

Mindreading, mindtravelling, and the proto-discursive origins of language

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Abstract

In this chapter, we propose a proto-discursive model of the origin of language. At the foundation of this model there is the idea that the origin of language is founded on discursive global coherence. Discourse coherence, in effect, is an essential property of human communication that, contrary to Sperber and Wilson (1986), is not reducible to their *relevance principle*. In support of our proposal, we demonstrate that the processing of discourse coherence implies different cognitive systems than those involved in the processing of relevance. Specifically, we suggest that to account for the ability to produce and comprehend discourse, it is necessary to refer to systems of spatial and temporal navigation, beyond the mindreading mechanism. From these considerations, it follows that Relevance Theory must be extended both on the level of properties and on the level of cognitive systems.

1. Introduction¹

The idea that syntax is the essence of human language is a conceptual hypothesis that was strongly supported in the 20th century by the fathers of so-called classical cognitive science. According to Chomsky (e.g. 1980, 1986), the devices at the foundation of the language faculty are those that elaborate the constituent structure of sentences, and according to Fodor (1975, 2008), the predicative structure of the sentence reflects the propositional structure of Language of Thought. Underpinning the primacy of the sentence in these authors' work is a way to propose a specific conception of language and cognition. In fact, the idea that language competence is a device that analyses the shape (syntax) of symbols regardless of their content and the relationship between the uttered expression and its context is part of a broader conception of how to analyse the study of the mind in classical cognitive science.

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Rejecting the view of cognition as computations on amodal symbols, independent of the brain's sensori-motor systems for perception an action, the standard position of cognitive science has been criticized by the action-oriented perspectives of mind (e.g. Barsalou 2008; Clark 1997; Varela et al. 1991). These perspectives, with their anti-cognitivism and attention to bodily experience, have strongly influenced cognitive semiotics (cf. Zlatev 2012). Following these action-oriented perspectives, we propose a model of language strictly tied to the paradigm of embodied cognition. Against the syntax-centred view, in effect, we maintain that the nature of language (i.e. its functioning and origin) needs to be analysed in reference to the human pragmatic capacity to build coherent narratives rather than to the ability to construct syntactical well-formed sentences. Specifically, our proposal is that narrative abilities are dependent on the ability to (mind)travel in space and in time and that the narrative foundation of human language provides important insights to suggest a proto-discursive model of the origins of our communication skills.

2. The primacy of microanalysis and sentence

At a general level, language can be analysed along two major dimensions: a within-utterance or microlinguistic dimension and a between-utterances or macrolinguistic dimension (e.g. Kintsch & van Dijk 1978; Davis & Coelho 2004). The microlinguistic dimension, which focuses on intra-sentential functions, assesses how phonological (or graphemic) sequences are organized into morphological strings and words (lexical processing) and how these are inserted in a grammatical well-formed sequence (syntactic processing). The macrolinguistic dimension, which analyses inter-sentential functions, focuses on the ability to select contextually appropriate words and sentences (pragmatic processing) and how sentences or utterances are connected in a flux of speech (or text) that is coherently organized (discourse processing).

The theoretical model of language elaborated within the framework of the classical cognitive sciences (Chomsky 1980; Jackendoff 1994; Pinker 1994) is characterized by exclusive attention to the microanalytic dimension. In this tradition, it is taken for granted that the central goal of linguistic production is to generate sentences that at a minimum are structured with a noun phrase and a verb phrase. As a consequence, at the basis of the classical framework are the assumptions that the structure of the internal constituents of a sentence represents the core of language and that the general device at the basis of language is

a module specialized in the analysis of the syntactic structures. Emblematic in this regard is the statement by Pickering and colleagues (2001, p. 1), according to which, “the question of what architectures and mechanisms underlie sentence comprehension, [...] illuminate[s] the general nature of human language processing in the context of cognition as a whole”. Evidence from sentence comprehension could be used “to understand the overall nature of language processing” (ibid).

There are two things to note about this perspective for the purposes of our argument: the first has to do with the model of communication that emerges from the conception of language functioning that is understood as syntactic processing of internal constituents of the sentence; the second concerns the impact that this model has on how discourse is processed.

The model of language of orthodox cognitive science is characterized by the implicit (and sometimes explicit) adherence to the so-called code model of communication (Shannon & Weaver 1949; for a discussion, cf. Ferretti & Adornetti 2014), a model that Fodor (1975, p. 106) considers “not just natural but inevitable”. The code model of communication seizes upon the idea that “we have communicated when you have told me what you have in mind and I have understood what you have told me” (Fodor, 1975, p. 109). According to this model, the thought (i.e. the message) is encoded by the speaker in a succession of sounds that the listener decodes in order to share the thought (the message) that the speaker has intended to communicate. In other words, the informational content is entirely encoded in the utterance. Therefore, adhering to the code model means to take a clear stand against pragmatic theories of communication that are focused on context and the speaker’s intention (cf. Sperber & Wilson 1986, Chapter 1).

The second thing to stress for our argument is that from the classical perspective, the production and the comprehension of discourse is just a by-product of the production and the comprehension of single sentences. Since discourse is composed, in fact, of a set of individual sentences, from the perspective of classical cognitive science the analysis of discourse coincides with the analysis of the microlinguistic dimension. From this point of view, producing and understanding discourse is equivalent to producing one sentence after another by means, for example, of the grammatical devices (e.g. the use of pronouns) that provide the links between consecutive utterances. The idea is that the mechanisms that regulate the structure in constituents within the sentence are the same that also regulate the establishment of links between sentences in the external flux of speech. The global level of discourse is attained starting from the analysis of the utterances of single sentences through a sequential

process of accumulation of information. In this sense, information processing that underlies narrative abilities has a strong “bottom-up” character: discourse analysis proceeds incrementally, from the local meanings of sentences to the global meanings of discourse (for a discussion and a criticism on this point, cf. Cosentino et al. 2013)

Disputing the priority given to microanalysis, in the following section we propose that the ability to process discourse takes priority over the ability to process sentences. In support of this, we discuss studies coming from neurolinguistics and neuropsychology showing that 1) the ability to process sentences (i.e. the capacity to construct well-formed utterances) is not a sufficient condition to communicate efficiently and 2) that it is indeed possible to communicate when the syntactical competence at the basis of sentence construction is disrupted.

3. From microanalysis to macroanalysis: evidence from the study of pathologies of language

Our argument is based on the analysis of a specific property of discourse and narration: *coherence*. In general, coherence can be defined as the conceptual organizational aspects of discourse at the suprasentential level (Glosser & Deser 1990, p. 69). Even if Chomsky does not address the issue explicitly, scholars who are inspired by generative linguistics and who are interested in the study of narrative processing maintain that the building of the coherent flow of discourse (the basis of any narrative ability) must be interpreted as a bottom-up process driven by syntactic parser functioning. Kintch and van Dijk’s (1978) construction-integration model is a good example in this regard. Specifically, the theoretical models that equate language with grammar and linguistic processing with sentence processing explain discourse coherence in terms of the linear relations of *cohesion* between consecutive sentences (e.g. Halliday & Hasan 1976; Reinhart 1980; for a discussion, cf. Giora 2014).² In a text, cohesive relations are accomplished through grammatical and lexical elements (Halliday & Hasan 1976). Grammatical cohesion includes elements such as reference (inside and outside the text, respectively endophoric and exophoric reference), substitution, ellipsis and

² Even if Halliday and Hasan (1976) do not equate coherence and cohesion, they are among the scholars that agree that cohesion— a grammatical phenomenon, and for this a surface structure phenomenon—both reflects and enables discourse coherence.

conjunction; lexical cohesion is based on reiteration (e.g. repetition, synonymy) and collocation (i.e. co-occurrence of lexical item). An example of a cohesive text is the sample of discourse shown in (1), in which the sentences (a), (b) and (c) are connected through the use of pronouns (a case of grammatical cohesion):

- (1) (a) **They** managed to catch him. It was an all-out abuse. **They** abused him, and I don't think something was done about it. (b) **They** put him in the toilet, I remember **the soldier**, I remember, he was a friend of mine, a friend from the company. (c) And **he** took pride in shoving the kid's head into the toilet. (Anonymous [Sergeant] 2000, in Giora 2014, p. 143).

For the purpose of our argument, it is important to highlight that from this perspective, cohesion is conceived as a pre-requisite for coherence (see Daneš, 1974; 1987). The basic idea is that for a discourse to be coherent, its sentences must be cohesive. The coherence of a text, in fact, is not a given, but rather a product obtained through cohesive ties. These ties help to ensure the unity of the text and act as signals that the speaker offers to the listener marking the way the listener should follow in order to interpret the verbal utterances in a coherent way. The idea, in other words, is that discourse coherence relies on linguistic elements and capacities.

Now, although cohesive relations have an important role in the expression and recognition of coherence, we suggest that the cohesion between consecutive sentences is not a necessary condition for narrative coherence. Our claim in this regard is that the cohesive devices do not constitute a necessary condition for coherence since cohesion is the superficial expression of a deeper level of coherence that concerns cognition prior to language production (Adornetti 2015). A crucial distinction is between *global* discourse coherence and *local* discourse coherence (cf. Glosser and Deser 1990). Local coherence refers to the conceptual links between consecutive sentences or propositions that maintain meaning in a text or discourse. Global coherence refers to the overall conceptual organization of the flux of speech; it refers to the manner in which discourse is organized with respect to an overall goal, plan, theme, or topic. As shown by the text in (1), cohesion contributes to local coherence. But is local coherence a necessary condition for global coherence? Theoretical arguments and empirical evidence suggest that global coherence does not depend on the local coherence. Consider the following shown in (2).

- (2) I bought a Ford. The car in which President Wilson rode down the Champs Élysées was black. Black English has been widely discussed. The discussions between the presidents

ended last week. A week has seven days. Every day I feed my cat. Cats have four legs.
The cat is on the mat. Mat has three letters (Enqvist 1978, pp. 110–111).

In this text the sentences are connected through the cohesive mechanism of repetition. However, the set of sentences is not perceived as a coherent whole because the sentences do not hang together in a reasonable way. However, it can be argued that this text is just an artificial construction that does not reflect how human beings communicate each other. But let us consider the conversation produced in actual communicative situation shown in (3).

- (3) C: I admit this government we've got is not doing a good job but the unions are trying to make them sound worse than what they are
T: mm
C: they . they . cos I'm a Tory actually but I do vote . if there's a . er . a communist bloke there I will vote communist but . it all depends what his principles are but I don't agree . with the Chinese communism . and the Russian communism
T: right
C: but I believe every . should be equal but . I'm not knocking the royal family because you need them
T: mm
C: and they they they bring people in to see take photos (from Perkins et al. 1995: 304)

Despite the local sequential links (and at least a degree of local coherence) between trade unions/government, government/Tory, Tory/communist, communism/Chinese/Russian communism, communism/ equality, equality/ Royal Family, Royal Family/ tourist attraction, C shows a form of “topic drift”: he is unable to monitor what has already been talked about or to relate each individual utterance to some overall coherent plan or goal.

As mentioned, the text in (3) is produced by a person in an actual communicative situation. Specifically, it is produced by a subject with brain injury. Indeed, neurolinguistic research has shown that in several neurological populations, such as schizophrenic patients, traumatic brain injury subjects and patients with Alzheimer disease, there is a dissociation between the abilities that underlie sentence processing (microanalysis) and those that underlie narrative processing (macroanalysis) (e.g. Dijkstra et al. 2004; Glosser & Deser 1990; Davis et al. 1997; Marini et al. 2008; Marini et al. 2014). Specifically, these patients correctly connect sentences by using cohesion ties (grammatical devices), but they are unable to construct and maintain the global coherence of their verbal productions: they cannot relate the individual sentences to a plan or to a more general purpose, and they often introduce material

that is irrelevant to the current context in their verbal productions. Because of such deficits in coherence, these patients are unable to communicate in an effective way, despite the fact that their capacities to construct well-formed sentences are relatively preserved. Interestingly, it has also been shown that aphasic subjects with syntactical deficits and problems in the construction of well-formed sentences did not suffer such a pragmatic deficit as they were able to produce coherent discourse (Gloser & Deser 1990).

To conclude this part dedicated to language functioning, we underline two points relevant to our argument: First, discourse coherence is an essential property of language because it is necessary condition to communicate in an efficient way; Second, the construction of global coherence in a narrative is not reducible to cohesion, that is to say, the macrostructure of a narrative discourse cannot be formally derived by the microstructure of the sentence.

4. At the origins of human language

What can be deduced about language origins from the arguments and empirical evidence we presented about language functioning? Having identified discourse coherence as an essential property of human communication and having argued that global coherence cannot be explained in terms of cohesion leads us to a substantial change of perspective regarding the interpretive models that consider the origin of language in reference to the advent of syntax (e.g. Bickerton 1990; Berwick et al. 2013). In sharp contrast with these models, we propose that language has a proto-discursive origin and that the selective pressures that drive the evolution of language meet the needs of pragmatic concerns before grammatical ones.

4.1 Relevance Theory reconsidered

The *pragmatic turn* in cognitive science is mostly represented by Relevance Theory (RT) proposed by Sperber and Wilson (1986, 2002). However, we question whether relevance can be conceived as a principle that can explain discursive coherence and, if so, whether relevance can be intended as a principle capable of explaining both the origin of language and its functioning. As we will show, global coherence is not reducible to the so-called relevance principle. Therefore, our hypothesis is that the answer to both questions is negative. That said,

our intent is not to reject the model proposed by Sperber and Wilson. Rather, our proposal may be considered as a revision and an extension of the model of communication proposed by RT. We maintain that the basic idea of RT, that in communication the speaker simply offers *evidence* of her communicative intention to the listener – what can be called the “clues” model of communication – is at the same time a correct yet incomplete manner in which to analyse the origin and functioning of language. Before clarifying what we think has to be added to this model, it is necessary to present briefly the main assumptions of RT.

Relevance Theory has its starting point in the criticism of the code model of communication, which has dominated not only classical cognitive science, but also classical semiotics (cf. Sperber & Wilson 1986). As we said in section 2, according to this model, communication is an associative process of encoding-decoding: information is encoded into a signal, sent along a channel, and then decoded at the other end. However, as outlined by Grice (1968), the code model is unable to account for everyday language use, in which the speaker conveys more than she actually says in the encoded message. Assuming Grice’s distinction between a sentence’s meaning (what is encoded) and a speaker’s meaning (what a speaker intends conveying), RT develops an ostensive-inferential model of communication according to which the production and comprehension of signals does not involve encoding and decoding of a message, but rather the provision and interpretation of evidence of the speaker’s intentions. It is important to note that evidence of such intentions can be various: not only linguistic utterances are understood as evidence, but also pointing, shrugs, glances, nudges, and other gestures. The listener recognizes all these pieces of communicative evidence as clues and draws inferences about the speaker’s intentions.

The goal of RT is to explain how the listener infers the speaker’s meaning on the basis of the evidence provided. The explanation is based on the claim that communicative signals automatically create expectations that guide the listener towards the speaker’s meaning. These expectations are *relevance-based*. According to Sperber and Wilson (1986), a stimulus (a sight, a sound, an utterance, a memory) is relevant to an individual when it connects to background information she has available to her in order to yield conclusions that matter to her: what is called the *positive cognitive effect*. However, what makes an input worth processing among other competing stimuli is not just the cognitive effects it achieves. In different circumstances, the same stimulus may be more or less salient, more or less accessible, and the same cognitive effects easier or harder to obtain. Indeed, the greater the effort required to perceive, remember, and infer, the less rewarding the input will be to

process, and hence the less deserving of our attention. In terms of RT, and all other things being equal, the greater the processing effort required, the less relevant the input will be. Thus, relevance may be assessed in terms of cognitive effects and processing effort: a) all other things being equal, the greater the positive cognitive effects achieved by processing an input, the greater the relevance of the input to the individual at that time; b) all other things being equal, the greater the processing effort expended, the lower the relevance of the input to the individual at that time (Sperber and Wilson, 2004, p. 252).

The clues model of communication proposed by RT is an admirable way to respond to the issue of the origins of language (Origgi and Sperber 2000; Scott-Phillips 2014). Indeed, it overcomes both the difficulties of imagining the early stages of human communication in reference to an overly complex code of expression, and the difficulties of thinking about the birth of human language in reference to a simple expressive code based on signals such as those produced by non-human animals (see Scott-Phillips 2014, 2015). All that is required for the proper functioning of the clues model of communication, in effect, is a cognitive system that allows reading the speaker's communicative intention and taking advantage of the clues the sender produces. So characterized, the main value of the analysis in terms of the clues model is coincidental with the analysis of the cognitive architectures that allow the receiver to infer the content the speaker intends to communicate. Now, a model of communication focused on the role played by the speaker's intention in production-comprehension processing conforms to the idea that the linguistic processes are driven by a *mindreading* cognitive system. It is exactly this kind of cognitive system to which Sperber and Wilson make reference in order to explain the transition from animal communication (founded on the code model) to human language (Sperber 2000; Origgi & Sperber 2000; Sperber & Origgi 2010; see also Scott-Phillips 2014). So far so good.

Because of the importance we attribute to the discursive nature of human language, the point to analyse here is the question of whether the clues model and the mindreading system can be considered as sufficient conditions to explain human narrative abilities. The answer Sperber and Wilson give to the question is explicit and peremptory: as relevance is the principle of human communication that can explain any feature of language functioning and origin, even global coherence has to be interpreted in terms of relevance (global coherence is a derivative notion of relevance).

However, contrary to Sperber and Wilson's hypothesis, Giora (1997, 1998) convincingly showed that relevance cannot be the only principle that governs human

communication. The relevance principle, in fact “can by no means replace current accounts of discourse coherence since it is neither necessary nor sufficient for text well-formedness” (Giora 1997, p. 17). A useful example for understanding the coherence-pertinence distinction is the case of situations in which it is possible to distinguish between discourses characterized by *different degrees* of coherence (as in 4a and 4b)

(4a) The first time she was married her husband came from Montana. He was the kind that when he was not alone he would look thoughtful. He was the kind that knew that in Montana there are mountains and mountains have snow on them. He had not lived in Montana. He would leave Montana. He had to marry Ida and he was thoughtful (taken from Ida by Gertrude Stein).

(4b) The first time she was married her husband came from Montana. He was the kind who loved to be alone and thoughtful. He was the kind who loved mountains, and wanted to live on them. He loved Montana. But he had to marry Ida and leave Montana (Giora, 1997, p. 26).

Giora’s view is that the difference in coherence between (4a) and (4b) cannot be explained in reference to the principle of relevance. In fact, while the segments of discourse are both relevant (according to Sperber and Wilson’s definition) “they nevertheless differ drastically in terms of coherence” (Giora, 1997, p. 26): (4b) is more coherent than (4a). According to Giora (1997, p. 22), the general conclusion that can be drawn from these considerations is that “coherence is not a derivative notion”.

The stance in favour of the explanatory autonomy of coherence is grounded on the idea that the narrative dimension of language relies on the identification of the causal links that regulate the segments of discourse: discourse coherence, in fact, is closely linked to the respect of a *well-formedness* criterion.³ In sharp contrast with Giora, Wilson (1998) argues that the characteristics of discourse attributable to well-formedness are not a concern of RT since RT is a theory of comprehension while the reference to well-formedness involves properties not implicated in the (psychological) processes of comprehension. Without entering into the details of the dispute between Giora and Wilson, the question to analyse in order to understand if coherence is reducible to relevance is the question of whether the way in which the segments of discourse are connected together becomes part of production and comprehension processes.

³ Giora’s criticism toward the possibility of reducing cohesion to coherence is a proof that according to Giora the expression well-formedness in this context has a pragmatic (and not syntactical) characterization.

In accordance with Giora, we maintain that the ability to order the sentences of discourse in the right sequence represents an essential aspect of discourse coherence and of the processes that govern our “narrative faculty”. Specifically, we maintain that to account for coherence it is necessary to refer to principles other than those proposed by Sperber and Wilson. Two issues have to be stressed in this regard. The first one is related to the centrality attributed to the notion of *event* in human cognitive experience. As Sinha and Gärdenfors (2014, p. 76) claim, in effect, “the very structure of language attests to the primacy of the event in human cognition,” considering that “the life world of human experience is made of events, in which selves and other people figure as agents, performing actions directed to other agents and to objects”. The second issue concerns the fact that, as narrative discourse can be interpreted in terms of “the temporal organization of event sequences” (Sinha & Gärdenfors 2014, p. 72), in order to explain narration we inevitably have to explain the ability to analyse the causal structure of the sequence of events. Discourse coherence seems to be strongly linked to a capacity of this type. Data from the study of linguistic pathologies support our opinion. In a study relative to the temporal order of the discourse in schizophrenics, Ditman and Kuperberg (2007) show that the difficulty of these subjects to maintain the coherence links across sentences is due to the fact that “building a coherent representation of discourse meaning (...) requires the establishment of logical and psychological consistency between the events and propositions described in individual sentences” (ivi, p. 992). It is difficult to account for the logical and psychological congruence between events and propositions without referring to the causal relationships between the events narrated in a discourse and the segments of the discourse used in the narration. The emphasis placed by Giora on the issue of well-formedness fits well with the idea that the organization of discourse in regards to the temporal sequence of events plays a decisive role in the inability of schizophrenics to construct a coherent representation of discourse. So much for the issues of conceptual order. Considerations of this type have consequences on the level of cognitive architectures. In the following section, we discuss the systems involved in discourse processing.

5. Cognitive systems underling discourse coherence

According to Sperber and Wilson (1986, 2002; especially, Sperber 2000 and Origgi & Sperber 2000), the thesis that relevance is the only explanatory principle of language is

strongly connected to the idea that mindreading is the only system at the basis of our communicative skills. The point to be stressed here is the fact that the interpretative models based on mindreading – such as RT– explain the aspects of language related to the clues model of communication alone. However, models such as these suffer from a serious difficulty: the exclusive attention paid to the speaker’s intentions leads one to exclude the temporal dimension from discourse processing, and in so doing, to overshadow the narrative foundation of communication. From the point of view of RT, a speaker can communicate, for example, that she doesn’t intend to go to the cinema both with a simple cue or, *without altering the nature of her intention*, with a long and detailed discourse explaining the reasons of her refusal. In both cases, all that the listener needs in order to understand what the speaker says is to grasp the speaker intention that she doesn’t intend to go to the cinema. The speaker’s intention, acting as an “attractor” that guides the interpretative processes, allows to the listener to grasp the point (in a literal sense) of what is being said by eliminating any accessory and irrelevant news. The contracted and punctuated nature of communicative intentions – that is, their atemporal character – is a great advantage in terms of cognitive economy.

Scott-Phillips (2014) maintains that, in the current research on human communication, the code model and RT are the only two alternatives. As the criticism of the code model made by Sperber and Wilson (1986) is strong, we can say that there is no alternative to RT. However, the possibility to improve upon Sperber and Wilson’s model is an open question that deserves to be examined. The idea that the expressive clues may function as evidence of the speaker’s communicative intentions is of great importance for a model of the origin and functioning of language. That said, the exclusive reference to the relevance principle (and to mindreading as the unique processing system involved in language functioning) prevent scholars from further analysing properties and processing systems crucial to the study of communication. When one switches from the analysis of communicative exchanges conceived as simple cues – the typical examples in support of RT – to the study of conversational exchanges in the flow of speech, a fact clearly emerges: the understanding of the flow of discourse cannot be reduced to the interpretation of the speaker’s intentions. As we said, the atemporal (punctuated and contracted) nature of communicative intentions is, because of its cognitive economy, a strength of the clues model. Nevertheless, it is also a weakness. The fact that the same communicative intention (e.g., not wanting to go to the cinema) could be expressed by means of a simple cue or by means of a long articulated

discourse implies, in effect, the functioning of different processes. In an articulated discourse, indeed, the evidence of the communicative intentions offered by the speaker to the listener are deployed on a temporal level. When language functioning is analysed in reference to such a level, it appears clearly not only that the speaker's intentions can change in an ongoing conversation, but that the intentions themselves can change because of the reciprocal relationship. Such a reciprocal relationship among intentions, guided by a principle of coherence, represents the thorn in the side of the clues model. From these considerations, it follows that the primary reason why discourse coherence cannot be reduced to relevance is that the processing system that grasps the evidence of the speaker's intentions cannot account for the temporal dimension of conversation. If such temporal dimension appears to be a necessary condition for the flux of speech, then mindreading cannot be considered the only processing system on which to base the functioning of human communication.

5.1 Temporal navigation

Given the attention we devoted to the temporal sequence of segments of discourse as a constituent element of the narrative foundation of language, a good way to begin our argument is a quote from Chafe (1987), discussed by Wilson in her dispute with Giora. Wilson is right to claim that:

...discourse is best approached in terms of process than structure: "It is more rewarding, I think, to interpret a piece of discourse in terms of cognitive processes dynamically unfolding through time than to analyse it as a static string of words and sentences" (Chafe 1987, p. 48 quoted in Wilson 1998 p. 70).

We are completely sympathetic with this perspective. Provided, however, one takes seriously the idea that the processes involved in discourse processing are "dynamically unfolding through time." Now, in spite of the emphasis reserved by Wilson to the temporal dimension of discourse, in terms of cognitive architectures, RT is not equipped to account for the processing implicated in the temporal plane of flow of speech. To explain processing of this kind, in fact, we have to make reference to Mental Time Travel (MTT), the cognitive device that enables individuals "to mentally project themselves backwards in time to re-live, or forwards to pre-live, events" (Suddendorf & Corballis 2007, p. 299; Corballis 2011; for a neuroscientific review cf. Grondin 2010). Corballis offers an important clue to the fact that a navigation device in time has to be involved in the elaboration of discursive coherence. As he

considers that MTT primarily serves to study the ability at the base of the syntactic aspects of language to embed sentences in other sentences (Corballis, 2009, p. 553; Corballis 2011), he argues that MTT may be related to the human narrative ability (see also Ferretti & Cosentino 2013). Corballis also maintains, quoting Neisser (2008), that remembering is much more like telling a story than playing back a tape or looking at a picture. He states: “the same constructive process that allows us to reconstruct the past and the construct possible futures also allows us to invent stories” (Corballis, 2011, p. 111). Corballis’ analysis clearly indicates a first important move to take in order to extend RT: if the explanation of narrative abilities has to appeal to MTT, then language processing cannot be interpreted in reference to mindreading alone.⁴ But there is more: arguing that temporal navigation is involved in the origin of narrative abilities inevitably means referring to the idea that spatial navigation is involved too.

There are anatomical and functional reasons for the necessity of the involvement of spatial navigation in temporal navigation. From an anatomical point of view, the close link between space and time representation is well demonstrated by brain structure (Corballis, 2013). The discovery of place cells allowed O’Keefe and Nadel (1978) to argue that the hippocampus is the basis of spatial cognition in rodents and is the substratum for episodic memory of humans (Dudchenko 2010; Assmus et al. 2005; Assmus et al. 2003; Oliveri et al. 2009; Parkinson et al. 2014). The neuroanatomical connections between space and time are commonly used to justify the close relationship between space and time also from a functional point of view. According to the proponents of the “spatial representation account”, in fact, as they “occupy an overlapping temporo-spatial representation” (Cai & Connell, 2015, p. 269), space and time cannot be considered as separate entities (Stocker, 2014).

The paradigm of reference is represented by the idea that the close connection between space and time rests on a profound asymmetry where space is primary. The starting point of the perspectives that refer to the “spatial metaphor” is Lakoff and Johnson’s conceptual metaphor theory (1980; Gibbs 2006). In talking about time speakers of many languages use spatial metaphors, saying things like *the future is in front of us* and *the past is behind us* (or vice versa in some cultures) as a way to conceptually interpret abstract entities in reference to more concrete entities. According to Lakoff and Johnson, the ability to talk about time using space is the surface effect of a deeper phenomenon: the spatial metaphor is actually the product of our ability to think about time by means of space. Considerable experimental

⁴ For the role of time in the evolution of language see also Cosentino (2011) and Gärdenfors & Osvath (2010).

evidence supports the priority of space over time, and therefore an asymmetric interpretation of their relationship (Casasanto & Boroditsky 2008; Merritt et al. 2010). From these considerations, it is possible to argue that the primary source domain in order to analyse the human narrative capacity is the navigation in space.

5.2 Spatial navigation

In effect, even intuitively, spatial navigation represents a good metaphor for thinking about the processes at the foundation of discourse. Gallistel (1990) defines navigation as “the process of determining and maintaining a course or trajectory from one place to another”. The ability to maintain a trajectory is a core component of the process involved in approaching a destination. Indeed, in order to reach the expected destination, one needs to keep the intended route (such as that calculated from the identification of the azimuth on a topographic map to get from point A to destination B) and overcome geographic obstacles (e.g. cliffs, rivers, or forests). What happens in real navigation is never equivalent to the straight path drawn on the map: the actual movement in space requires a continuous realignment of the goal because of the difficulties posed by the harshness of the environment. In a very similar way, the process of discourse construction also relies on the ability to identify a goal (the content that the speaker intends to convey to the listener), and to overcome several difficulties that may alter the intended route. Indeed, in order to reach the expected destination, one needs to keep the intended route and overcome geographic obstacles. In a very similar way, the process of discourse construction also relies on the ability to identify a goal (the content the speaker intends to convey to the listener) and to construct the route and to maintain the right trajectory to express it. Like navigation in space, the flow of communication is strongly linked to difficulties in maintaining the course to reach a given destination. In fact, in the same manner as in space navigation, the achievement of the communicative goal depends on the continuous realignments implemented by speakers to rebuild the route in the face of continual digressions imposed by the different points of view typical of verbal communication (Ferretti 2014; Ferretti & Adornetti 2011; Ferretti et al. 2013). Building the route and maintaining the right trajectory to the goal is equivalent, in narrative terms, to building and maintaining the global coherence of discourse.

The hypothesis (at the foundation of spatial metaphor) that the more abstract knowledge domains are interpretable in terms of more concrete knowledge domains is of great value in order to understand the construction of a coherent discursive flow. The idea that time navigation is grounded on space navigation, in effect, allows a step toward the opportunity to understand the nature of the properties required from the cognitive elaboration of the flow of speech. The description of the temporal organization of event sequence that, as we said, forms the backbone of the narrative, has to be guaranteed, not only on the level of the internal relationship between discourse segments, but even on the level of the external relationship between the narrative plan and the flow of events that represent the core knowledge of individual experiences.

The temporal relationship between the segments of discourse, in effect, cannot be considered in abstract terms alone: if time represents the key element of the narrative texture of the clues in the expressive speech flow, the spatial metaphor helps make the speech flow congruent with the flow of events narrated (Ferretti 2014). For this reason, spatial and temporal navigation represent the basic metaphor of the discursive nature of human communication. Such arguments lead us to argue that the extension of the clues model of communication must be linked to mindtravelling systems in space and time. That said, what kind of evidence could we offer to justify the involvement of navigational systems in the processing of discourse coherence?

Schizophrenic derailment is suitable to act as a reference point for an analysis that sees one of the basic building blocks of human narrative capabilities in the ability to stay the course of speech. Disturbances of the speech of schizophrenics are a textbook case of the loss of coherence in discursive abilities (Marini et al., 2008). Although to our knowledge there are no experimental data on the direct causal relationship between navigational systems in space and time and deficits in schizophrenic global coherence derailment, experimental data related to the difficulty in time projection (Peterburs et al., 2013; D'Argembeau et al., 2008) together with data related to the difficulty on space projection (Weniger & Irle, 2008) of these individuals seem to support a causal link between the navigation systems and the construction of the flow of discourse (for a discussion on the relationship between schizophrenia and MTT, cf. Cosentino, 2011).

The analysis of the narrative foundation of our communication skills is a useful tool to hypothesize the protodiscursive origin of human language. It is in reference to a perspective of this kind, in fact, that the intent of extending RT by linking the clues model of

communication with the narrative perspective of language shows its explanatory power in reference to the issue of the origins of language (Ferretti 2014). If the ability *to maintain the route* in navigation can be seen as the condition for the construction of the flow of discourse in human communication, we have good reason to think that the clues model (and the mindreading system strictly tied to it) must seek an ally in the navigation systems in space and time. It is only through projections in space and time that the expressive clues produced by our ancestral relatives earn a significant distinction from the signals produced in animal communication. From this order of argument it follows that the transition from the code model to the clues model is not a sufficient condition to ensure the transition from animal communication to human language: the reasons we used to maintain that RT has to be extended in order to account for the functioning of language are the same reasons that lead us to sustain that RT needs to be extended and integrated also in order to explain the origin of language.

Conclusion

In this chapter, we have argued that the narrative foundation of human language is a useful tool to investigate the functioning and the origin of our communication skills. At the basis of our hypothesis is the idea that the production and comprehension of sentences is not a sufficient condition for an effective communication and that the primacy usually assigned to the study of sentence grammar must give way to the investigation of discourse pragmatics. A confirmation of our hypothesis is the fact that discourse coherence is a property reducible neither to cohesion nor to relevance. While the relevance principle probably represents a necessary condition for understanding the birth of our communicative skills, nevertheless it is not a sufficient condition to account for the narrative texture of the flow of speech, and hence nor can it be a sufficient condition to explain the origins of language as a whole.

From the point of view of cognitive semiotics, the conclusion to be drawn from these considerations is that discourse processing requires additional devices beyond mindreading, as well as very different devices than those implied in the analysis of constituents of the sentence. In line with an action-oriented perspective of cognition, we have argued that the basis of the ability to produce and comprehend discourse is based on cognitive-semiotic systems that allow individuals to navigate through space and time. The experimental data

coming from the pathologies of language concerning the processing of global coherence, lead us to hypothesize that the metaphor of navigation we have assumed as key explanatory of the human narrative abilities is more than a simple metaphor.

References

- Adornetti I. (2015). The phylogenetic foundations of discourse coherence: a pragmatic account of the evolution of language. *Biosemiotics*, 8(3), 421-441.
- Assmus, A., Marshall, J., Noth, J., Zilles, K., & Fink, G. (2005). Difficulty of perceptual spatiotemporal integration modulates the neural activity of left inferior parietal cortex. *Neuroscience*, 132, 923–927.
- Assmus, A., Marshall, J. C., Ritzl, A., Noth, J., Zilles, K., & Fink, G. R. (2003). Left inferior parietal cortex integrates time and space during collision judgments. *NeuroImage*, 20, S82–S88.
- Barsalou, L. W. (2008). Grounded cognition. *Annual Review of Psychology*, 59, 617-645.
- Berwick, R. C., Friederici, A. D., Chomsky, N., & Bolhuis, J. J. (2013). Evolution, brain, and the nature of language. *Trends in cognitive sciences*, 17(2), 89-98.
- Bickerton, D. (1990). *Language and Species*. Chicago: University of Chicago.
- Cai, Z. G., & Connell, L. (2015). Space–time interdependence: Evidence against asymmetric mapping between time and space. *Cognition*, 136, 268-281.
- Casasanto, D., & Boroditsky, L. (2008). Time in the mind: Using space to think about time. *Cognition*, 106, 579–593.
- Chafe, W. (1987). *Cognitive constraints on information flow*. In R. Tomlin (Ed.), *Coherence and grounding in discourse*, Amsterdam: Benjamins, 21-51.
- Chomsky, N. (1980). *Rules and representations*. New York: Columbia University Press.
- Chomsky, N. (1986). *Knowledge of language: Its nature, origin, and use*. New York: Praeger.
- Clark, A. (1997). *Being there: Putting brain, body, and world together again*. Cambridge: MIT press.
- Corballis, M. C. (2009). Mental time travel and the shaping of language. *Experimental brain research*, 192(3), 553-560.
- Corballis, M. C. (2011). *The Recursive Mind. The origins of human language, thought and civilization*. Princeton: Princeton University Press.
- Corballis, M. C. (2013). Mental time travel: a case for evolutionary continuity. *Trends in cognitive sciences*, 17(1), 5-6.
- Cosentino, E. (2011). Self in time and language. *Consciousness and cognition*, 20(3), 777-783.
- Cosentino E., Adornetti I., & Ferretti F. (2013) Processing Narrative Coherence: Towards a top-down model of discourse, *Open Access Series in Informatics*, Special Issue “2013 Workshop on Computational Models of Narrative”, 32, 61–75.
- D'Argembeau, A., Raffard, S., & Van der Linden, M. (2008). Remembering the past and imagining the future in schizophrenia. *Journal of abnormal psychology*, 117(1), 247.

- Davis, G. A., O'Neil-Pirozzi, T. M., & Coon, M. (1997). Referential cohesion and logical coherence of narration after right hemisphere stroke. *Brain and Language*, 56(2), 183-210.
- Davis, G. A., & Coelho, C. A. (2004). Referential cohesion and logical coherence of narration after closed head injury. *Brain and Language*, 89(3), 508-523.
- Dijkstra, K., Bourgeois, M. S., Allen, R. S., & Burgio, L. D. (2004). Conversational coherence: Discourse analysis of older adults with and without dementia. *Journal of Neurolinguistics*, 17(4), 263-283.
- Ditman, T., & Kuperberg, G. R. (2007). The time course of building discourse coherence in schizophrenia: An ERP investigation. *Psychophysiology*, 44(6), 991-1001.
- Dudchenko, P.A (2010). *Why People Get Lost: The Psychology and Neuroscience of Spatial Cognition*. Oxford: Oxford University Press
- Enqvist, N.E. (1978), Coherence, pseudo-coherence, and non-coherence. In J.-O Östman. (ed), *Cohesion and Semantics*, Åbo, Meddelanden från Stiftelsens för Åbo Akademi Forskningsinstitut, 109–128.
- Ferretti, F. (2014). Travelling in Time and Space at the Origins of Language. *Humana.Mente—Journal of Philosophical Studies*, 27, 243-268.
- Ferretti, F., & Adornetti, I. (2014). Against linguistic Cartesianism: Toward a naturalistic model of human language origins and functioning. *Language & Communication*, 37, 29-39.
- Ferretti, F. & Adornetti, I. (2011). *Discourse processing and spatial navigation*. In B. Kokinov, A. Karmiloff-Smith, & N. J. Nersessian (Eds.). *European Perspectives on Cognitive Science*, Sofia: New Bulgarian University Press.
- Ferretti, F., Adornetti, I., Cosentino, E., & Marini, A. (2013). Keeping the route and speaking coherently: the hidden link between spatial navigation and discourse processing. *Journal of Neurolinguistics*, 26(2), 327-334.
- Ferretti, F., & Cosentino, E. (2013). Time, language and flexibility of the mind: The role of mental time travel in linguistic comprehension and production. *Philosophical Psychology*, 26(1), 24-46.
- Fodor, J. A. (2008). *LOT 2: The Language of Thought Revisited*. Cambridge: Oxford University Press.
- Fodor, J. A. (1975). *The language of thought*. Cambridge: Harvard University Press.
- Gallistel, C. R. (1990). *The Organization of Learning*. Cambridge, MA: Bradford/MIT Press.
- Gärdenfors, P. & Osvath, M. (2010). *Prospection as a cognitive precursor to symbolic communication*. In Larson, R. (Ed.), *Evolution of Language: Biolinguistic Approaches*, Cambridge: Cambridge University Press, 103-114.
- Gibbs, R. W. (2006). Metaphor interpretation as embodied simulation. *Mind & Language*, 21(3), 434-458.
- Giora, R. (2014). *Cognitive and Social Aspects of Coherence*. In Thomas M. Holtgraves (ed), *Handbook of Language and Social Psychology*. New York, NY: Oxford University Press, 141–153.
- Giora, R. (1998). Discourse coherence is an independent notion: A reply to Deirdre Wilson. *Journal of Pragmatics*, 29(1), 75-86.
- Giora, R. (1997). Discourse coherence and theory of relevance: Stumbling blocks in search of a unified theory. *Journal of Pragmatics*, 27(1), 17-34.

- Glosser, G., & Deser, T. (1991). Patterns of discourse production among neurological patients with fluent language disorders. *Brain and language*, 40(1), 67-88.
- Grice, H. P. (1968). Utterer's meaning, sentence-meaning, and word-meaning. *Foundation of Language* 4 (3): 225–242.
- Grondin, S. (2010). Timing and time perception: a review of recent behavioral and neuroscience findings and theoretical directions. *Attention, Perception, & Psychophysics*, 72(3), 561-582.
- Halliday, M., & Hasan R. (1976), *Cohesion in English*, London: Longman.
- Jackendoff, R. (1994). *Patterns in the mind: language and human nature*. New York: Basic Books.
- Kintsch, W., & Van Dijk, T. A. (1978). Toward a model of text comprehension and production. *Psychological review*, 85(5), 363.
- Lakoff, G., & Johnson, M. (1980). *Metaphors we live by*. Chicago: University of Chicago Press.
- Marini, A., Spoletini, I., Rubino, I. A., Ciuffa, M., Bria, P., Martinotti, G., Banfi, G., Boccascino, R., Strom, P., Siracusano, A., Caltagirone, C., & Spalletta, G. (2008). The language of schizophrenia: An analysis of micro and macrolinguistic abilities and their neuropsychological correlates. *Schizophrenia Research*, 105(1), 144-155.
- Marini, A., Zettin, M., & Galetto, V. (2014). Cognitive correlates of narrative impairment in moderate traumatic brain injury. *Neuropsychologia*, 64, 282-288.
- Merritt, D. J., Casasanto, D., & Brannon, E. M. (2010). Do monkeys think in metaphors? Representations of space and time in monkeys and humans. *Cognition*, 117, 191–202.
- Neisser, U. (2008). Memory with a grain of salt. In H.H. Wood & A. S. Byatt (Eds.), *Memory: an anthology*, London: Chatto and Windus, 80-88.
- O'Keefe, J., & Nadel, L. (1978). *The hippocampus as a cognitive map*. Oxford: Clarendon Press.
- Origg, G., & Sperber, D. (2000). *Evolution, communication and the proper function of language*. In P. Carruthers & A. Chamberlain (Eds.), *Evolution and the Human Mind: Language, Modularity and Social Cognition*. Cambridge: Cambridge University Press, 140–169.
- Parkinson, C., Liu, S., & Wheatley, T. (2014). A common cortical metric for spatial, temporal, and social distance. *Journal of Neuroscience*, 34, 1979–1987.
- Peterburs, J., Nitsch, A. M., Miltner, W. H., & Straube, T. (2013). Impaired representation of time in schizophrenia is linked to positive symptoms and cognitive demand. *PLoS one*, 8(6), e67615.
- Perkins, M. (2007). *Pragmatic Impairment*. Cambridge: Cambridge University Press.
- Perkins, M., Body, R., & Parker, M. (1995). Closed head injury: assessment and remediation of topic bias and repetitiveness. In: M. Perkins, S. Howard (Eds.), *Case Studies in Clinical Linguistics*, London: Whurr, 293-320.
- Pickering, M., Clifton, C., & Crocker, M. (2001), Architectures and Mechanism in Sentence Comprehension. In M. Crocker, M. Pickering, C. Clifton (Eds), *Architectures and Mechanisms for Language Processing*, Cambridge: Cambridge University Press, 1-28.
- Pinker, S. (1994). *The language instinct*. New York: HarperCollins.
- Reinhart, T. (1981). Pragmatics and linguistics: An analysis of sentence topic. *Philosophica*, 27, 53–93.

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- Reinhart, T. (1980), Conditions for text coherence. *Poetics Today*, 1, pp. 161-180.
- Scott-Phillips, T. (2015). Nonhumans primate communication, pragmatics, and the origins of language. *Current Anthropology*, 56(1), 56-80.
- Scott-Phillips, T. (2014). *Speaking our mind*. London: Palgrave Mcmillan.
- Shannon, C., & Weaver, W. (1949). *The mathematical theory of communication*. Urbana: The University of Illinois Press.
- Sinha, C., & Gärdenfors, P. (2014). Time, space, and events in language and cognition: a comparative view. *Annals of the New York Academy of Sciences*, 1326(1), 72-81.
- Sperber, D. (2000). *Metarepresentations in an evolutionary perspective*. In D. Sperber (Ed), *Metarepresentations: A Multidisciplinary Perspective*. Oxford: Oxford University Press, 117-137.
- Sperber, D., Origg, G. (2010). *A pragmatic account of the origin of language*. In R. K. Larson, V. Déprez, & H. Yamakido, (Eds.) *The Evolution of Human Language: Biolinguistic perspectives*. Cambridge: Cambridge University Press, 124-132.
- Sperber, D., & Wilson, D. (2002). Pragmatics, modularity and mind-reading. *Mind & Language*, 17(1-2), 3-23.
- Sperber, D., & Wilson, D. (1986). *Relevance: Communication and cognition*. Cambridge: Harvard University Press.
- Stocker, K. (2014). The theory of cognitive spacetime. *Metaphor and Symbol*, 29(2), 71-93.
- Suddendorf, T., & Corballis, M. C. (2007). The evolution of foresight: What is mental time travel, and is it unique to humans?. *Behavioral and Brain Sciences*, 30(03), 299-313.
- Varela, F., & Thompson, E., Rosch E. (1991). *The embodied mind: cognitive science and human experience*. Cambridge: MIT press.
- Weniger, G., & Irle, E. (2008). Allocentric memory impaired and egocentric memory intact as assessed by virtual reality in recent-onset schizophrenia. *Schizophrenia Research*, 101(1), 201-209.
- Wilson, D. (1998). Discourse, coherence and relevance: A reply to Rachel Giora. *Journal of Pragmatics*, 29(1), 57-74.
- Zlatev, J. (2012). Cognitive semiotics: An emerging field for the transdisciplinary study of meaning. *Public Journal of Semiotics*, 4(1), 2-24.