un-Cartesian linguists to devise sufficiently refined experimental tools to uncover these hypothesized impairments. Hinzen speculates that for such cases “initial phonological and syntactic difficulties shared between the groups appear to give rise to the higher-order semantic and pragmatic difficulties more prominent in (...) ASD” (Section 3.1.3). Still, what seems to be needed to substantiate this claim are longitudinal studies empirically proving the hypothesized evolution.

Secondly, groups of children with ASD have been reported to show grammatical development proportionately more advanced than their social and communicative development (Naigles and Tek 2017). This would again imply an asymmetry between the cognitive specificities of their condition and their grammatical development, possibly with grammar occupying a secondary position. If for even some children on the spectrum, their grammar is relatively spared compared to their grasp of meaning distinctions (including referential meaning) required for navigating the social world (Naigles 2002), then un-Cartesian predictions entailing a central, decisive role for grammar do not seem borne out.

Thirdly, postulating a pivotal role specifically for a Person feature disturbance in ASD, which would yield a disturbance in selfhood, needs more clear
justification in light of certain empirical findings. Indeed, difficulties reported for 1st (and 2nd) Person are not unique to ASD, given that similar errors with the corresponding pronominal forms have been attested in young typically-developing children before age 2;6 (e.g. Chiat 1982; Schiff-Myers 1983; Oshima-Takane 1992). If this type of error in the Person feature were indicative of a disturbance in selfhood characterizing the cognitive phenotype of ASD (Section 3.1.3), why would young neurotypical children display the same difficulty (Naigles and Tek 2017)? Similarly, difficulties with deictic pronouns, and thus with Person, although more predominant in ASD than TD, are still not universal in ASD, and have even been argued to be rather rare (Naigles et al. 2016). If such difficulties were at the heart of a disturbance in selfhood and ToM-related socio-cognitive impairments throughout the spectrum, it is unclear how these various findings can be explained.

5 Conclusion

The language network clearly plays a central role in human cognition. The un-Cartesian approach makes the bold claim that referential meaning would not become accessible without an intact grammar, thus predicting both inter- and intra-species cognitive variation. On the one hand, we have considered findings indicating that mastery of embedded propositions allows forms of reference corresponding to expressions being true or false, and enhances aspects of theory of mind such as false belief reasoning. This is in line with the un-Cartesian view. On the other hand, we have also considered recent findings revealing the presence of at least some forms of (first-order) false belief attribution, in both young infants and primates, and thus it would appear that propositional meaning could arise in the absence of evidence for the corresponding linguistic expressions. This poses a challenge for the un-Cartesian stance. We have furthermore examined the case of ASD; a condition frequently associated with difficulties in belief reasoning and social communication. An un-Cartesian claim is that this cognitive disorder would necessarily be accompanied by language-related symptoms (Section 1), including impairments in embedding and grammatical Person. While some individuals with ASD can display associations between grammar and their symptomatology, this is not the case throughout the spectrum. The idea that their grammatical impairments would critically explain their condition seems at odds with their high variability in grammatical abilities, and with their grammar seeming at times intact or at least relatively spared as compared to their grasp of referential meaning and social
understanding. Finally, the grammatical difficulties attested in subsets on the spectrum are also observed in subsets of young, typically developing children, who do not seem to have related disturbances reminiscent of ASD. Still, despite these challenges, the un-Cartesian enterprise offers interesting perspectives on human-specific thought, as well as far-reaching predictions, propelling research in new directions that may build exciting bridges between linguists, psychologists, anthropologists, philosophers and clinicians.

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For a few years now, Hinzen has been pushing forward a distinction between two approaches to language, the Cartesian approach (according to which language is a modular ability through which thought gets expressed) and the un-Cartesian approach (according to which language and thought cannot be dissociated in humans). In his foundational paper, Hinzen (2014) makes it clear that what is central to the un-Cartesian view is the ambition to account for the specificity of human thought through grammatical organization. The present paper is a detailed exposition of this view with application to mental pathologies, autism spectrum disorder and schizophrenia. Hinzen argues that both pathologies are in fact primarily the result of disruptions of grammar leading to cognitive disruptions. I will not get into a detailed discussion of his argumentation regarding autism and schizophrenia, because whether they support the un-Cartesian view very much depends on whether one accepts the rather stark dichotomy between Cartesian and un-Cartesian linguistics, as presented by Hinzen.

There is much to agree with regarding Hinzen’s un-Cartesian view. First, it has the prima facie major advantage of insisting on the idea that language is not primarily or only a tool for communication, emerging through cultural evolution to allow humans to communicate, a view fraught with difficulties (see Reboul 2015a, 2017). Second, it clearly accounts for the indubitable fact that human thought is species-specific by the notion (with which I concur) that it is so intimately linked to language that it is indissociable from it, justifying the view that language is as much, if not more, for thought as it is for communication. The main question is whether we must adopt Hinzen’s dichotomy and his un-Cartesian position to reap those benefits.

In its basic form, Hinzen’s argument can be reduced to two main ideas: (a) language is thought; and (b) language corresponds to the external languages that we use to communicate (Chomsky’s E-languages). The advantage of his position clearly lies in the first one: as he himself points out, if we accept that language is thought, we do not need to explain the specificity of human thought, as language itself is species-specific to humans. In other words, if we...
If we have grammar, we get (human) thought ‘for free’. The second idea raises some difficulties, however, notably the fact that, though given grammar, we get thought for free, this leaves us with a mystery: where does grammar come from? And it does seem that seeing language as corresponding to external languages rather deepens the mystery (if anything, it would seem to bring us back to the view that language evolved for communication with its problems). So, the main question is whether we can keep the first idea in view of the difficulties that the second raises and this is directly linked to the question of whether we should accept Hinzen’s dichotomy as it stands. Does it really delimitate our only choices?

Whether it does or not depends on several points, some of which are explicitly discussed in Hinzen’s paper, while others are left tacit, but which all underlie his rejection of a Language of Thought (LoT), à la Fodor (see Fodor 1975, 2008; Fodor and Pylyshyn 2015), in humans. The first ground for Hinzen’s rejection is not explicitly discussed in his paper though it is quite central to several of his arguments. This is the idea that, given that the very notion of a LoT makes sense in that it accounts not only for human thought but also for pre-linguistic thought, whether it is that of animals or of pre-linguistic infants, LoT must be identical in non-linguistic animals, pre-linguistic infants and linguistic human adults. If this is the case, then LoT cannot in fact be a language in the sense that it does not have the grammatical structure that is characteristic of human thought. Hence, it cannot account for human thought. However, as early as 1975, Fodor argued that LoT in humans is structured very much as is language and allows for the propositional thought that Hinzen rightly sees as characteristic of human thought. In other words, there is nothing to prevent LoT to differ from one species to the next (just as perception does), and in humans, there is no reason to think that it is not structured in very much the same way as language. If this is the case, the equation between grammar and external language seems rather less obvious than before.

Another recurrent argument that Hinzen has invoked against the existence of LoT in humans is that it would be redundant with language: given that humans have language and that the grammar that comes with it shapes human thought, why would humans need LoT in addition? Linked with that argument is an argument to the effect that LoT is not only redundant: it is useless anyway. This second argument depends on the notion of interfaces that generative grammar has postulated, in which syntax interacts with a conceptual/intentional module (= LoT), SEM, as well as with a phonological module, PHON, for externalization. SEM is supposed to provide the semantics, but Hinzen argues that, as SEM is not itself linguistic, and, hence, has no grammar, it is powerless to interpret grammatical structures.
An obvious, but not very strong objection is that these two arguments go in opposite directions. LoT can only be redundant with language if it is itself a language of some kind. And it can only be semantically powerless relative to grammatical structuring if it is not. Be that as it may, what merit is there in thinking that a ‘linguistic’ LoT, endowed with grammar would be redundant? Clearly, there is an obvious answer in the Cartesian view: LoT is in fact the medium in which the thoughts that get communicated through language are produced. In other words, LoT is for thought and external languages are for communication. This answer is clearly unavailable in the un-Cartesian view. But there, one or another variation on a view of the relation between language and thought (LoT), according to which native language, once acquired, supplants or replaces LoT, could be an answer. We could, so to speak, eat our un-Cartesian cake and keep it. Regarding the argument that (nonlinguistic) LoT would be grammatically powerless, this very much depends on which view about the extent and function of grammar is adopted.

Hinzen’s central claim is that language has the core cognitive function of allowing decoupled reference (reference in the absence of the target in the immediate environment). This is something that concepts cannot do for two reasons. First, concepts refer to categories (classes of objects). Second, they are perception-dependent (hence, by definition, not decoupled). One might quibble with the idea that concepts cannot be singular (both pre-linguistic infants and animals do seem to have singular concepts). But it is hard not to agree that the concept DOG does not, in and of itself, refer to any specific dog. As Hinzen points out, it will only do so when combined with a suitable function word, such as a determiner or demonstrative. What about the argument that concepts cannot be decoupled? Here, one might argue again, there is evidence of decoupling in animals through planning. Clearly, planning is only possible in species that can represent the final goal (nonexistent at the time of planning), as well as any intermediary goals (or tools) that constitute steps toward the ultimate one. Thus, evidence of planning is evidence of an ability to entertain decoupled representations. Given that there is strong evidence that planning is to be found in chimpanzees (see Osvath and Osvath 2008; for a relevant set of experiments, Osvath 2009; Osvath and Karvonen 2012, for an especially convincing spontaneous example), a non-linguistic species, this would seem to speak against the idea that decoupling is essentially linked to ‘lexemic’ concepts. This, however, is not the end of the story. In defense of Hinzen’s view, one might invoke the distinction between weak decoupling (which occurs when a representation is deployed in the absence of its target), and strong decoupling (which occurs when in addition, the representation is not deployed in a cognitive process oriented toward action) (for the distinction, see Reboul 2015b, 2017).
Arguably, while (some) non-linguistic animals are capable of weak decoupling, they are not thereby able of strong decoupling. In other words, it is strong rather than weak decoupling that is conditional on having language. So far so good, but why should decoupling need an externalized language anyway?

Arguably, referring is a matter of picking out a specific object in a singular proposition. Why could a (suitably grammaticalized) LoT not do so? It is here that Hinzen’s main argument is deployed. Reference is crucially dependent on triangulation. The notion was introduced by Davidson (2001) in two different contexts: to endorse (in a slightly orthogonal way) Wittgenstein’s argument against a private language, and to account for the emergence of thought in pre-linguistic children. The basic idea is that triangulation will occur when two creatures of the same kind are ‘simultaneously in interaction with each other and with the world they share’ (Davidson 2001: 128). What then occurs is that each creature will learn correlations between the reactions of the other to changes in their common environment, thus setting an objective standard of correctness. This still falls far from truth-conditional propositional thought and the additional ingredient to it is language as used in communication (and, obviously, this means externalized language). To return to Hinzen’s view of reference as the major contribution of (externalized) language, the idea is that the 1st person refers to an external object in an act of linguistic communication addressed to the 2nd person. This leads Hinzen to the strong conclusion that ‘speech contents and acts are subordinated to the self as identified in the 1st person’ (Section 2.4). This is extended to the tense system. On such a view, obviously, language must be externalized to fulfill this function, as it is essentially dependent on triangulation.

There is more to Hinzen’s argument, however, as he also proposes that the 1st person to which reference is attached is intrinsically grammatical as well. Here, it is worth going back to Hinzen’s discussion of reference. Hinzen claims that reference entirely depends on grammar. A (lexicalized) concept is referential in as much as it enters a grammatical structure (whether it is referential, generic or predicative and whether it is referentially intensional or extensional depends on the place where the phrase occurs in the structural configuration of the sentence, but I will ignore this complication here). What Hinzen proposes is that there is an inverse relation between the descriptive (or lexical-conceptual) content and its place in the hierarchy, and a convergent relation between the deictic (grammatical) content in the referential expression and its place in the hierarchy. On the one hand, the more descriptive content a referential expression has, the lower it will be in the hierarchy. On the other hand, the more deictic content a referential expression has, the higher it will be in the hierarchy. So, descriptions occur low in the hierarchy, followed by demonstrative
descriptions, bare demonstratives, deictics and pronouns in that order. But the pinnacle is the 1st person pronoun. This is because the 1st person pronoun, by contrast with the 3rd person pronoun, is entirely devoid of any descriptive content, as it is not marked for gender or number. Its being devoid of any descriptive content accounts for the well-known phenomenon of immunity to error through misidentification. It is not possible to be mistaken as to whom one is referring when one uses the 1st person pronoun. Additionally, replacing the 1st person pronoun by a co-referring expression in self-reference will lose that advantage.

There are quite a few points of interest here. The first one is that one could buy Hinzen’s referential hierarchy without agreeing that we need an externalized language to have it. We certainly need a language (and hence a grammar), but that language does not have to be externalized. Additionally, one might want to argue that if, as Hinzen insists, triangulation is necessary for reference, the best argument for it does not lie in the 1st person pronoun, but in the 2nd person pronoun. Arguably, the 2nd person pronoun is dependent for its existence on language as used in communication. It is more debatable that the 1st person is. But it is the 1st person pronoun that is central to Hinzen’s argument, not the 2nd person pronoun, because it is to the 1st person that reference is attached. Let me now turn to this ‘attachment’ between reference and the 1st person. More precisely, any linguistic act is ‘subordinated’ to the 1st person as the expression of the self. The question of how to understand this notion of ‘subordination’ is clearly central, but Hinzen is not very explicit about it. One obvious way of making sense of it is through the notion of an *unarticulated constituent*. The notion was introduced by Perry (1998) and has been largely influential, being a central point in the ongoing debate between contextualists and minimal semanticists (see, e.g., Sperber and Wilson 1995; Carston 2002; Recanati 2004; Borg 2004, 2012; Stanley 2007), which I will largely ignore in what follows for reasons of space. Perry’s point of departure was that some sentences, e.g., ‘It is raining’, seem to lack constituents that would be necessary to attribute to them nontrivial propositional forms, here the time and location where it is raining. Perry proposed that, in such utterances, time and location, though unarticulated at the linguistic level, are contextually recovered in the proposition expressed. Here, it is instructive to go to Hinzen’s (2015) own contribution to the debate. He basically points out that the very notion of unarticulated constituents rests on a misguided view of language where the distinction between the respective lexical and grammatical contributions to content is not taken into account. In examples such as ‘It is raining’, while time and space are not articulated at the lexical level, they are articulated at the grammatical level (for time through verbal tense marking). This is because
utterances are inherently produced in a place and at a time. More generally, and more crucially for the ‘subordination’ of utterances to the 1st person, all utterances are deictically relative to the utterer, self-identified as the grammatical 1st person and the propositional content depends on that deictic anchoring. This, presumably, is how one should understand the 1st person subordination on which Hinzen insists.

All of this, however, leaves us with something of a tension. On the one hand, grammar is crucial to reference and is claimed to be crucial to a strongly decoupled use of concepts. On the other hand, grammar is inherently deictic relative to the 1st person and in Hinzen’s referential hierarchy, the more deictic an expression is, the more referential it is, because the less descriptive (conceptual-intentional) content it has. Given that deixis is strongly context-dependent, it can hardly be said to be decoupled, not even weakly decoupled. What this suggests is that one should dissociate reference and decoupling. In other words, in Hinzen’s referential hierarchy, decoupling and reference are in inverse ratios: the more referential a term is, the less decoupled (even weakly decoupled) it is, and the less referential a term is, the more decoupled it can be. If this is the case, even if one acknowledges that reference depends on grammar, it is more doubtful that decoupling does. Indeed, the very fact that (some) nonlinguistic animals have weak decoupling is already an indication of this. In other words, decoupling, while it may be very limited in nonlinguistic species, is a matter of the lexical (conceptual-intentional) component and not of the grammatical component, to take up Hinzen’s useful distinction. This brings us to the following conclusion: grammar is crucial to reference, but not to decoupling.

Let us turn to decoupling. The distinction between weak decoupling and strong decoupling is not the distinction between perceptually dependent (not weakly decoupled) concepts and perceptually independent (weakly decoupled) concepts, but, among perceptually independent (weakly decoupled) concepts, between those that are deployed for action and those that are not. This raises two important points: perceptual independence for concepts does not depend on language; strong decoupling, i.e., independence of concepts from action does. Why should this be the case? Beginning with the first question, Hinzen’s view is that it is only lexicalized concepts that can be decoupled. Lexicalization crucially adds an edge to a concept allowing it to be combined with other concepts (in other words, to be merged). In other words, it transforms a self-standing representation into a representation that can contribute to propositional thought. Thus, it is having an edge that is crucial to strongly decoupled concepts, because strong decoupling basically occurs in disinterested propositional thoughts (on this notion, see Millikan’s (2013) discussion of epistemic
disinterestedness in humans and its absence in animals), thoughts that are not oriented toward immediate or future action. Such disinterested thoughts are propositional and thus dependent on grammatical combinatoriality, hence the importance of lexicalization for strongly decoupled concepts. However, this leads us back to the crucial question of why this should mandate equating language with external languages. Why shouldn’t an internal language incorporate edges and the grammatical apparatus that Hinzen rightly sees as central to human thought?

Here, there are two different arguments, the first one going back to triangulation, while the second is a throwback to the redundancy/semantic inertia of concepts argument. Beginning with triangulation, again there are two arguments: Hinzen’s argument that triangulation is intrinsic to reference, and Davidson’s argument that triangulation grounds objectivity and, in linguistic creatures, truth. Beginning with Hinzen’s view, the only plausible reason for why triangulation is essential to reference, is that reference is grammatical, and hence importantly deictic and that deixis is anchored in the 1st person. But deixis being anchored in the 1st person does not make triangulation intrinsic to reference. What would make it so would be the necessary involvement of the 2nd person. Yet, we are given no reason why the 2nd person should be involved. True, utterances are usually other-directed. But thoughts are not. And thoughts are no less anchored in the 1st person than are utterances. At one point, Hinzen invokes the fact that inner speech, when used to admonish oneself may use the 2nd person. But surely this is not the case in all inner speech, and certainly not even mandatory for self-admonition. The 2nd person seems incidental rather than central, casting doubt that triangulation is intrinsic to reference. Thus, this hardly seems a convincing argument. What about Davidson’s view that triangulation grounds objectivity and ultimately truth? The least that can be said is that it is not the only game in town. Burge (2010) has published a dense and tightly argued book, relying on psychology of perception, to the effect that the basis of objectivity in all creatures lies in perception, notably in visual perception. While Burge falls short of claiming that perception is conceptual or propositional, Matthen (2005) sees perception as classificatory (and this is at least tacitly endorsed by Hinzen when he insists that concepts are perception-dependent). As Matthen and Burge both point out, perception has been strongly shaped by natural selection (hence, it varies between species). If this is the case, the intersubjective objectivity that Davidson sees as emerging from triangulation may in fact quite simply be the result of conspecifics sharing the same relevant evolutionary history and hence the same perceptual and classificatory schemata. No triangulation is needed. It would seem thus that the general conclusion regarding triangulation is that it is far from central to thought and language.
is only essential to external language, but this is because external language is used in communication. It is certainly not essential to language or thought independent of communication.

Let me now turn to the second argument. Hinzen’s idea here is that to account for the relations that grammar introduces between concepts, LoT would have to incorporate additional concepts, such as PREDICATION for instance. But, surely, this can only be true if LoT is not a language, i.e., if it has no grammar. Otherwise, given the very useful distinction Hinzen insists on between grammatical and lexical (conceptual-intentional) content, there does not seem to be any difficulty. Predication is read off the grammar, just as would be the case for an utterance in an external language. Postulating that LoT is not a language and has no grammar, given that the reasons for doing so are not exactly decisive, amounts to begging the question. This brings us back to the redundancy argument: if LoT is a language, why should we have external languages as well? Here the redundancy argument falters on the fact that, while LoT, if suitably grammatical, explains the specificity of human thought, it hardly allows communication. For communication, we need to externalize LoT. Hence, the existence of externalized languages.

This brings us back to a final important point. Hinzen is sensitive to the fact that, given cross-linguistic variation, his insistence that language corresponds to external languages leaves him open to some version of the Sapir-Whorf hypothesis (SWH). He excludes this possibility, based on two arguments. The first is that, as the SWH postulates that languages exert an influence on the conceptual systems of the people that speak them, it cannot apply if there is no conceptual system in addition to the lexicon. As Hinzen rejects the existence of such a system, there is no room for a linguistic relativity effect. This, obviously, does not exclude the possibility that different linguistic groups will have access to different lexicons and hence to different thoughts depending on the language they speak. Hinzen’s answer to this worry is based on the distinction between grammatical content and lexical content. He proposes that linguistic variation is limited to lexical and morphosyntactic dimensions that are peripheral to the meaning produced by grammar itself.

While it is certainly true that it is in the lexicon and morphosyntax that cross-linguistic variation is found, it is not entirely clear that morphosyntactic variation is innocuous for Hinzen’s un-Cartesian approach. For it to be, it would have to be the case that the central structuration of meaning that is due to grammar (i.e., the formal ontology of substance, object, event and proposition that is due to grammatical reference) is not affected by morphosyntactic variation. But this seems to be an unwarranted assumption. For instance, the referential hierarchy is very much dependent on the distinction between indefinite and definite determiners,
as well as between different sorts of demonstratives. The Slavic languages have no
determiners, Japanese has only emphatic pronouns, which are optional and not
routinely used and no person marking on the verb. The absence of morphological
tense in Chinese could also be regarded as problematic. While none of this might
be decisive, it nevertheless raises doubt about the idea that morphosyntactic
variation is innocuous for an un-Cartesian view, such as that advocated by
Hinzen. Additionally, there are some affinities between Hinzen’s proposal and
the exo-skeletal view of syntax advocated by Borer (2005a, 2005b, 2013). Both see
much of the content generally taken to be part of lexical content as in fact
determined by grammar. But, in contrast with Hinzen, Borer sees grammar as
encompassing not only syntactic structure, but also function words and morpho-
syntax. And, not being un-Cartesian, she can resist the SWH by saying that LoT is
not affected by its externalization in different languages.

To conclude, there is much to admire in Hinzen’s view, even if one resists
adopting it lock, stock and barrel. The central point that it is language that is
crucial to an explanation of human thought is very important. It is not jeopar-
dized by the hypothesis of LoT, however, if one accepts that human LoT is
structured, as are external languages, by a grammar, with much of the attributes
that Hinzen confers to external languages. Again, it does not necessarily mandate
the idea that thought is first produced in LoT and then expressed. Given a
suitable notion of externalization, thinking and speaking, though separable in
principle, could coincide.

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1 Introduction

The core idea explored in Hinzen’s target paper (henceforth H) is that language is the organizational principle of human thought. This contrasts with classic approaches to the problem according to which there is a separate system of thought, which can be expressed with, but is not dependent on, language. On this view (elaborated in H and in much of Hinzen’s recent work) the organization of grammar reflects the organization of a specific mode of thought (Hinzen 2013). Grammar restricts how we think, and how we say the things we think. I refer to this as the Language = Thought hypothesis (henceforth L = T). It follows from the L = T hypothesis that, if thought is clinically disturbed, it will go hand in hand with a language dysfunction and vice versa. The goal of H is to explore this prediction based on two different types of cognitive disorders, which both have language-related clinical symptoms: autism spectrum disorder (ASD) and schizophrenia (SZ).

The question about the nature of “thought” is vast; H keeps it manageable by restricting the discussion to reference, both propositional reference (roughly the meaning of sentences) and individual reference (roughly the meaning of nominal phrases). In this area of thought, H argues, it is the role of grammar to map (lexicalized) concepts onto referential meaning (propositions and individuals). It appears that in ASD and SZ, reference is disturbed (H: 3.2.3), which reflects a dysfunction of language and hence – given the L = T hypothesis – amounts to a dysfunction of thought. For SZ, the dysfunction can be summarized as a failure to make use of context (H: 3.2.3): the SZ linguistic profile includes problems with definite reference and the distortion of the deictic space. The former results in the lack of coherence in speech; the latter results in non-sensical language which is free-floating of referential and deictic anchors and thus leads to the loss of propositionality (H: 3.2.3). For ADS, the disorder also affects contextual information but here the problem presents itself in the opposite way: we find “rigidified forms of reference that lack the flexibility of normal language use in its ordinary deictic frame” (H: 3.2.4). Problems manifest themselves again in the use of definite (but not indefinite) determiners as well as personal pronouns.

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The L = T hypothesis creates an exciting new research paradigm, with implications for linguistic theory, language evolution, philosophy, theory of mind, and – as discussed in H – clinical linguistics. It requires a particular conceptualization of grammar, which is deeply rooted in generative assumptions (Section 2). However, the main goal of this commentary is to introduce two potential avenues of research on clinical speech triggered by the L = H hypothesis: language variation (Section 3) and the grammar of interaction (Section 4).

2 What is grammar?

For the L = T hypothesis to go through, H assumes a specific conceptualization of what defines language, specifically grammar and syntax. Specifically, it departs from the classic definition of grammar as the way words are put together to form proper sentences. While modern linguistic theory – at least since Chomsky (1957) – has departed from this conceptualization of grammar, it still pervades in other fields that touch upon language. For example, Boucher (2012) identifies one of the language traits of autism spectrum disorder as “affecting receptive language more than expressive language, with productive syntax unimpaired, although the use of words and phrases can be idiosyncratic” (H: 3.1.3; emphasis MW). As H observes, in this description, ‘syntax’ refers to “putting words in the right order” (ibid.); but crucially H’s hypothesis predicts no difficulties with word order as its conceptualization of grammar (and syntax) is radically different. While H takes care to demarcate the L = T hypothesis from mainstream Chomskyan tradition (which takes thought to be separate from language), the conceptualization of grammar itself is very much in line with that tradition. Specifically, Chomsky (1957) introduces two far-reaching innovations forever changing the study of language in general, and grammar in particular.

First, words are no longer viewed as the smallest building blocks of syntax. For example, the syntactic rule of Affix hopping (Chomsky 1957: 39 (29ii)) affects a bound morpheme rather than a verb; similarly, we find syntactic rules for nominalization and passivization, both phenomena traditionally viewed as belonging to the domain of morphology. In addition, Syntactic Structures introduces syntactic rules that can target prosodic notions such as word boundary or intonational tunes. This is in line with H’s view that language (qua grammar) is an integrative system (H: 2.4) which spans across

1 In Hinzen (2013), it is narrow syntax that is equated with the language of thought.
several cognitive functions. What is crucial for the present purpose is that it allows for a new methodology in the study of language (including clinical language): language description depends on one’s theoretical framework. Work on the language of SZ is all based on a linguistic theory where the traditional descriptive levels (syntax, semantics, and pragmatics) are observed. The investigation of how reference is constructed cannot be reduced to one level only as it “straddles all three levels” (H: 3.2.3).

Second, Chomsky (1957) introduces the idea that syntax as one of the classic levels of descriptions (along with phonology, morphology, and semantics) can be decomposed into various levels of representation including i) phrase-structure, ii) transformational structure, and iii) morphophonemics. This decomposition of syntax has arguably led to the postulation of functional architecture dominating lexical categories (see Wiltschko to appear for discussion). For example, the division of the concept of subject into thematic subject and grammatical subject was originally conceived of as arising from two levels of representation: thematic subjects are introduced at Deep-structure and grammatical subjects are introduced at Surface-structure. With the introduction of functional categories via generalized X*-theory (Chomsky 1986) it was possible to maintain the decomposition of subjects within a single level of representation. Instead a more complex structure is introduced: thematic subjects are introduced VP-internally while grammatical subjects are derived via movement into SpecIP (Koopman and Sportiche 1991). Over the years, the functional structure dominating VPs and NPs has become more and more articulated, culminating in Cinque’s (1999) cartographic approach towards language typology. Specifically, Cinque (1999) argues that clausal architecture consists of a series of functional categories, each of which is identified with a meaningful categorial label such as Aspecthabitual, Tenseanterior, Moodevaluative.

It is this assumption, which paves the way for the claim that “grammar is meaningful” (H: 2.2): by dissociating the meaning of grammar (qua functional categories) from the meaning of lexical entries (qua lexicalized concepts), it is possible to understand how grammar can construct reference. Grammatical structure serves as the “glue between concepts” (H: 2.3) and derives the individual and propositional reference which in turn aligns perfectly with the formal ontology of thought (H: 2.2).

3 Beyond English: Language variation

A striking absence in H is the mentioning of any specific language (such as English) that serves as the object of investigation of clinical speech. This
suggests that most studies on the linguistic properties of the language of ASD and SZ are based on English-speaking individuals or at least that the role of language variation in the manifestation of the linguistic dysfunction is not considered.\footnote{A cursory bibliographical search supports this conclusion.} I suggest that exploring clinical speech across languages – just like exploring language variation more generally – will help to shape the $L=\text{T}$ hypothesis. In addition, especially if the $L=\text{T}$ hypothesis is on the right track, it will allow us to gain insight into the nature of the language faculty in mental health and the range and limit of language variation. To see how, consider briefly the fact that there are considerable cross-linguistic differences in the way Specific Language Impairment (SLI) manifests itself (Leonard 2017). Among the differences reported are whether or not word order is affected, the way agreement is affected, and the way finiteness is affected. It is unlikely that the nature of the disorder differs across languages; hence we must conclude that the observed differences reflect differences in the way word order, agreement and finiteness is derived across languages. Consider for example different patterns of subject-verb-agreement (SV-agr) across languages: in English, SV-agr is realized on verbs only in the absence of an auxiliary (1a); if an auxiliary is present it must bear SV-agr (1b) and the main verb cannot (1c/d).

(1)  
\begin{align*}
\text{a. } & \text{John lives in Manhattan} \\
\text{b. } & \text{John is living in Manhattan} \\
\text{c. } & \text{*John be lives in Manhattan} \\
\text{d. } & \text{*John is lives in Manhattan}
\end{align*}

This pattern is however not universally attested: in Halkomelem, ergative agreement is always realized on the verb independent of the presence of an auxiliary, as shown in (2).

(2)  
\begin{align*}
\text{a. } & q'ó:y-t-\text{es} \te qwá:l \\
& \text{kill-TRANS-3S DET mosquito} \\
& \text{‘He killed the mosquito.’} \\
\text{b. } & li \quad q'ó:y-t-\text{es} \te qwá:l \\
& \text{AUX kill-TRANS-3S DET mosquito} \\
& \text{‘He killed the mosquito.’} \\
\text{c. } & *li-\text{s} \quad q'ó:y-t \te qwá:l \\
& \text{AUX-3S kill-TRANS DET mosquito} \\
& \text{‘He killed the mosquito.’}
\end{align*}
Assuming that distributional differences reflect categorial differences, we have to conclude that SV-agr is categorially different across languages: while in English it associates with T, in Halkomelem it associates with v and hence is not sensitive to the presence of an auxiliary (Elouazizi and Wiltschko 2006). In addition to the (in)sensitivity to the presence of auxiliaries, there are other differences that fall out from the hypothesis that SV-agr can associate with different positions in the functional architecture.

Similar cross-linguistic differences have been found for other grammatical categories as well, including those that play a role in the profile of SZ and ASD such as pronouns, determiners, person, and tense. Specifically, none of these grammatical categories are primitives of universal grammar: they are language-specific constructs and hence can be constructed in different ways, with different distributional properties (Wiltschko 2014). Furthermore, differences in categorial properties coincide with differences in referential properties. For example, pronouns are realized as different categories (pro-NP, pro-PhiP, and ProDP) with correlating morphological, syntactic and referential properties (Déchaine and Wiltschko 2002). Differences in referential properties can be gleaned from their binding-theoretic behavior: while pro-PhiPs function as variables and hence can be bound, pro-DPs function like R-expressions and cannot be bound (Wiltschko 1998; Déchaine and Wiltschko 2002). Moreover, in a polysynthetic language where full argument DPs are generally optional, pronouns play a different role than in an inflecting language: they are often used for focus or emphasis, hence their referential properties differ.

The correlation between distributional and referential properties is expected under the L = T hypothesis in as much as both are mediated by grammar. Specifically, H (2.6) assumes that reference is gradually constructed grammatically out of lexical concepts such that different types of grammatical categories derive different degrees of referential strength. Referential strength is directly correlated with context such that deictic and anaphoric forms are considered strongest. Since both types of clinical speech considered in H, involve dysfunction in the integration of context such forms are affected the most. We cannot simply expect that pronouns or determiners are equally affected in clinical speech across languages: it will depend on the particular categorial – and hence referential – properties of the grammatical category in that particular language. Specifically, we expect that, for example, pronouns that are more descriptive and hence referentially weaker (i.e., pro-NPs of the type found in Japanese according to Déchaîne & Wiltschko) should be affected less than pronouns that are highly deictic and hence referentially stronger. In this way then, the exploration of clinical speech across languages can inform our analyses of these pronouns in mental health and vice versa.
4 Beyond propositional structure: the grammar of interaction

The L = T hypothesis explored in H focusses on the way grammar (syntax) relates concepts to referential expressions including individual and propositional referents. The former is expressed by virtue of nominal expressions and the latter is expressed by sentences. In this section, I explore in more detail the notion of the “sentence”. I suggest that the L = T hypothesis, and its application to clinical speech, might benefit from the investigation of structure that goes beyond the propositional structure explored in H.

In the early days of transformational grammar, the notion of a sentence was viewed as a primitive and had its own label (S). However, it turns out that the notion of the sentence is actually not that easy to define. One might define it as the combination of a subject and a predicate, but this would include small clauses as in (3)a. Crucially, small clauses lack the grammatical means to anchor the event to the utterance: they do not derive a proposition, and they cannot stand on their own ((3)b) The verb has to be inflected for tense as in (3)c.

(3)  a. John saw [Mary leave]<sub>SC</sub>
    b. *Mary leave
    c. Mary left

The data in (3) illustrate that there is a minimal requirement that must be met for a sequence of words to be considered a sentence: it must denote a proposition. However, consider the examples in (4). A proposition can be embedded (4)a, in which case it can or must be introduced by a complementizer that. While the embedded clause denotes a proposition, it cannot be used as a free-standing sentence (4)b. The addition of a complementizer was originally analyzed as introducing another layer, referred to as S’ (S-bar), illustrated in (4)a.

(4)  a. John knows [S'(that) [sMary left]]
    b. *That Mary left

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3 This is reminiscent of the notion of the “word” which is also hard to define. However, whereas problems with the definition of the word have been widely discussed (see Newell et al. 2017 for a recent overview), problems with the definition of the sentence are discussed much less (Wiltschko and Heim 2016).
The label S’ already indicates that there may be structure that goes beyond the minimal sentence structure. Since the labels S and S’ were abandoned in favor of generalized X’-theory and replaced by IP and CP, clause-structure is viewed as a series of functional projections. On this view then, there is no dedicated functional category that would correspond to the notion of the sentence. Crucial for our purpose is the fact that the functional architecture of sentences has been articulated and extended. Consider for example Rizzi’s (1997) cartography of the left periphery schematized in (5). There are four distinct categories, which replace CP: one to host finiteness marking, one to host focus, one to host topics, and one to host the marking of (illocutionary) force.

(5) ForceP > TopicP > FocusP > Fin(iteness)P ...

The addition of a category ForceP marks an important step towards extending the propositional structure of the clause: force is a category traditionally associated with speech act theory and hence straddles the division between syntax and pragmatics.

The syntacticization of speech acts has a history that goes much beyond the explicit coding of force in the functional architecture of the clause. In particular, early on Ross (1970) and Sadock (1974) introduced the idea that all sentences are embedded in an articulated speech act structure. According to Ross (1970), all declarative sentences are embedded under a ditransitive verb of communication (say, tell, etc.) which takes the overt proposition as one of its arguments, the other arguments corresponding to the speech act participants (speaker and addressee). Speech act structure is deleted via the rule of performative deletion and hence only the proposition is spelled out. This is illustrated in Figure 1.

![Figure 1: Speech act structure.](image)

More recently, the idea that speech act structure is part of syntactic structure has been revived, albeit in different ways. While the Ross/Sadock structure depicted in
Figure 1 consisted of another layer of propositional structure, current instantiations of this idea make use of a series of functional categories, thereby simply extending the functional architecture of the sentence (cf. Speas and Tenny 2003; Haegeman and Hill 2013). Furthermore, it is no longer assumed that this structure is deleted (and hence silent). Instead scholars exploring speech act structure are doing so on the basis of a variety of linguistic elements whose meaning goes beyond propositional content, including discourse markers (Wiltschko in press), discourse particles (Thoma 2017), sentence final particles (Paul 2014; Lam 2014; Wiltschko and Heim 2016; Haegeman 2014), response markers (Krifka 2013, Wiltschko to appear), vocatives (Hill 2013), and allocutive agreement (Miyagawa 2017).

If indeed speech act structure is part of grammar, and if indeed grammar is the organizational principle of human thought, then it follows that speech act structure, too, should reflect thought just as propositional structure does. Evidence that this is indeed so comes from the fact that thought does not necessarily end at the closure of a proposition. It is recursive, such that thoughts (propositions) can be the object of other thoughts as evidenced by sentences such as (4) which have a proposition (that Mary left) embedded under a propositional attitude verb (know). Thus, we can think about what we know, and we can think about how what we know compares with what others know. We can think about how long we have known things; and how we got to know those things. Languages have not only lexical concepts to express this (propositional attitude verbs, for example), but also functional material including some of the markers that have led to the postulation of speech act structure. To see this, consider the examples in (6). The sentence final particle eh is used to request confirmation for a particular belief that the speaker holds to a degree that requires confirmation from someone with more authority over its truth (hence Wiltschko and Heim 2016 refer to such particles as confirmationals). This belief can be about the world as in (6)a where the speaker believes that the addressee has a new dog. In this case the addition of eh can be paraphrased as “confirm that p is true”. But (at least some) confirmationals can also be used to confirm a belief about the addressee’s belief as in (6)b where eh can be paraphrased as “confirm that you believe that p” (see Wiltschko and Heim 2016; Heim et al. 2016; for detailed discussion).

(6)  
   a. You have a new dog, eh?
       = Confirm that p is true.
   b. I have a new dog, eh?
       = Confirm that you believe that p.

Confirmationals like eh are widely attested across the languages of the world; they share similar distributional patterns but they also vary across a number of
variables (Bertrand et al. 2017). For example, some confirmational are sensitive to how long the proposition has been in the speaker’s set of beliefs (Burton and Wiltschko 2016). This is the case in Austrian German. The confirmational geu can only be used if the belief has been in the speaker’s set of beliefs prior to the time of conversation (7)a. If the proposition just entered into the set of beliefs, based on current evidence, then geu is ill-formed. Instead the sentence-internal discourse particle leicht has to be used (7)b.

(7)  

a. Du host an neichn Hund, geu?  
You have a new dog, CONF  
= Confirm that p is true, where p has been in my belief set before our current conversation.

b. Du host leicht an neichn Hund?  
You have PRT a new dog  
= Confirm that p is true where p just entered my set of beliefs.

Confirmationals have long been neglected as an object of grammatical investigation, and in fact some have claimed that they are “outside the clause” (Kaltenböck et al. 2016) and hence they should not be part of grammatical analysis. As we have seen, there is a conceptualization of grammar according to which confirmationals are grammatical elements, just like tense marking. What makes them appear different is – under this view – merely the fact that they associate with the highest domain of the functional architecture, namely speech act structure. It is also compatible with the conceptualization of grammar assumed in H: thinking about beliefs (including the beliefs of others) still counts as thinking and hence, given the L = H hypothesis, it is part of grammar. Confirmationals (as well as other linguistic elements that serve to negotiate interaction) contribute to reference, albeit in different ways. That is, reference doesn’t stop at establishing a relation between a concept and the world (by identifying a particular individual or proposition). When we interact with others, reference also involves establishing a relation between referents (individual and propositional) and the common ground (in the sense of Stalnaker 2002) and crucially we can think and talk about these second order mental states as evidenced by the examples in (6) and (7).

Given the profile of both SZ and ASD, as discussed in H, we might expect that the use of confirmationals (and other discourse markers) is severely affected in their use of language. For example, autism has been characterized as involving “difficulties with communication and social interaction” (H: 3.1.1). I suspect that these difficulties will manifest themselves as absence or misuse of precisely those linguistic elements that – in mental health – facilitate communication
and interaction by establishing the relation between referents and the common ground. Similarly, the fact that ASD is characterized by difficulties in the use of grammatical person (especially first person) suggests that we might expect difficulties in the use of speech act structure, which heavily relies on the encoding of speech-act participants. As for SZ, we expect difficulties with the use of confirmationals and other discourse markers as these linguistic elements are highly context dependent and SZ is characterized by a failure to use context.

In sum, I submit that the investigation of elements currently explored under the label of “syntacticization of discourse” (Haegeman and Hill 2013) “the interactive stance” (Ginzburg 2012) and “the syntax of interaction” (Wiltschko 2017, in prep) will further our understanding of the nature of the disorders on the one hand and the specifics of the L = T hypothesis on the other hand. To do this, we will have to look at the use of confirmational and other sentence final particles, discourse markers, response markers, evidentials, etc. in clinical speech. Ideally this is done based on corpus studies as well as (story-board) elicitation tasks (Burton and Matthewson 2015).

On a final note, it will also be interesting to explore the role of intonation in this context. This is because intonational contours can themselves be viewed as morphemes (Liberman and Sag 1974; Trager and Smith 1951; Haggo 1987: 32) which are syntactically integrated (Davis 2011; Truckenbrodt 2013) and are sometimes analyzed as operating on speech acts (Trinh and Cnic 2011). Interestingly, the linguistic profile of ASD includes a deficit in prosody (H: 3.1.3 citing Peppé et al., 2007; Noterdaeme et al. 2010).

5 Conclusion

The L = T hypothesis opens up a radical new research agenda. One of these new areas of research has to do with the profile of clinical speech in patients typically identified as manifesting dysfunctional thought. According to the L = T hypothesis we expect that dysfunctional thought correlates with dysfunctional language. To fully explore this, it is necessary to have a detailed description and analysis of clinical speech in the first place. Specifically, clinical speech has to be subjected to analyses using modern syntactic theory. Current descriptions of the SZ and ASD have either no linguistic descriptions (H: 3.1.4) or if they do, these descriptions are assuming the classic levels of description according to which grammar deals with the way words are arranged into sentences. This means that it is time to treat clinical speech like any other language: through thorough field work we will be able to describe and analyze their unique patterns.
I have further suggested that it will be useful to do this across different languages. That is, SZ and ASD patients speak different languages natively. Given that languages differ in the way they construct their grammatical categories, we expect to find differences in the way these categories are affected. In this way the exploration of clinical speech across languages will allow us to better understand not only the nature of the dysfunction, but also the make-up of the language faculty and the nature of variation. Crucially, the L = T hypothesis must be about the language faculty rather than its manifestation in individual languages. Grammar, in H’s sense is not only the organizational principle behind thought, it is also the organizational principle behind the creation of individual languages. However, individual languages are our window into the language faculty and, if the L = T hypothesis is correct, into human-specific thought. It is for this reason that we need careful comparative analysis along two dimensions: i) comparing clinical versions of a particular language (e.g., English) with its counterpart in mental health and ii) comparing the clinical versions of a particular language (e.g., English) with the clinical version of another language (e.g., Spanish).

Secondly, I argued for the inclusion of discourse markers (such as confirmationals) into the analysis of clinical speech. While these elements are sometimes considered to be outside of grammar, the conceptualization of grammar underlying H is consistent with their inclusion: they contribute to the creation of reference. Specifically, they are used to express a relation between the referent (and individual or a proposition in the world) and the common ground (the interlocutors’ shared referents).

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Wiltschko, Martina. in prep. The syntax of interaction. Ms. UBC.


1 The grammaticalization of thought and meaning

Prof. Hinzen’s paper “Reference across pathologies: A new linguistic lens on disorders of thought” (hereafter RP) divides into two parts. The first, spanning the introduction and Section 2, presents in summary form elements of a theory of language; the second, spanning Section 3, applies the theoretical elements to explain features of the cognitive pathologies of autism spectrum disorder and schizophrenia. My comments will focus on the central concept of the linguistic theory in the first part of the paper: reference.

The linguistic theory consists of a distillation and highlighting of a number of previously published works by Hinzen alone as well as in collaboration with other scholars. Most significant among these is Hinzen and Michelle Sheehan’s The Philosophy of Universal Grammar (hereafter PUG). In the following remarks I will liberally appeal to contents from this monograph to elaborate on points in the summary of the paper and to offer my critical responses.

The very plausibility of applying linguistic theory to explain cognitive pathologies owes of course to the nature of the linguistic theory in question. Hinzen’s theory, called un-Cartesian linguistics, ultimately rests on the conjunction of two theses. These might be called constitution theses insofar as each claims that one thing crucially, if not wholly, constitutes another. The significance of the constitution theses in turn owes to conventional, opposing views that the pairs of things in question are wholly or at least crucially independent of one another. Alternatively, the theses might be called reunification theses insofar as each claims that two entities that scholarly tradition has misguidedly taken to be independent are in fact crucially or wholly interdependent. For convenience I’ll conjoin these ideas and speak of the theses as reconstitution theses.

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1 Oxford, 2013. Hereafter and merely for simplicity’s sake, I will speak of Hinzen’s, rather than Hinzen and Sheehan’s, views in PUG. Note also that aside from conventions of bibliographical citation, throughout I use italics when mentioning expressions and citing linguistic examples; and I use unitalicized text in quotation marks when quoting from authors.

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The one reconstitution thesis, which is strictly the more fundamental of the two, is that language is constitutive of thought. Contrast this with the so-called Cartesian alternative according to which thought does not depend on language; modular neural networks realize each capacity; and language functions merely as an expressive system, dedicated to the communication of thought. The second reconstitution thesis is that grammar is crucially constitutive of meaning. According to the alternative – that grammar or syntax and semantics are crucially if not wholly independent – grammar is conceived as a merely formal and so uninterpreted system, which, somehow, interfaces with an independent content providing, for example conceptual-intentional, system.

From the conjunction of the two reconstitution theses, the linguistic constitution of thought and the grammatical constitution of meaning, the deep cognitive and so epistemological significance of grammar in humans emerges. Accordingly the central thesis of PUG is that “grammar is a distinctive way of organizing meaning and thought, making knowledge possible.” Consider the punchy Wittgensteinian epitaph to the book: “Like everything metaphysical, the harmony between thought and reality is to be found in the grammar of the language.”

In light of these commitments, it follows that cognitive pathologies in humans should have linguistic symptomatology. Such symptomatology will not be explicable as mere impairments in the capacity to express thought, as in fact is the case with those who suffer from aphasia. Rather the symptomatology will be explained as a disorder intrinsic to thought itself, since again according to the un-Cartesian theory thought is constituted by language. More precisely still, given the grammaticalization of meaning thesis, the linguistic symptomatology should be explicable precisely in grammatical terms. The topic of Hinzen’s paper, reference across pathologies, then follows from the view that reference is a function of grammar.

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2 Whether Descartes himself was actually a Cartesian in this sense is questionable. Cp. PUG 14, n. 12.
3 Cp. Hinzen’s remarks on Chomsky’s Strong Minimalist Thesis at PUG 6. Note also that in PUG Hinzen provides a valuable historical account and explanation of this, call it, non-constitution thesis and its prominence in modern philosophy and contemporary linguistics. He also identifies two historical precursors – largely neglected in mainstream Anglophone philosophy and linguistics – to the un-Cartesian theory: the Indian tradition of Vyākarana rooted in Pāṇini’s theory of Sanskrit grammar and the late Medieval Modists’ view of the cognitive significance of parts of speech. Cp. PUG 15-32.
4 PUG 1. Cp. “the goal of this book at large [is] to demonstrate the epistemological significance of grammar.” (PUG 119)
5 Philosophical Investigations, § 55.
2 Kinds of reference

One feature of the summary in RP that may be confusing relates to Hinzen’s use of the central term: *reference*. Hinzen aims to advance a novel theory of reference. But this novel theory does not simply entail the rejection of a range of other conceptions of reference. This owes to the fact that Hinzen recognizes various kinds of reference. Precisely, in PUG he distinguishes three kinds: functional, lexical, and grammatical.⁶

Functional reference occurs in non-human animals. It obtains between percepts, rather than concepts, and what might be called their *perceptual specifications*. The example Hinzen cites is alarm calls in monkeys or chickens: “When under the causal control of an external trigger, monkeys or chickens call for alarm, the call can be acoustically distinct depending on what predator is perceived to cause the threat.”⁷ The term *functional* encourages the thought that the referring expression, here the alarm call, plays a role in a (relatively simple, direct, and inflexible) causal nexus.⁸ The call is the effect of a certain perceptual stimulus, and it in turn prompts some form of behavioral response among the members of the caller’s troop or flock. As Hinzen indicates, qualities of the vocalization may vary according to the nature of the perceptual specification; and presumably this may in turn effect distinct types of response.

Lexical reference is a relation between lexemes, that is, “content words” or lexical concepts, and their so-called lexical specifications. So lexical reference is limited to language users. In RP Hinzen offers *man*, *edible*, and *warm* as examples of lexically referring terms. Such items are said to “classify perceptual data ... falling into abstract stimulus classes.”⁹ Ontogenetically then lexemes are stimulus-determined; however, in contrast to percepts, their tokening does not depend on the presence of the type of perceptual stimulus that constitutes their

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⁶ PUG 80. Hinzen uses the term *reference* in additional ways as well. E.g. cp. “In all the cases we have considered – bare nominals, names, definite determiners, demonstratives, and pronouns – *referentiality* is scalar: it can be purely predicative, quantificational/scope-taking, referential, or deictic, depending on grammatical context.” (PUG 127, with my italics)


⁸ “The triangle between the caller, the stimulus, and the action is causally and adaptively closed. The calls occur when the stimulus does, which is also when the percept does, which identifies the predator. There is no evidence that the calls in question are ever applied to anything other than the stimulus, in the very adapt context in question; or that the percept involved in one such call can be targeted as such, and be combined with another percept ...” (PUG 42; cp. Derek Bickerton, *Adam’s Tongue*, Hill and Wang, 2009, 44–7, 68–9)

⁹ RP 2.3. Cp. PUG 49 where Hinzen defines a lexeme as a “lexical address for a set of perceptual features.”
content. In more traditional terms, lexical reference appears to be equivalent to what has been called *semantic reference* and thereby to contrast with so-called *pragmatic reference*.  

Finally, grammatical reference is a distinct form of linguistic reference, in this case reminiscent of pragmatic reference. Grammatical reference, in almost all of its forms, incorporates lexical reference. But in contrast to lexical reference, grammatical reference is mediated by grammar. As such it obtains between grammatical entities and whatever it is that is the content of such entities. Central to Hinzen’s theory, the entities in question are so-called *formal ontological types* or *categories* (more on which below).

In principle these three kinds of reference might be related in any number of ways, including having no substantive relation at all. Yet they do appear to share the following basic features. All three kinds of reference consist of some type of content bearing entity: a non-linguistic vocalization, a content word, and a grammatical expression respectively. Each content bearing entity is essentially related to a mental representation: a percept, a lexical concept, and a grammatical thought respectively. And each mental representation is essentially related to some type of content or feature of the external world that it bears. To this extent one might view these forms of reference as specifications of a single, admittedly rather abstract model.

At any rate, in view of these considerations, what Hinzen should be viewed as presenting in *RP* is a theory of a particular kind of reference, again grammatical reference. Therefore, the novelty and controversy pertaining to the theory should turn on one or the other of the following opposing theses: either there is no such thing as grammatical reference; or there is such a thing as grammatical reference, but Hinzen has in some way mischaracterized or inadequately characterized it.

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11 I discuss the single exception, first person pronominal reference, below.
12 Cp. “The core meaning of ‘semantic’ is that it denotes relations to the world: *content*.” (*PUG* 141)
13 Analogous points regarding Hinzen’s use of other central terms in *RP* such as *thought*, *meaning*, and *deixis* could be made. E.g. Hinzen commits himself to the view that among animals only humans are capable of thought. But, I take it, what Hinzen intends to convey by this is that there is a species-specific form of cognition that occurs only in humans and that such cognition depends on the uniquely human capacity for language. In turn, Hinzen recognizes forms of cognition in non-human animals. Such cognition is moreover taken to be computational, to involve the manipulation of symbolic representations. However in non-human animals the representations are limited to percepts. (Cp. *PUG* 45) On *deixis*, see below and at n. 31.
In the following, my primary aim will be to clarify some of the central features of grammatical reference, as Hinzen conceives it. Along the way I will offer some critical remarks pertaining to this conception. My critical responses fall under the general claim that in certain respects Hinzen has inadequately characterized grammatical reference. More precisely, it seems to me that Hinzen’s account occasionally needs clarification; as the example of reference illustrates, key terms of the theory are used in multiple ways. There also appear to be some contradictions in the theory. Above all, one of the central concepts of the theory, referential scalarity, seems not to be entirely clear or coherent.

3 The nature of grammatical reference

What then is grammatical reference? And what justifies Hinzen’s claim to it? As stated, grammatical reference is a relation that obtains between a grammatical entity and a formal ontological entity. In elucidating the nature of the grammatical entity, it must be appreciated that Hinzen does not understand grammar in terms of parts of speech. Grammar is universal, whereas diverse natural languages exhibit variation in their morpholexical and morphosyntactic classes. Accordingly, grammar is understood in terms of a set of universal functions and relations that hold between the words that fall into diverse language-specific classes.14

What then are the universal functions and relations that constitute grammar? We are told that grammatical reference and predication are the most salient kinds. Indeed grammatical reference is the most basic function of grammar.15 With this, however, we have lapsed into an explanatory circle: grammatical reference is being defined in terms of grammar, and grammar in terms of functions such as grammatical reference. To what extent Hinzen has a non-circular account of the kind of reference that he aims to explain remains to be seen.

At any rate, since grammatical reference is the most basic function of grammar, a unit of grammatical reference – call it a referential unit – is the most basic unit of grammar. Referential units themselves are of three kinds: nominal, verbal, and clausal. Among these, nominal referential units are the most basic kind. Verbal and clausal referential units are constructed in part by embedding them.

All referential units share a structure that is constituted by two elements: an edge and an interior, viz.: [EDGE [INTERIOR]].16 Hinzen notes that this entity resembles a Chomskyan phase. Accordingly he suggests that “the phase is the smallest unit of grammatical organization.” (PUG 102)
descriptive content. The edge contains “grammatical elements” and so grammatical content. For any given kind of referential unit – again, nominal, verbal, or clausal – the type of grammatical element contained in the edge governs a form of grammatical reference with a certain so-called referential strength. Accordingly, a central feature of Hinzen’s theory of grammatical reference is that it is scalar and that its scalarity is, again, conceived in terms of the gradable property of referential strength. I return to this idea below.

Presently, in the case of the nominal referential unit, the descriptive content of the interior is supplied by lexemes (recall the description of lexical reference above). In other words, descriptive content is lexical content. The grammatical content of the edge is, again, supplied by “grammatical elements,” one example of which is a determiner. The following unit provides an illustration of these commitments: \([DP \text{the [NP man]}]\).

In *PUG* Hinzen refers to grammatical reference as intentional reference as well as deictic reference. In elaborating the present account of grammatical reference, I will comment on Hinzen’s use of these two terms respectively.

Between *RP* and *PUG*, Hinzen uses the term intentional in two ways. Consider *RP*:

> All thought inherently has a content – without it, it would be empty and not be thought. This is one sense in which thought is intentional (with a ‘t’): it is always “about” some object, person, state, event, possibility, or fact, and properties that these involve.\(^{17}\)

Compare *PUG*:

> Intentionality (with a ‘t’) refers, as we will use the term, to our ability to refer to an object in the world deliberately and flexibly.\(^{18}\)

It is in terms of this latter usage that Hinzen speaks of grammatical reference as intentional reference. Accordingly intentional reference entails voluntary reference. Contrast this with sense perception. Insofar as our sensory faculties are intact, the external world simply impinges upon them. In other words, sense perception is a stimulus dependent cognitive state, and as such not under voluntary control. Grammatical reference, on the other hand, is not constrained by environmental stimulus.\(^{19}\) We can think and speak of and therefore

\(^{17}\) *RP* 2.2.

\(^{18}\) *PUG* 36.

\(^{19}\) Cp. “the whole point about the emergence of lexical items is that they can be activated in the absence of a sensory trigger.” (*PUG* 119)
grammatically refer to things in their absence.\textsuperscript{20} Hence what we think and speak of is (in many respects) up to us.\textsuperscript{21}

The cognitive control and flexibility that grammatical reference enables in turn depends on what Hinzen refers to as cognitive capacities for and processes of \emph{de-} and \emph{re-indexicalization}:

The process of lexicalization de-couples the percepts that are selected from their respective visual stimuli, giving us new and more abstract entities, lexical items, which are stimulus free and independently manipulable, enabling creative thought and reference. For this reason, we may describe the process as one of “de-indexicalization”.\textsuperscript{22}

But the “freedom from experience” that lexicalization enables “is bought at the cost of having to \textit{re-establish} a link with experience.” In other words, the decoupling in turn requires a “\emph{mechanism} ... to relate [lexical concepts] back to the world on occasions of activating them: a system converting concepts into \emph{referential expressions}. In this reference-system, reference to the world will be a creative (intentional) act subject to conscious control ... We identify this system with grammar.”\textsuperscript{23}

Re-indexicalization is deixis. In both \textit{PUG} and \textit{RP} Hinzen identifies the developmentally most basic form of deixis with finger pointing in infants, and he describes grammar a “device of \textit{extended deixis}”:

The root meaning (and earliest developmental manifestation) of this notion of reference [i.e. grammatical reference] we take to be (e.g. index finger) pointing, which is deictic.\textsuperscript{24}

For instance, the infant points at a dog and says \textit{dog}. In this sort of case the lexical term \textit{dog} combines “predicatively with the declarative gesture” to form an “integrated unit ... involving both reference and description in different

\textsuperscript{20} Observe that imagination is also a form of cognition that is not stimulus-dependent. Hinzen acknowledges this point in a footnote in \textit{PUG}, and remarks that what distinguishes imagination from grammatical reference is that the former is not combinatorial. (\textit{PUG} 38, n. 1)

\textsuperscript{21} In his employment of the term \textit{flexibility} in this context, it seems to me that Hinzen may be conflating two capacities: one for stimulus free activation, the other for combination of contents. Memory does not require stimulus, and some animals have, for example, extraordinary spatial memories. So it might be helpful here to target combinatorial capacity and to reflect further on its constitutive and enabling conditions. Central, I would think, must be its involvement in abstraction of a particular kind, including non-analogic and non-isomorphic symbolization.

\textsuperscript{22} \textit{PUG} 47.

\textsuperscript{23} \textit{PUG} 47.

\textsuperscript{24} \textit{PUG} 80; cp. \textit{RP} 2.6.
modalities.\textsuperscript{25} As linguistic capacities develop, the incorporation of explicit grammatical elements into speech “vastly [expands] the range of possible reference beyond where our index finger can point.”\textsuperscript{26}

This account suggests that it is precisely the grammatical elements in the edge of referential units that are responsible for encoding and thereby enabling the deictic function. On the other hand, an act of pointing or extended deixis also requires some conception of what it is that one is referring to. As such deixis and so grammatical reference requires descriptive content.\textsuperscript{27} Evidently it is the lexemes or lexical concepts housed in the interior of the nominal referential unit that provide this content. Compare Hinzen’s following remark from \textit{PUG}:

\begin{quote}
Any act of reference, then, contains an \textit{identifying description}, however reduced it may be, which as such must involve a concept, which is what \textit{supplies} the descriptive content in question, and hence the identity conditions for the referent.\textsuperscript{28}
\end{quote}

On the other hand, in \textit{RP}, in the context of his discussion of grammatical reference as intensional (with an \textit{s}), Hinzen writes:

\begin{quote}
Intensionality entails that when we change the lexical or grammatical (i.e. relational) ingredients of a thought, the thought becomes a different one, whether or not we keep the reference [i.e. the referent] (the external element) stable.\textsuperscript{29}
\end{quote}

This suggests that in fact the grammatical elements of the nominal referential unit also contribute to the “identity conditions” of the referent. If so, then Hinzen’s remarks here appear to require his recognition of two types of descriptive content: lexical and grammatical.\textsuperscript{30} Alternatively, given the distinction he draws between the contributions of the edge and the interior of the nominal referential unit, further clarification of the non-descriptive, but \textit{semantic} contribution of grammatical elements seems needed.

In concluding this brief consideration of grammatical reference as deictic reference, I return to the worry expressed above whether Hinzen is able to offer a non-circular account of grammatical reference. Hinzen’s conception of grammar as a mechanism for re-indexicalization helps clarify what he might mean

\begin{flushleft}
\textsuperscript{25} \textit{RP} 2.6.
\textsuperscript{26} \textit{PUG} 80; cp. \textit{RP} 2.6.
\textsuperscript{27} As noted above, first person pronominal reference seems to be one exception to this principle.
\textsuperscript{28} \textit{PUG} 54.
\textsuperscript{29} \textit{RP} 2.2, with my italics.
\textsuperscript{30} E.g. cp. the phrase “grammatical semantics” at \textit{PUG} 142.
\end{flushleft}
by *deixis*.31 I take it that deixis is here conceived as the phenomenon whereby language enables a speaker, that is, a first person, for the purposes of communication to a second person, to situate (lexical) content in time and place. Hinzen’s position is precisely that grammar is the means by which this phenomenon is realized. This seems to me to some degree and, I think, non-circularly to illuminate Hinzen’s conception of what grammatical reference consists in.

## 4 Referential strength and formal ontology

I return now to the claim mentioned above that grammatical reference is scalar, and more precisely that referential units have varying degrees of strength. I continue to focus on the case of nominal reference. In *PUG* Hinzen proposes the following “hierarchy of nominal reference”:

\[
\text{(*the)} \ast (\text{NP}) \prec \ast (a) \ast (\text{NP}) \prec \ast (\text{the}) \ast (\text{NP}) \prec \ast (\text{this}) \ast (\text{NP}), \prec \ast (\text{he}) \ast (\text{NP}).
\]

Here the symbol \(\prec\) means *referentially weaker than* or *is more dependent on the lexical content of the descriptive predicate*. Accordingly, the hierarchy proceeds from bare noun-phrases to indefinite determiner noun-phrases to definite determiner noun-phrases to demonstrative determiner noun-phrases to pronouns.32

Hinzen characterizes the basic grammatical principle of this scalarity in the following terms:

The general principle [is] that increased referentiality [i.e. referential strength] corresponds to the [referential unit] becoming more “*edge-heavy*” … along with the fact that increased referentiality correlates with [the recruitment of] increased grammatical resources.33

For instance, in the phrase *unicorns* in the sentence *Mary is hunting unicorns*, it is suggested that no edge is projected and therefore that reference is determined

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31 *Deixis* and *deictic* are other key terms of his theory that Hinzen uses in various ways. E.g. “This becomes even clearer where the edge gets even stronger, through the addition of a deictic element, assuming with [Tom Leu, *The internal syntax of determiners*, NYU dissertation, 2008] that ‘this’ morphologically decomposes into the definite determiner and a deictic element (‘the’ + ‘here’).” (*PUG* 128) And: “Where ‘the’ in the copular construction … [John is the man] is strengthened to ‘this’, the predicative reading is out in this position as well, and the speaker will necessarily make deictic reference to a particular individual in the context: [John is this man].” (*PUG* 120-21)

32 *PUG* 41.

33 *PUG* 129.
“purely via the descriptive content of the nominal.”

In the phrase *lamb* in *Mary is eating lamb*, arguably an edge is projected, viz. Mary is eating [Ø [lamb]], which is equivalent to *Mary is eating some lamb*. Referential strength increases further as the edge is both projected and filled, for example *Mary is petting a lamb*. And referential strength increases still further with the employment of increasingly strong determiners, for example: *Mary is petting the lamb* and then *Mary is petting this lamb*. At the strong pole of the nominal referential hierarchy, the descriptive content is obligatorily dropped: *Mary is petting it*.

More generally, Hinzen characterizes the transformation of the grammatical and descriptive content constituting the referential unit as *topological*:

> the term “topology” indicates the possible transformations (or deformations) of a given geometrical object, while leaving its basic identity intact (invariant under the transformations in questions). In the case of grammatical reference, the geometrical object is the [referential, e.g. nominal referential unit].

In short, Hinzen’s theory of grammatical reference is also a topological theory.

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34 *PUG* 128.

35 There is reason to question whether *Mary is eating lamb* is equivalent to *Marry is eating some lamb*. Compare the following two sentences: *Mary ate lamb for two weeks. Mary ate some lamb for two weeks*. In the former the quantifier *two* takes scope over *lamb* and there is no alternative reading. In contrast there is a reading of the latter in which the quantifier *some* takes scope over *two*. (I have adapted this example from Gregory Carlson, *Reference to Kinds in English*, Garland Publishing, 1980, 12–17.) If this criticism is correct, it may not simply constitute the flagging of an isolatable infelicitous example. Bare mass nouns and plurals appear to share an array of semantic properties. But at least according to a Carlsonian or neo-Carlsonian interpretation of them, these properties are not to be explained by appealing to “grammatical elements” in the specifier of the NP.

36 *PUG* 127-28. Cp. “as the edge expands – from an edge that is necessarily lexically zero to one that has a referentially weak, indefinite determiner, to one with an obligatory ‘strong’ and definite determiner, to one with a deictic determiner or pronoun that can occur without the lexical restriction, and finally to a deictic pronoun that must occur without such a restriction – we see reference getting more specific and stronger, i.e. less dependent on a lexical description or predicate.” (*RP* 2.6)

37 *PUG* 117.

Granted this, what exactly is referential strength? In grammatical or linguistic terms, we have already encountered an answer: from weakness to strength referentiality correlates with a progression from those linguistic forms that are “most lexically mediated or descriptive” to those that are “most grammatically mediated or deictic.”\(^{39}\) But crucial as this idea is for Hinzen’s theory, it constitutes merely one component of a satisfactory answer to the question posed.

As Hinzen notes, the grammatical forms constitutive of the hierarchy of nominal reference also correlate with a hierarchy of types or categories of content. These categories Hinzen characterizes as members of a formal ontology. The general formal ontological category corresponding to the nominal referential unit is – to employ a term of traditional ontology that Hinzen uses – that of object. Compare event as the general formal ontological category corresponding to the verbal referential unit, and proposition corresponding to the clausal referential unit.\(^{40}\)

Accordingly, the formal ontological categories of content of weaker and stronger forms of nominal reference are kinds of objects. Those kinds of objects referred to by weak forms of nominal reference include: abstractions, non-individuated substances, and properties. Examples of each, employing the lexeme *man* follow: John is *man* enough to solve this problem; John likes *man* (that is, he has a penchant for cannibalizing); John is *a man*.\(^{41}\) Stronger forms of nominal reference correspond to various sub-categories of individuated substances, that is, individuals, such as an arbitrary number of individual instances of a kind (*John is looking for men*); particular individual instances of a kind potentially unknown to the speaker (*The men arrived*); a particular individual instances known to the speaker (*John likes the men*).\(^{42}\)

In contrast to the grammatical principle responsible for differentiating nominal referential units of variable referential strength, the principles that distinguish these formal ontological categories seem to be heterogeneous and difficult to synthesize in a coherent way. They appear to include: metaphysical features such as abstractness versus concreteness, generality versus specificity, and property-hood versus individuality; seemingly hybrid metaphysico-epistemological features such as indefinite versus definite quantities; and also epistemological features such as being unknown versus known to the speaker.

\(^{39}\) RP 2.6.

\(^{40}\) PUG 103. I wonder: if Hinzen borrows the terms object, event, and proposition from traditional ontology merely for heuristic purposes, then how should we ultimately understand the general formal ontological categories corresponding to nominal, verbal, and clausal referential units (not to mention the sub-categories corresponding to the various sub-forms of referential unit)?

\(^{41}\) PUG 122.

\(^{42}\) PUG 122.
A distinct concern the account raises is that some referential units that are constituted by grammatical forms of distinct referential strength appear to correspond to identical formal ontological categories. For example, compare the demonstrative determiner noun-phrase and pronoun in *John knows that man* and *John knows him*.

Another concern relates to Hinzen’s claim that the first person pronoun constitutes the strongest referential unit. For one thing, contrary to Hinzen’s claim that every act of reference “contains an identifying description, however reduced it may be, which as such must involve a concept, which is what supplies the descriptive content in question,” the first person pronoun is expressly said to lack descriptive content. Compare Hinzen’s statement in *RP*: “reference to oneself as ‘I’ involves no description and is minimally lexical and maximally grammatical.” In part due to these facts, it is difficult to understand what kind of formal ontological object *I* could refer to. Surely it refers to an individual. But that individual is, explicitly, not to be identified with a particular body. Hence it appears to refer to a non-physical and as such abstract individual.

However these questions regarding the nature of referential scalarity may be answered, Hinzen’s theory of referential scalarity prompts the following thought. At one pole of the referential scale, the first person seems to be the source of deixis, for the situating of lexical content in time and place by grammatical means is fundamentally anchored in the speaker’s orientation to the world. At the opposite pole, where reference is said to be determined “purely via the descriptive content of the nominal,” such content seems to reach its most tenuous connection to speaker and so context. In fact Hinzen’s illustrative sentence, *Mary is hunting unicorns*, appears, even in its choice of lexical content, to underscore this ungroundedness.

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43 *PUG* 119.
44 *RP* 2.8. At the other pole of the referential scale, recall that in certain instances, e.g. bare plurals such as *unicorns* in *Mary is hunting unicorns*, no edge is projected and reference is determined “purely via the descriptive content of the nominal.” In that case, it appears that Hinzen’s committed position is that grammatical reference requires a conjunction of grammatical and lexical components in all but the extreme cases corresponding to the poles of the referential scale.
45 “This body’ merely specifies a physical object, reference to which does not equate to 1st Person thought.” (*RP* 2.8)
I am honoured by the thoughtful considerations that have gone into all of the commentaries in this issue. Their respective origins in psychology, linguistics and philosophy indicate the ramifications and implications that the present research program is meant to have and the challenges it faces from all of these directions. It is only in this broader frame that the fruitfulness of the central hypothesis of the present framework can be demonstrated: that sapiens-specific thought rests on a linguistic foundation and grammatical distinctions mediate cognitive ones. Ultimately, this hypothesis raises the question of what language is – how it functions as a system, and whether or how it transforms the cognition of which it is an aspect. The point of the hypothesis, however, is to motivate new empirical and experimental research questions. De Villiers pointedly formulates one of them within developmental psychology: Do ‘children with autism fail to automatically “see” the world through language’? I agree with her that, in psychology more generally, ‘the empirical research to date has not focused on the kinds of questions that Un-Cartesian linguistics poses’. Theoretical linguistics, too, is not at present pursued as targeting the integration of language with a particular cognitive type, and as Reboul discusses, it still tends to separate language as such from the type of species-specific communication that it supports, a separation that the present framework urges to resist. None of this even touches on the deeper philosophical issues that Wolfsdorf raises, from the nature of meaning to the connection between language and metaphysics. These are barely addressed in my work (though see Hinzen & Sheehan [henceforth HS], 2015, chapter 9) and a fascinating enterprise to embark on in the future.

1 Articulating the framework

In his meticulously researched review, Wolfsdorf distinguishes functional, lexical and grammatical reference and suggests that I have ‘lapsed into an explanatory
circle: grammatical reference is being defined in terms of grammar, and grammar in terms of functions such as grammatical reference’. However, the existence of grammatical reference as a natural kind is an empirical claim, not a definitional one: the claim is that the referential capacity discussed in the article depends on the existence of grammatical organization. The claim could be false, if, say, nonverbal humans or non-human species exhibited instances of the same forms, or if we saw different forms of such reference varying independently of forms of grammatical organization (for example, being regulated pragmatically instead). In short, such reference is grammatical by name and empirical fact, not definition. As for defining grammar, I take the standard view to be that reference is a ‘semantic’ function, not a grammatical one, often more specifically posited to hold between words and things, with grammar adding an only formally specified mechanism of recursion/Merge. Grammar in this sense is reference-free. That core grammatical relations such as Case or thematic roles are mechanisms through which different forms of reference are generated in language is, again, an empirical claim about the nature of grammar, which The philosophy of universal grammar (HS, 2015) and related work (Hinzen 2014) sought to substantiate.

Wolfsdorf also suggests that I recognize ‘two types of descriptive content’: lexical and grammatical. However, functional and lexical structures in nominal phrases cooperate in such a way that lexical-descriptive content provides a semantic condition on reference in the sense of a concept that identifies the relevant referent as belonging to a general kind, while functional structure in the edge of the nominal regulates the type of referential use to which it is put on an occasion of the concept’s retrieval. This is the ‘semantic’ contribution of determiners, or the content of grammar, in this nominal case.

Crucial to the framework is not only that the forms of reference in question exist in a grammatical frame but that they exhibit an at least partial order (a hierarchy). In this regard, Wolfsdorf notes that along with grammatical differences between these forms of reference, there are a number of other features that distinguish them, which do not form a homogeneous set and appear, at first glance, difficult to synthesize. As he illustrates, this includes seemingly metaphysical features (e.g. abstractness versus concreteness; generality versus specificity; or denoting properties versus individuals); hybrid metaphysico-linguistic features such as indefiniteness versus definiteness; or even epistemological features such as being known or unknown. Yet in response to the general heterogeneity seen in almost any aspect of the natural world, we need to find systems that organize the diversity seen in a coherent fashion, making it intelligible to our understanding. It so happens, the claim is, that the grammatical specifications of the hierarchy do form such a natural system. That differences structured in this fashion will not also co-vary with other factors is not the claim,
and indeed this would be expected given how interwoven language is with cognition at large. How valid, on the other hand, the descriptive notions above are, is another question. For example, if abstractness vs. concreteness are said to be ‘metaphysical’, and they demonstrably are also both grammatical and lexical-semantic distinctions, how independent are our metaphysical distinctions really from linguistic ones? Aspects of grammatical organization in human language might be intrinsically relevant to the concerns of an epistemologist or metaphysician.

This can be illustrated with the grammatical first person, which in many languages including English involve overt lexical forms that involve no descriptive content whatsoever.\(^1\) How epistemologically significant is this? Hinzen and Schroeder (2015) have pointed out that the absence of descriptive content implies that no act of reference involving such first person forms can involve the misapplication of a description, protecting such reference from failure due to misapplication of a concept (‘immunity from error through misidentification’, in traditional epistemological terms). While not questioning this argument per se, Wolfsdorf finds it ‘difficult to understand what kind of formal ontological object I could refer to’. This raises an interesting question about the connection between grammar and metaphysics. I do not see an empirical basis for suggesting that the shift from the grammatical third to the first person changes anything in whether a given NP in a given grammatical position is referential or not. It is equally a fact that forms of reference in the third and first person are distinct grammatically, semantically and epistemologically: it is not the case that one could be replaced for the other. For example, reference specifically to one’s body by saying ‘this body’ cannot be collapsed with saying ‘I’. Finally, it is a fact that referring to oneself as ‘I’ is not to give any descriptive features of whatever the object of reference here is – unlike in the case of ‘this body’ or ‘this man’, for example. Therefore, from the viewpoint of the formal ontology of grammar, the two kinds of referents are distinct. Does this mean they are metaphysically distinct as well, validating a form of metaphysical dualism (Lowe 2007)? This is a fascinating question in the realm of the interface between grammar and metaphysics, which unfortunately has been far beyond the scope of my own work to address (but see Miller 2014).

Wiltschko articulates a core prediction of my account in a slightly misleading way: ‘It appears that in ASD and SZ, reference is disturbed […], which reflects a dysfunction of language and hence – given the [Language = Thought] hypothesis – amounts to a dysfunction of thought.’ I feel slightly uneasy of

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\(^1\) For discussion of other cases see Reichard (2013), Reichard and Hinzen (2016), and Hinzen et al. (2014).
reducing my framework to the programmatic claim in corner brackets above: the qualification in particular that many forms of ‘thought’ with different kinds of content – music, arithmetic, spatial navigation, etc. – may not depend on language, is crucial. De Villiers, too, makes the un-Cartesian claim unnecessarily strong by stating that ‘The further claim is that there is nothing either before [human-like thinking] in ontogeny or like [it] in a nonlinguistic mind’. The point is that our species has a cognitive type different from those of other species, even in our genus Homo, for which we need an explanation. But apart from that type of worry to do with formulation, I would prefer to state the prediction the other way around than Wiltschko does: ASD and SZ both involve a disorder of thought (virtually by definition, in the sense that they are neurocognitive disorders), and there is strong empirical evidence that they both empirically involve disorders of reference; given the un-Cartesian approach, then, these should amount to a linguistic dysfunction. As Wolfsdorf rightly puts it, ‘cognitive pathologies in humans should have linguistic symptomatology’.

Collins sees room for a more traditional position consistent with the un-Cartesian commitment that there is no ‘generative system of independently determinate thoughts’, and ‘propositional thought is largely structured by linguistic combinatory technology’. ‘Largely’, though, means ‘not completely’, on this alternative view, which Collins regards as the ‘standard position of generative linguistics’. Specifically, a substantial injection of pragmatics – i.e. extra-linguistic factors – is required ‘to fix the content of utterances on their occasion of use’. This position remains un-Cartesian in my terms, precisely insofar as the additional processes to yield ‘complete’ thoughts are pragmatic in Collins’ sense: for if so, there is no syntax there, and the structural frame is in place. In different terms, the formal ontology of language – the potential for a thought system with referentiality and an ontology of objects, events, and propositions – is set. Collins’ additional extra-linguistic factors remain formally unspecified, but they are postulated because of empirical considerations, not architectural ones. Since the ambition of the un-Cartesian program is investigating the neurobiological foundations of a cognitive type unprecedented even in the human lineage prior to our species, the addition of the envisaged pragmatic element to the claim that language lays the foundation of this type will not change the basic research hypothesis. My view here (Hinzen 2015) remains that the question Collins raises is empirical. While the weakened position may certainly be forced empirically, it should, in my view, only be adopted if forced in this fashion.

I will comment on relevant empirical data immediately below, but note first that the framework I outlined hardly amounts to a rejection of what Collins suggests is the standard position of generative linguistics. In its minimalist shape, the latter is a research program – it does not amount to any position.
This crucially includes the issue of the interface(s) between language and thought. Minimalism as such does not imply deciding this issue one way or the other, as Chomsky (2007) noted. As a sociological generalization, the Cartesian position is probably maintained intuitively by most formal semanticists as well as syntacticians. But it is rarely if ever explicitly discussed or defended (though see Jackendoff 2002), and Chomsky’s own frequently re-stated commitment to the idea that a thought system arises from the operations of the computational system of language, without an independent Language of Thought (LoT) (e.g. Berwick and Chomsky 2011), lacks articulation: we need to explain why this thought system takes the form it does, i.e. how its empirical features (e.g. the referentiality that it inherently entails) fall out from the operations of language. Doing this is the ambition of HS.

2 Linguistic challenges

Let us now come back to the empirical facts that Collins adduces (though I stress that none of the following judgements can be made as lightly and require detailed empirical and cross-linguistic investigations). Their purpose, in Collins’ exposition, is to prove the point that extra-linguistic (specifically, extra-grammatical) factors determine propositional meaning. Beginning from those of most relevance to what I was discussing in the article, Collins claims that (1) has an existential construal, equivalent to (2), which, if true, would entail that bare plurals in English do not map obligatorily to the generic reading seen in (3), creating an apparent mismatch between grammar (nominal syntax) and propositional interpretation:

(1) Dogs are in the garden

(2) Some dogs are in the garden

(3) Dogs are four-legged

In response, I note that I have not claimed that bare plurals do obligatorily map to the generic reading. Indeed, (4) is immediate evidence to the contrary:

(4) I saw dogs in the garden

(1), on the other hand, is less clear. It has the generic reading of Dogs are in the garden, cats are in the house (e.g. stating a rule), but it is not clear that it has the
existential reading of (2), and even if it does, then (5) (apart from (2)) is definitely a more natural way of stating this reading, which in turn strongly disfavours the rule-reading:

(5) There are dogs in the garden

If so, the example illustrates a classical un-Cartesian point: change the grammar of a sentence, and you’ll change its propositional meaning. There is no synonymy, in grammar, ever: if (2) has an overt determiner, and (1) does not, available readings change.2 (2) is grammatically different from (1), as is (5). These doubts continue with his example stated here as (6):

(6) A mini is black and yellow

Collins states that ‘we naturally read [6] as being about some particular mini rather than minis as such, for minis are not so generally coloured’. But in the reading Collins has in mind, where a particular mini is intended, (7) is way better than (6):

(7) a. Some mini is black and yellow
   b. There is a mini (here) that is black and yellow

(6) is more naturally read generically (in which case it would be false). Note further that Collins (problematically, on my view, as argued above) states that the difference between (1) and (3) that he envisages – i.e. (1) is existential, (3) generic – depends ‘on the predicate being either stage- or individual-level’. If so, rather than making a point about the extra-linguistic influence on the fixation of propositional meaning, he directly specifies the linguistic factors involved. The referential hierarchy I formulated never entailed that NP structure viewed in isolation determines the nature of the referential act – it always is NP-structure together with the sentential configuration (see further Martin and Hinzen 2014). Collins’ point, if correct, would thus only show that the difference between existential and generic uses of NPs depends on the sentential configuration as

2 The exclamative version of (1) (e.g. a person shouting Dogs are in the garden!, where stress shifts to Dogs, may favour the existential reading. Hans-Martin Gaertner reminds me of the ‘joke’ in Dogs must be carried (Halliday, see Gussenhoven 2008: 94) as sign on the underground train, meaning either Dogs that aren’t carried aren’t allowed or People without dogs aren’t allowed, suggesting that the existential reading is available to some extent with stress on dogs, similarly to what is seen in (5). Wolfsdorf (fn. 36) notes a similar difference in meaning arising from whether the indefinite determiner some is present or not.
a whole and what factors are involved in it. Indeed, stage-level vs. individual-level is not merely a lexical distinction, since many lexical predicates can be used in both ways, in the right grammatical configuration: for example, *I am red* can mean that I got a sun burn earlier that day, but it can also mean that I am red by nature (in terms of skin colour, political convictions, etc.) (see also Raposo and Uriagereka 1995).

This brings us to the second range of examples, more lexical in nature, that lead Collins to think that linguistic structure does not suffice to fix propositional meaning. *A red pen*, he notes, may ‘merely look red, given the lighting, or be classified as red due to the draw it belongs in’. Grammar, for sure, does not tell. I agree (Hinzen 2015). But this is the point: where grammar does not reign, context rules: *red* as such, irrespective of context, doesn’t refer to anything, virtually, not even a determinate general concept.3

3 Challenges from psychology

De Villiers is helping me to predictions for the one species of humans that I am not actually researching at the moment: neurotypical children. Will infants faced with nonverbal tasks such as individuating the instances of a kind or interpreting the thematic structure of an event behave differently depending on their progress with language? Will adults form different implicit concepts of what makes structured events ‘similar’, when the participants and actions are perceptually different but fall under the same linguistic descriptions (e.g. *Dog bump car*?), in dual task designs where their language faculty is not at their disposal? Is the same true in the absence of dual task designs of children younger than 2 years, who did not yet master the syntactic complexities of reversible event descriptions? Negative answers to the last two questions from recent experimental work of de Villiers (2014, 2016) and Shukla (2016) to the last question (and see Nordmeyer 2011), imply that the relevant tasks are in fact misclassified as ‘nonverbal’: they require verbal, not nonverbal thinking. In my own terms, these research questions and experiments precisely address to what extent the intuitive formal ontology of the world, whether in the case of objects or events, is linguistically configured. The idea that we first configure our thoughts non-linguistically via some formally unspecified mechanism, and then ‘map it onto’ a

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3 Applied to Collins’ (3a), *Every student passed the exam*, this means what counts as a ‘student’ will contextually vary, while I take his (3d) to be a classic case of structural ambiguity, though argument structure is of course in part lexically encoded as well.
linguistic surface, may be a myth. Almost all of the work cited by de Villiers (see also Newton and de Villiers 2007) beautifully illustrates how an empirical agenda speaks to a foundational and abstract idea.

I can strongly relate to the worry that the un-Cartesian position becomes untestable when we cannot find experimental paradigms that manage to disentangle language-guided cognitive processes from others that may only be lower-level perceptual and behaviour-oriented. Implicit theory of mind (ToM) type of tasks shown to be mastered by very young children just seem to fit the bill, yet de Villiers notes recent evidence against the replicability of these early findings (Kulke et al. 2017). Independently of that, it is not clear which cognitive process, exactly, implicit ToM tasks with looking time as an outcome measure really tap into. In a formal fashion, putative cognitive processes underlying different ToM tasks have to my knowledge never been described – in the way, say, that the mental process of constructing a recursive sentence has been (the project of modern generative grammar). Typically, researchers simply use their own language faculty to provide a verbal description of the stimuli, e.g. Sally thinks her marble is in the basket. Based on these, reasoning of experimental subjects is then thought to unfold. But does this structure depict the thought of a 7-month old infant accurately? Can we ever fully tell? There is reason to believe that, in principle, we will not: any perceptually presented task will always underdetermine the concepts that we employ to cognize it, since thought is not controlled by what we see – a consequence of its inherent intensionality (with an ‘s’).

Based on the very nature of thought, that is, a margin of doubt on any claim to the effect that a human being has a certain thought, when and as long as this thought is not and cannot be rendered verbally by that being, will always remain. For now we simply do not know what the cognitive mechanisms are that are said to fall under the label ToM, and how minimal they might be, perhaps failing to involve a notion of ‘mental state’ at all (Heyes 2015; Apperly and Butterfill 2009; Heyes and Frith 2014).

The worry should affect the Cartesian theorist as well: it is him who wants to disentangle two systems that the un-Cartesian predicts are necessarily entangled, once thought is conceptual, intensional, and referential in the sense described. Yet the systematic implication of non-aphasic language anomalies in cognitive pathologies can provide relevant evidence. Whatever cognitive process ToM tasks tap into, and however ill-described it may be formally when language is not presupposed, we can look at whether performance on such tasks ‘marches along’ with language development, as de Villiers puts it. Will completely nonverbal children and adolescents with autism master even implicit false belief tasks? This seems highly unlikely. While this deficit could then be credited to their autism or intellectual impairment rather than their lack of language, this
question can be addressed by asking whether IQ- or language-matched non-autistic individuals will fail the same tests.

Wiltschko raises another possible area to explore more specific predictions of the un-Cartesian hypothesis in the context of mental disorders. As she notes, reference is a deeply social phenomenon: it ‘doesn’t stop at establishing a relation between a concept and the world (by identifying a particular individual or proposition)’. This illustrates why the study of reference in populations such as people with ASD or SZ is vital: both disorders involve deficits in what can broadly be called social cognition, and ASD is virtually defined by these deficits. Languages however differ in how aspects of discursive interaction are encoded syntactically. How do social communication difficulties in these populations pan out linguistically, then, when we compare languages with different morpho-lexical and morpho-syntactic resources, such as confirmationals and other sentence final particles, discourse markers, or evidentiality? How do cognitive disorders affect language use and perception at the level of prosody and intonation? There is not only a dearth of serious linguistic work on schizophrenia, but of cross-linguistic work as well.

4 Language and communication

Reboul takes things in a new direction inspired by her own work (Reboul 2017), which conceptualizes human language as grounding sapiens-specific thought rather than merely being a tool of communication, more in line with a traditional postulation of a Language of Thought (LoT). However, Reboul simplifies and partially mis-states my account as resting on the claims that: ‘a) language is thought; and b) language corresponds to the external languages that we use to communicate (Chomsky’s E-languages).’ For one thing, having language in place, the human mind becomes capable of taking things further, probing other ‘languages of the mind’ such as mathematics, music, or logic. These, while on my view resting on the foundations that language lays, can take us further into mental spaces that may not be governed by linguistic laws and clearly have different kinds of inherent contents (lacking referentiality, and arguably lacking content altogether in the case of logic). Secondly, point b) invokes the distinction between I- and E-languages that does not figure in the conceptual framework laid out here. Sheer endless discussions have taken place in philosophy and linguistics over the exact meaning of this distinction and its implications. Rather than furthering this debate, which I distanced myself from since Hinzen (2007), I note here that there seems to be no evidence of the existence of any human-like minds that have language figuring in them
internally, yet do not externalize it as speech or in some other way (selective mutism would not prove the contrary). Abstracting from these other ways, language is implemented in the brain as a speech circuit: the standard picture of left-hemispherically lateralized perisylvian pathways connecting superior temporal and inferior frontal areas in the brain are interwoven with the sensory-motor integration that inherently characterizes speech. This suggests that the linguistic species we are, inherently, is a communicating one as well, with its mode of thought manifest as speech. What is ‘I’ and what is ‘E’ here? Could noun phrases exist ‘internally’ but not ‘externally’? Would they be referential in this case? If they were not, would they be noun phrases? The framework I have outlined has not so far required me to answer these questions, whose meaningfulness is not clear to me.

What is empirically assertible, however, is the triangular nature of reference in either language or thought: it is my thought that I think, identifying myself in 1st Person, where the thought (i.e. any thought) can be different from that of an interlocutor identified in 2nd Person, and is necessarily about something distinct from us both, the 3rd or non-Person. This triangulation is both inherently grammatical (since Person is, along with Tense and other such inherent features of thought) and it plays itself out in the public domain, where speech acts take place at times and as uttered by people. The I-vs.-E distinction again does not seem meaningful here. Reboul thinks that at best the second person gives us an external dimension, but a thought in first person without a content, and hence the third person, viewed as external to my first personal world, is not a thought; and if the thinker cannot fathom that it is his thought, possibly without it being a second or third person’s thought, could it be a thought at all or be recognized as such? This three-fold Person distinction appears to act as a system: we cannot abstract the first person out from it, identifying a radically privative mode of thought that does not seem to be the species-specific one.

Any teacher of Linguistics-101 type courses will realize the need to make students understand that language is not the same as communication, a critical insight foundational for modern linguistics as such. But having digested this insight, it is in my view timely now to concede that, with language, and apparently inherently and exceptionlessly, goes a form a communication that is as sapiens-specific as language is. Communication in that sense and language are inseparable and come as a unit. This is where pathologies can teach us so much: where this species-specific mode of communication is disturbed, it is in linguistic (or language-related gestural) communication that we see this happening. People with autism do communicate: it’s the species-specific forms of communication, which involve language inherently, where we see a disturbance.
5 LoT or no LoT?

Against this, Reboul champions a LoT type view, conceding that whatever LoT we are going to postulate in the human case, it is going to be different from the animal case. This raises the immediate question of which neurocognitive change triggered this step change in evolution, if that factor was not language, and it deprives us of a potential advantage of the LoT hypothesis, namely that it provides continuity between linguistic and non-linguistic species. The more the human LoT becomes language-like in its internal structure, moreover, the more we would have to ask: What makes it different from language? A language is a thought system, inherently. We cannot talk without producing thoughts, and indeed communicating them. So what distinction does Reboul insist in making, if she pulls these apart, suggesting that ‘LoT is for thought and external languages are for communication’? Thought, language and communication (in their sapiens-specific forms) universally co-occur in humans, factually; for some, their co-occurrence is a conceptual necessity as well (Davidson 2010).

6 ‘Concepts’

‘Concept’ is a problematic term in current discussions, used widely to stand in for whatever the author’s preferred notion of ‘meaning’ is. The notion of ‘word’ improves things, since words have identifiable empirical properties which can be studied in a controlled fashion. Since they have meaning as part of what makes them the words they are, I am also calling them ‘lexical concepts’. Reboul concurs that these as such only have general meaning, with forms of referential meaning only arising within relevantly complex grammatical configurations occurring in utterances taking place in contexts. But she also introduces the notion of ‘decoupling’ the concept from the referent, and states that in the referential hierarchy I describe, ‘decoupling and reference are in inverse ratios: the more referential a term is, the less decoupled (even weakly decoupled) it is, and the less referential a term is, the more decoupled it can be’. She notes that this suggests that decoupling as such should not depend on grammar: even if grammar is crucial to reference, decoupling is not, which she argues evidence from animal cognition on planning supports.

In response, I note that a conceptual capacity (having lexical concepts) in my sense requires both more and less than ‘perceptual independence’ in Reboul’s sense: less, because lexical concepts correspond to categories, I suggest, which are rooted in our perceptual capacities, which in turn are
partially shared with other species.\(^4\) Concepts corresponding to such categories remain perceptually dependent in their lexical content, even after they are lexicalized – they are never ‘decoupled’ in this sense. What changes is their grammatical meaning, and it is the latter, not the lexical concepts, which are perceptually independent. Referentiality and perception are independent dimensions. Grammar lies between them, turning lexicalized concepts based on perceptually rooted categories into referential expressions on an occasion of use. Grammar can only function in this way if it can access categories in a way that does not depend on perceptual stimuli: we can think about anything we like, at any point (which is presumably false even of planning in animals).

It therefore presupposes lexicalization, a crucial reformatting step logically required for reference in the propositional, i.e. ‘disinterested’ (non-action related) sense that Reboul identifies, which in turn presupposes grammaticalization, i.e. adding a functional-grammatical ‘edge’ to the lexical concept in question.

Reboul is right that, in theory – though not in empirical fact, as noted above – an edge in this sense would not need to connect with any externalization at all, i.e. it could have led to a fully internal recursive system used independently of communication. A language/LoT system would then have evolved to which triangulation does not matter. The problem I have with this account is that the triangulation does matter: here is where pathologies are telling. Where the deictic frame is disturbed, the content of both thought and language change. In the schizophrenic case, truth and objectivity, which are inherent conditions of thought in the human-specific sense, are lost. If this aspect of the triangulation did not depend on language, Reboul would be right that we could go the old way: accept a language-like LoT, separating a Merge-based I-language from both communication and E-language. Truth could then be grounded in perception, as Reboul speculates, rather than in linguistic communication. But here we face the old problem: This will not do without an explanation of why other species with similar perceptual capacities lack the rationality and the thought system that we do. Whatever the way in which objectivity and truth are ‘grounded’ in perception, a difference remains with how truth figures in speech and the specific form of thought it conveys.

Overall, whether there is a problem for the LoT hypothesis to solve depends on what we think the language system is and what functions it involves. Here, for me, the discussion should be centred: how does language function

\(^4\) I do not see the alternatives, although the view is entirely open to the existence of ‘foundational abstractions’ in e.g. Gallistel’s (2009) sense, and I also suggest that other content can come from language and can lexicalize.
cognitively? The question is barely on the research agenda, especially with regards to grammatical organization. If language carries out the cognitive functions that I hypothesize it does, Reboul’s disqualification of language as ‘merely for communication’ loses motivation: There is no need to go to a still only obscurely identified and formally undescribed ‘thought’ system, which is paradoxically meant to be both very language-like yet different from the only language system we effectively know: language as such.

One of the deepest reasons for staying on the more conservative LoT-oriented side is a linguistic relativity scare: with only language left, how variable will thought be? A critic may grant the distinction independently assumed in much linguistic theory between lexicon and morpho-syntax, on the one hand, and grammatical relations, on the other. Yet I recognize that morphosyntactic variation may not be ‘innocuous for an un-Cartesian view’, as Reboul states. By postulating a universal LoT-style thought system unaffected by the vagaries of its externalization in different languages, we are seemingly out of this trouble. But at what cost? The problem of separating what is ‘externalization’ from what is ‘language’ is still with us now, as is the problem that the human-specific LoT remains unexplained; and language only is the explanandum that I think it is, if it involves externalization.

7 How promising is a new linguistic lens on autism spectrum disorders?

Durrleman asks whether the relation between grammatical competence and ASD is as strong as I envisage, mentioning a recent ‘form is easy, meaning is hard’ claim championed by Naigles and Tek (2017). These authors argue for ‘generally good (or even intact) grammatical usage and development in children with ASD’. However, they equally emphasize that ‘few extant studies of children with ASD actually include the relevant comparisons between language form and language meaning’. They also note evidence against their hypothesis from two studies (Tek et al. 2014; Park et al. 2012). Since these involved children with cognitive impairment, they subsequently restrict their claim to children with ASD without such impairment, thereby excluding almost half of the ASD spectrum. Negative evidence also comes from a third study of Eigsti et al. (2007), who found lower grammatical complexity in an ASD group matched with non-ASD groups on nonverbal IQ (see also Pierce and Bartolucci 1977). Naigles and Tek (2017) here comment that this finding may be due to the children with ASD talking ‘less frequently about the kinds of situations that might elicit, for
example, past tenses and questions’, giving them less opportunities to show their mastery of grammar, rather than manifesting lesser grammatical capacities. However, the opportunities for producing such structures were presumably the same among the groups, hence lesser production of such structures still needs to be explained. A difficulty with producing such structures is a natural explanation, as Eigsti et al. (2007) discussed. An alternative is difficult to consider. For example, representing a past Tense is representing a relation between the utterance, event and possibly a reference time. The structure of such mental representations is linguistically well described. A non-linguistic alternative, such as a deficit in ‘mental time travel’, remains more vague and formally comparatively undescribed at present.

Positive evidence for Naigles and Tek’s hypothesis is mixed and needs to be carefully qualified. For example, positive evidence relying on crude quantitative measures like the growth of the mean length of utterance in the development of ASD and Down syndrome children (Tager-Flusberg et al. 1990) will ultimately be limited in force. Evidence on similarities in TD and ASD in the order of acquisition of morphemes from Waterhouse and Fein (1982) and Park et al. (2012) is in contradiction with evidence from another early study by Bartolucci et al. (1980). Some tasks purporting to assess syntax in ASD such as adding plural markers to nonsense nouns (e.g. Naigles et al. 2011) leave out the meaning dimension that all grammatical marking has in ordinary language use and which is critical to the present approach. The same applies to evidence for intact patterns of statistical learning of artificial grammars in ASD (Obeid et al. 2016), since these are devoid of meaning equally.

The most serious problem, however, with the ‘form is easy, meaning is hard’ hypothesis is a conceptual one: it only makes sense if meaning is independent of form. This is debatable for lexical meaning and unlikely to the extreme for grammatical meaning, i.e. the meaning expressed by grammatically structured utterances, since it would entail that all such meaning is available to a cognitive system no matter whether it masters principles of linguistic form or not. School-age children with ASD without language are one relevant population in this respect, which suggests that most of meaning and thought is in fact wiped out in this case (Norrelgen et al. 2015). Put differently, the ‘form is easy’ claim can’t be circularly based on a vision of syntax where syntax is completely meaningless – i.e. irrelevant to what types of meaning our mind can grasp. Indeed, on such a vision, the present view would concur with the ‘form is easy’ hypothesis. The level of grammatical meaning is crucial to the present approach, where grammar is not viewed as something free-floating of its use; this level is not considered by Naigles and Tek (2017), who only consider (i) pragmatic meaning, (ii) lexical meaning, and (iii) syntax.
As for (i), the authors are surely right that ‘a successful conversation with a social partner is not possible if one is not able to decode the intended meanings of words and utterances’, and hence that a difficulty in pragmatics widely granted to be universal in ASD will predict difficulties with conversational language. However, ‘decoding the intended meaning of words and utterances’ also requires mapping their grammatical meanings. A foreigner learning a new language will find it enormously taxing to follow jokes and non-literal speech, when he is still struggling even to catch the literal meaning. That difficulty is then clearly not due to a failure of pragmatics. What cognitive dysfunction triggers a failure in processes loosely described as pragmatic is an entirely open question: pragmatics is a descriptive, not an analytic category, and not necessarily an explanatory one. As Wittgenstein famously noted, ‘intended meanings’ are not things that can be perceived. But deviant uses of words in particular contexts can be, like a speaker saying that John is a dog. Not penetrating the speaker’s mind to identify an invisible ‘intention’ is required to understand the intended meaning here, but understanding what dog on this occasion and in this grammatical configuration is taken to refer to: not an actual dog, but a man who behaves in a dog-like way. John is the referential expression, dog part of the sentential predicate, which is why the speaker refers to a dog-like man, not a man-like dog or both a man and a dog. It thus seems natural to hypothesize that a difficulty characterized loosely as pragmatic could have its roots in this mechanism of detecting what refers to what in fluent speech. Is there evidence for a pragmatic impairment independent of a referential impairment in ASD, when it looks as if the two have to go hand in hand?

Some studies have provided evidence for them going together. For example, as Naigles and Tek (2017) note, even high functioning adults with autism or Asperger syndrome use fewer referential expressions and form sentences that are not linked in a temporal order while narrating a story (Colle et al. 2008). Use of referential expressions and of tensed verbs is to use phrases of particular grammatically identified classes. In our study of narrativity in high functioning ASD (Schroeder et al. 2017), overall narrative scores correlated with such grammatical measures. Claims cited by Durrleman about ‘subgroups with spared grammatical profiles’ are problematic, when such claims are necessarily relative to the standardized clinical language measures used, which often do not involve narrative tasks, in which language impairments can appear even when they don’t show in standardized measures (Norbury et al. 2014). The claims become circular when ‘grammar’ is identified from the beginning to simply exclude aspects of language.

5 See Davies et al. (2016), for similar doubts in rooting pragmatic difficulties in a social cognition rather than language impairment.
contradicting the predictions, such as noun phrases, which are an inherent aspect of grammatical organization and as such go with certain kinds of uses. How can the understanding and use of NPs not be affected, if pragmatic difficulties are universal in ASD, and they involve grasping what NPs refer to in context?

A referential disturbance linked to grammatical organization ties in well with the early claim that reference often becomes too rigid in autistic language, featuring denotation but not connotation – the kind of flexible and generalizable meaning that is factored into normal NP use (Fay and Schuler 1980; Boucher 2012). It also connects with one of the most classical disturbances in autistic language, namely reversals of personal pronouns, which simply are NPs positively specified for grammatical Person. Durrleman points out that misuses of personal pronouns may be less frequent than sometimes assumed, and that they are also found in typical development, where they clearly do not correspond to atypical forms of selfhood. Nonetheless, extended difficulties with I and you beyond the few months where we expect these in TD would make any mother rightly worried; and the pattern also may not be quite the same in TD and ASD, with a preference for 3rd Person forms of self-reference is seen together with personal pronoun reversals (Jordan 1989; Lee et al. 1994; Mizuno et al. 2011). These would seem even more worrisome to such a mother, and the recent finding of such personal pronoun avoidance patterns across the oral and visual modalities should certainly make us think (Shield et al. 2015).

8 Do mind-reading capacities in non-human primates challenge the un-Cartesian hypothesis?

Is the un-Cartesian position threatened by evidence from non-human species passing false belief tests? As discussed above, the first question here should be what this means, and what is at stake. I will assume in what follows that what is not at stake is that apes, ever, have a concept figuring in their mind, equivalent to our concept belief, which figures in an explicit thought of the form He believes she is smart. Rather, I will take it that the notion of passing a false belief test is operationalized simply by the criterion that certain choices are made in certain conditions. That these conditions are labelled as the ‘false belief’ and ‘true belief’ conditions says little as such about which neurocognitive mechanisms are actually involved. The labels reflect descriptive choices of the verbal creatures that are the experimenters, which are questioned when other mechanisms are equally plausibly involved, which do not involve the concept of belief.
If no explicit concept of belief is involved, no concept figures as part of a thought whose identity conditions are partially determined by what exact concepts it contains. If so, whatever thought takes place is different from the human type, and it is not clear whether an issue even arises in the present context. But let us ignore this problem here and address the evidence from non-human primates. Buttelmann et al. (2017) found a variety of non-human primates behaving very similarly to 16- and 18-month-old human infants in a ‘false belief’ task requiring an active behavioural response (Buttelmann et al. 2009). This new study comes after a sequence of others by the same group that failed to find evidence that the great apes can pass false belief tests (Call and Tomasello 1999; Kaminski et al. 2008; Krachun et al. 2010). One other study by the same group (Krupenye et al. 2016) tested great apes on an implicit ToM paradigm using anticipatory-looking time as an outcome measure, finding similar performance as in 2-year old humans (Southgate et al. 2007). Yet as Buttelmann et al. (2017) explicitly note, in the Krupenye et al. study, ‘apes could have passed the test simply by predicting that the actor would go to the last place he saw the object’. If so, the study in fact leaves open whether any concept of belief, or of false belief, was involved. The question, therefore, reduces to whether the Buttelmann et al. (2017) study fundamentally changes the situation that apes do not understand false belief.

Buttelman et al.’s (2017) finding is that apes facing an experimenter (E) who has hidden an object in one box (box 1), will tend to help him open another box (box 2), in which the object was re-located in his absence, when they see him struggling to open box 1 upon returning to the scene. If the object is relocated in his presence, on the other hand, the apes chose randomly between the two boxes. This asymmetry paradoxically suggests that the apes can make sense of false belief, but not true belief, which raises a number of questions. One immediate way of making sense of the results in the false belief condition, however, is based on long-standing evidence that apes can track goals (Call et al. 2004) and are aware of intentional and attentional relations of agents to objects of their interest. Based on this, the ape might ‘reason’ in the false belief condition: 1. E returns to retrieve his object; 2. But the object is now elsewhere; 3. Therefore let’s help him to open the box where it is. The concept of belief does not enter. In the true belief condition, by contrast, the agents’ actions ‘make no sense’ in this light: if E wanted his object, he would go for it, since he has seen where it now is; but he goes to the other box nonetheless, struggling to open it. To what purpose? Lacking an answer, the ape’s choice becomes random, which makes good sense.

This conclusion, together with (i) scepticism from other groups regarding the understanding of beliefs in apes (Penn et al. 2008), (ii) longstanding methodological problems discussed by Heyes on finding evidence for animal mindreading (Heyes 1998, 2015), (iii) the methodological problems mentioned initially in this
section, (iv) recently emerged doubts about the language-independence of even implicit false beliefs in young infants including the findings of Southgate et al. (2007) mentioned above (Kulke et al. 2017), and (v) the general incapacity of apes to understand even imperative forms of referential meaning, never mind reference in false belief contexts (Tempelmann et al. 2013), I conclude that the case of false belief reasoning in non-linguistic primates is weak.

9 Conclusions

The un-Cartesian hypothesis lays out a framework inviting new predictions for how language and human-specific cognition are linked. These are testable in different clinical and non-clinical settings, and they have implications for our understanding of both language and mind at a foundational level, exploring the cognitive function of language. The hypothesis may also help addressing such open issues as the brain basis of reference as such, and how close the explanatory circle is in which grammar, reference, and mental pathologies connect.

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