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Dialogicality in languages, minds and brains: is there a convergence between dialogism and neuro-biology?

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Abstract

The aim of this contribution is to take a number of key notions in dialogical theory, and look for their possible counterparts in recent neuroscience. This comprises points like other-orientation, relationism and context-interdependence, embodiment of language, responsive understanding, potentialities, unfinalisability, implicitness and degrees of awareness, and redundancy of processing. The conclusion is that there is indeed an incipient convergence between neuro-biology and cognitive dynamics, on the one hand, and dialogism on the other. A general dialogical framework has something to offer to cognitive science and evolutionary psychology, not in the least because dialogue and dialogical interaction appear to be more fundamental than language (at least as language has been conceived most often). Brains are complex organisms coordinating the apperception of and interventions into the world, rather than producing and processing agency-free representations of the world. © 2007 Elsevier Ltd. All rights reserved.

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1. Introduction: dialogism

Dialogical theory, or dialogism, is a general framework for the understanding of human action, cognition, communication and language, and may be construed as a counter-theory to monologism, which is associated with individualism (Linell, 2006b). It puts

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emphases on relational processes in the individual's interaction with others and in general with the environment. Such interactions are typically carried out by mediational signs, such as words and other linguistic resources, and this is done in different ways in different contexts. Hence, *other-orientation*, *contexts*, *interaction*, and *semiotic mediation* are key concepts. This applies to solitary activities such as reading a text or thinking by oneself, just as much as to interaction between several mutually present individuals.¹

I propose an ecumenical approach as regards what constitutes dialogism. Thus, (many interpretations of) present-day empirical approaches to talk-in-interaction (Conversation Analysis, contextual discourse analysis, interactional (socio)linguistics, social pragmatics, activity theory, discursive psychology, social representations theory, etc.) would be included (Linell, 1998, p. 40–54). In addition, of course, many of the suggestions within cognitive dynamics, as presented in several contributions to this journal issue, resonate quite well with dialogical theory. All this is far more than the theories of Mikhail Bakhtin and his “circle” (e.g. Brandist et al., 2004), with whose names ‘dialogism’ is sometimes exclusively associated.

2. Monologism, representationalism, individualism

Before going into the dialogical (i.e. dialogistic²) concepts in more detail, I will briefly discuss and partly dismiss some monologistic approaches. Let us then take our point of departure in the *individualism* of modern psychology. One should note, in this context, that this individualism extends to mainstream social psychology, especially in the US, for which a group is a simple aggregate of individuals who come together (Moscovici and Marková, 2006, p. 44).

So, for most psychologists, their discipline is per definition concerned with individual, mental phenomena. Furthermore, since the mind is understood as something lodged inside the skull, theories of the human brain easily invite individualist interpretations and thus reinforce individualism in psychology and cognitive science. After all, only individuals have brains, and therefore, it is argued (although sometimes only implicitly), mental phenomena are by necessity individual, subjective or, with another term, ‘monological’ in nature. From a dialogical point of view, this appears to be a misleading argument and a fallacious conclusion; even if only individuals have brains and minds, it does not follow that we are indulged only in truly individualised activities, in monologue or solipsism. In fact, the most fruitful assumption is arguably the opposite: the brain is dialogical!

Cognitive science has for a long time been dominated by approaches based on assumptions of information processing and mental representations of the world. Thagard (2002), cited by Potter and de Molder (2005, p. 15), says that “[t]he central hypothesis of cognitive science is that thinking can best be understood in terms of representational structures in the mind and computational procedures that operate on those structures.” Cognition is seen here as information processing, with ‘information’ taken to be items in a representation

¹ Accordingly, ‘dialogism’ or ‘dialogical theory’ is more abstract and comprehensive than ‘dialogue theory’, which is sometimes understood only as theories about concrete semiotic exchanges between two or more (mutually present) individuals, organisms or systems. In referring to this broad framework, I will use the adjective ‘dialogical’, even though, strictly speaking, I should say ‘dialogistic’.

² See footnote 1.

of the world, these items being deprived of agency, embodiment and culture.³ Other monological assumptions include language as a fixed code, and communication as information transfer from individual to individual (the ‘autonomous transmission’ account in the terms of Pickering and Garrod, 2004). Some more recent trends in cognitive science have modified the picture with claims that thought is embodied and imaginative (not just mirroring or representational), and it has gestalt properties (it is not atomistic) and ecological validity (Lakoff, 1987). But these variants too suffer from an interactional deficit, and do not seem to be dynamic enough.

3. Towards a more dialogical stance in cognitive science and neuro-biology

We should contest the cognitivist assumption that the brain is primarily engaged in modelling, imaging and imagining the outside reality. Instead, the brain is designed to serve as a means for the individual to relate to his/her environment, including social situations. Brains are interactive (“dialogical”) in several respects, in terms of their embodiment as well as their social embeddedness:

- the brain interacts with the rest of the *body*; the mind is embodied, not just embrained, and the body is mindful;
- the brain analyses and evaluates incoming signals from the *environment*, monitors responses to *others* in the social situations, and plans and controls interventions into the environment.

The brain connects with the body not only through the neural system (which could in some ways be seen as an extension of the brain). For example, pre-conceptual and pre-conscious meaning is bodily influenced, and feelings have a bodily basis to be found outside of the cerebrum, in the mid brain and indeed outside of the brain and the nervous system; feelings are induced not only by neural routes, but also by chemical routes (Damasio, 1994, p. 157). These are the two “main routes of interconnection within the organism”, between the brain and (the rest of) the body. The biochemical signals include hormones, neurotransmitters, etc. travelling in the bloodstream. Thus, Damasio talks about the mind’s relation to the ‘organism’, which comprises both the brain (neural system) and the rest of the body. “The mind is embodied, in the full sense of the term, not just embrained” (p. 118); it needs information about the viscera, muscles and joints, and it needs endocrine and chemical signals reaching the nervous system via the blood and other routes (e.g. p. 145). With Damasio (1994, p. 229), we should see the “mind [as] aris[ing] out of an organism rather than out of a disembodied brain”. Similarly, others (Thibault, 2005) talk about “the body–brain system”. Among the reasons for this is that “rather than being the seat of epistemically private mental representations, the brain functions to regulate the body’s interactions with its ecosocial environment” (p. 152).

Furthermore, the mind is not contained in the individual brain; instead, it is “inextricably interwoven with body, world and action” (Clark, 1996, p. xvii). Clark and others therefore suggest that we could talk about an “extended” mind, distributed over self

³ Boeckx and Piattelli-Palmarini (2005) claim that there are important parallelisms between theorising in “the most successful natural sciences” (p. 462), i.e. physics, and in generative linguistics, but these are based on very abstract and disputable comparisons. For some discussion, see Linell (2005).

and others, body and environment (including artifacts), etc. The mind is dynamic, not static; for example, memory is not like a dead “filing-cabinet” (Clark, 1996, p. 67; Love, 2004). “Memory is not [...] based on the storage and coding of static items of information in the brain, but on processes of dynamic and continual re-categorisation (Edelman, 1992, p. 102)” (Thibault, 2005, p. 119). Nor can cognition be “compared with the sequential analysis of symbols by a digital computer” (Lewis, 2002, p. 177). Brains can very well be apt, or adapted, for dialogue, social interaction and partially shared and emotionally driven cognition; indeed, there is ample empirical evidence for this, from specialist research on early interaction (Bråten, 2002; Halliday, 1975; Tomasello, 2003, 2005) as well as in neuroscience (see below).

According to this conceptualisation, dialogical theory combines variants of naturalism and social constructionism. The mind is embodied and spoken language is bodily behaviour with a temporal dimension, and they are dependent on neuro-biological realities. At the same time, language and discourse are embedded in social actions and associated with social values.⁴

Most neuroscientists would probably agree that the brain is ‘dialogical’ roughly in the general sense sketched above. Similarly, within cognitive science and usage-based linguistics, there is a wide-spread understanding that spoken language is designed for interaction. However, it is still justified to say that in general, the consequences of the insight that language, mind and brain are all essentially contextual and interactional are far from sufficiently heeded within these disciplines.⁵

If we take the brain to be dialogical⁶, this thesis should arguably be supported by, or at least be compatible with, solid neuro-biological insights and findings. The purpose of this text is therefore to bring up a number of dialogical core concepts, and discuss them in relation to some ideas in modern neuroscience, as described by e.g. Damasio (1994) and Solms and Turnbull (2002). I will do this in full awareness that these scientists are somewhat controversial in their field, and despite the fact that they do not explicitly embrace dialogical theory. One neuroscientifically informed psychologist, however, who does take up dialogical theory, is Lewis (2002, “The dialogical brain”), to whom I will also refer.

I will be particularly concerned with issues of language and communication, highlighting some points of a dialogical linguistics (Linell, 2006a) that are often quite divergent from the stances of mainstream linguistics. I shall compare them with (what might seem to be) central insights of modern neuro-biology. This makes my project rather similar to that of Thibault (2000, p. 293f; 2005, p. 118, 120), who argues for the convergence of Hallidayan systemic functional linguistics with findings from modern neuroscience. In a

⁴ It is not an easy task to combine naturalism with cultural theory. A telling example of a misguided attempt to neurologise socio-cultural theory is, in my view, the so-called ‘memetics’ (Aunger, 2000). The term ‘meme’ within ‘memetics’ comes from Dawkins (1982) and refers to a unit of cultural information that spreads through social transmission, leaping from minds/brains to other minds/brains. This seems to be a thoroughly monological approach.

⁵ With regard to linguistics, this thesis is discussed at length in Linell (2005) (see also Linell, 2006a,b). It should also be pointed out that neurobiologists such as Damasio and, Solms and Turnbull, sources to be exploited in this paper, do not deal extensively or specifically with language. Indeed, despite the dynamics of their neuro-biological accounts, their accounts suffer from an interactional deficit and from bringing along several monological descriptions.

⁶ Strictly speaking, brains are not dialogical. It is people who are dialogical, and brains do not know that they contribute to meaning-making in context.

similar vein, there are strong parallels with work in “integrational linguistics” (Harris, 1997; Love, 2004).

4. Relationism

A basic point in dialogism is that the individual constantly relates to others and to the environment. I shall treat aspects of this insight under four different headings.

4.1. Other-orientation

Other-orientation is a key concept, perhaps *the* key notion, in dialogism. In talk-in-interaction, the individual responds to an other and his or her prior actions or utterances, addresses the other and anticipates possible next actions from him or her. External dialogue gets internalised, when we learn to indulge in disciplined thinking, especially when it is supported by language. Even in solitary thinking, there tends to be some kind of other-orientedness. Lewis (2002, p. 179) talks about the experience of our own acting and thinking, “*as if* someone might be listening to us, evaluating us and ready to act verbally.”

Consciousness has a sociodialogical basis. It involves reflecting on one’s own position, and this is dependent on experiences of alterity, on the realisation that others understand you and the world (or may do so) in specific and sometimes divergent ways. Social apperception and recognition are important for understanding. You cannot begin to understand that you are somebody (who can think) until you have been approached and greeted as somebody by the other.⁷ Many studies of infants’ behaviours and interactions have shown that infants react differently to other human beings than to dead objects.

Pickering and Garrod (2004) talk about mutual and partly automatic interactional alignments between co-present individuals in dialogue. As regards possible connections between dialogical other-orientation and brain structures, we might look at both micro-structure and overall functional systems (Thibault, 2005, p. 151). As for the former, we can point to the discovery of mirror neurons (in apes) by Rizzolati and Arbib (1998), and others. These are neurons which have been shown to fire in partly the same ways when the individual him- or herself is doing something particular and when he or she observes someone other doing the same thing.

The studies by Bråten (2002), Trevarthen (1998) and others of very early infant interaction suggest that dialogical imitation is innate. There seems to be an inborn capacity “for dialogic attunement to the vocalisations and gestures of others” (Thibault, 2005, p. 150). As Bråten (2005) notes, this “virtual co-authoring” is “supported by the capacity for other-centred mirroring and resonance that we see at play in protoconversation and response to motherese”. These processes of altercentric mirroring and self-with-other resonance, exhibited soon after birth, will facilitate the infant’s ontogenetic path to speech in the culture into which the infant is born.

At the level of functional systems (see also below), we find that our perception of complex situations is directly linked to sets of response options that are immediate and highly

⁷ The Lithuanian-French philosopher Emmanuel Lévinas has reportedly claimed that human understanding does not start out from the Cartesian *Cogito*, but from *Bon jour!*

automatic, and often come with somatic markers. Later in ontogeny, we learn partly to inhibit some of these responses. Lewis (2002) talks about ‘attentional systems’, described as partly different in function, and related to different phases of a perception–action cycle. One of them, the orbitofrontal cortex, with its connections, is characterised as responsive and input-driven, tuned to immediate reactions of rewards and punishments to the immediate environment (p. 183). The other system, which Lewis localises to the anterior cingulate cortex (plus various limbic connections), is less responsive, and instead more projectional and geared towards “coherent or packaged motor plans”. In suggesting a dialogical interpretation, Lewis himself associates these with the expression of dominant “semi-autonomous” (dominant vs. alternate) I-positions. I would venture to suggest another link, namely, to responsive vs. initiatory aspects of contributions to dialogue (see next section). More complex initiatives based on deliberate decision-making and self-monitoring would of course involve the prefrontal cortex.

As I mentioned earlier, Pickering and Garrod (2004) argue for extensive mutual alignments in dialogue.⁸ But other-orientation in communication and thinking is not only about intersubjectivity, but also about alterity, in the sense of our being capable of responding to and (partly) understanding others’ different (“alien”) perspectives. Hence, dialogism must also account for asymmetries in knowledge and participation, and complementarity in the division of communicative labour in actual interactions (Linell, 2006b).

4.2. *Responsive understanding*

If languaging and thinking are other-oriented, it means that actions and cognitions are both responsive to prior events and actions, and anticipatory to possible next actions (on the part of oneself and the other). This in turn means that there is a close *relationship between understanding and responding*. The distinction between (utterance) production and comprehension is not as radical as has traditionally been assumed in models of senders (speakers, actors) and receivers (listeners). Preparing a response also involves stance-taking and perspective-*setting*, and we can, at least in part, take the other’s perspective. Arguably, this explains the origin of self-monitoring in one’s own utterance production (Pickering and Garrod, 2004).

To understand the other’s utterance in real time, we must, to some extent at least, be able to predict the continuation of the other’s utterance and also to project one’s own (or others’) possible next actions. The study of the grammatical and semantic-pragmatic properties of utterances in different languages have shown that they have been designed to allow for a fair amount of projectability (Auer, 2005). (Within more experimental paradigms, the same phenomena are dealt with in terms of ‘syntactic priming’.) If listeners can, within limits, project upcoming parts of others’ utterances, they can also complete others’ utterances, and they can respond relevantly and promptly to others’ utterances, latching their responses to these preceding utterances without any interjacent pauses (Goodwin, 1981; Schegloff, 1996). The interdependence with the other in an external interaction is shown in the two-sidedness of utterances, which are both responses to prior contributions and contain new initiatives by the speaker (initiatives that anticipate possible

⁸ The ‘mechanistic’ dialogue theory of Pickering and Garrod (2004) takes ‘dialogue’ in the concrete sense of overt interaction between two co-present individuals. Cf. footnote 1.

responses from the other). Conversation analysts talk about the ‘recipient design’ of utterances and other communicative actions.

Again, this resonates with modern neuro-biological assumptions. The role of the immediate evaluation (relative to bodily needs) of incoming “information” from the environment implies that responding is part of the apperception process. Lewis (2002, p. 180) points out, with reference to Neisser (1978), that from a neural perspective, action is always guided by anticipation, and anticipation always take place in the context of perception. “Actions begin with global, gist-like intentions that can be rapidly refined into specific motor plans and finally into a sequence of muscle movements (including speech)” (p. 180). Perceptions also “remain gist-like for some time but then shift to a rapid extraction of the specific features of a situation (e.g. the actual words in the case of dialogue).” Emotions motivate actions, and direct attention towards outer situations, and thus anticipate responses. Lewis points to circuits between frontocortical and limbic regions in the brain that support these processes (see above).

4.3. *Potentialities*

In dialogical theories of language and languaging (i.e. the dynamic use of linguistic (and other semiotic) resources in cognitive and communicative activities), language is conceptualised in terms of potentialities, rather than as fixed structures. This is opposed to the common assumption of language as a set of fixed abstract forms, or even as a(n infinite) set of sentences (Chomsky, 1957).

According to a ‘potentiality approach’, languages are constituted by resources to be used in producing utterances and in associating understandings with utterances. These resources are characterised by partial openness, i.e. they are designed to be completed only in situated meaning-making. They do not ‘encode’ or ‘contain’ their meanings; rather, they index, cue or prompt understandings in terms of reference, conceptualisation and intervention. Potentiality is related to creativity and adaptability, to the principled capacity of language to meet the communicative needs of ever changing situations.⁹

In the tradition of Michael Halliday, semantic potentialities are usually ascribed to an entire language or language variety (Thibault, 2005), but we can also talk about the meaning potentials of specific lexical items or grammatical constructions. A given word admits of many situated interpretations, as aspects of its meaning potential obligatorily combine with various contextual factors, which are, in turn, different in different situations (Norén and Linell, submitted for publication). For example, the word *new* can, when used in an utterance like *This is a new idea*, mean different things in different interactional contexts (the idea ‘has never appeared anywhere until recently’, ‘is new to me’, ‘is new for us (or you) in this context’, etc.). Rommetveit (1974) launched the idea of the dialogical (i.e. sequential, interactional) constitution of situated interpretations, given particular semantic potentials of words.

But if meaning potentials are dynamic, they are also relatively stable, thus not endlessly open-ended. Meaning potentials must be decoupled from specific situations (cf. Ross, this issue, p. 4), and robust (they must not be useless in new situations, and situations are

⁹ Chomsky’s notion of recursivity in syntax is, in this comparison, an impoverished notion of creativity, accounting for only some aspects of syntax and being entirely internal to the language system.

always at least partly new). But they are not decoupled from *types* of situations; meanings are always made (or at least completed) in contexts, and abstracted linguistic resources are designed to be used in and adapted to contexts. Aspects of meaning potentials cue or prompt situated meanings; the relative stability pertains to regularities in cueing. Ross (this issue, p. 6) suggests that this is the nearest you can get to a notion of a linguistic ‘code’: “similar public linguistic representations cue similar behavioural responses in individuals with similar learning histories, as a result of conventional associations established by those similar histories”.

Turning now to neuro-biology, we find Solms and Turnbull (2002, p. 11) saying that in general, the brain is built in such a manner that many neurons have an inbuilt ability to develop interrelations in many different ways. These are potential networks that are not always actualised; in reality, only a few of the potential interconnections are actually activated Solms and Turnbull (2002, p. 147). They are aggregates of dispositions to interact with stimuli and experiences from the body and the environment. Damasio (1994, p. 102) speaks about ‘*dispositional representations*’ that “exist as potential patterns of neuron activity in [the] small ensembles of neurons [he] call[s] “convergence zones”. These convergence zones are located, according to Damasio (p. 102) “throughout the higher-order association cortices (in occipital, temporal, parietal, and frontal regions), and in basal ganglia and limbic structures.” A dispositional representation, in Damasio’s account, is not a picture or an image per se, but “a means to reconstitute a “picture” ” (p. 102). Dispositional representations are “dormant firing potentialit[ies] which come to life when neurons fire” (p. 103–104). Actualised “representations” such as images “are constructed momentarily under the command of acquired *dispositional* neural patterns elsewhere in the brain” (p. 102; italics in original).

We might venture to transpose Damasio’s notions of dispositional and actualised representations into dialogical-linguistic terms, according to which situated meanings of utterances are constructed by exploiting (more abstract) meaning potentials that exist (“elsewhere”, as it were, in Damasio’s wording) in the language processing system.

Another field in which theorising in terms of potentialities is central is individual development, e.g. of linguistic, cognitive and communicative abilities. Mainstream clinical psychology, and related specialities, often concentrate on trying to identify and measure communicative and cognitive abilities and disabilities in terms of context-free (in)competences and (in)capacities tied to and inherent in the individuals themselves. A dialogical approach, by contrast, needs concepts which are more interactional in nature. Therefore, a metalanguage of ‘potentialities’ and ‘vulnerabilities’ is near at hand.

Vygotsky’s (1978) theory of the zone of proximal development (ZPD) assumes that an individual can sometimes perform over his or her normal level, if he or she is supported by a partner, who is more competent or can fulfil a complementary (scaffolding) role in interaction. The most obvious applications of ZPD pertain to children’s development. But it can also apply to other levels. For example, a client who needs help in grasping the nature of personal, psychic (or psychiatric) problems or experiences, may be supported by a sensitive therapist in the process of “recognising, reformulating, understanding, and, eventually, resolving the problematic experiences” (Leiman and Stiles, 2001, p. 311). Relatedly, individuals with weaknesses are usually not just incapable or incapacitated *tout court*, but they may quite *vulnerable* to unfavourable circumstances.

4.4. *Affordances in a relational world*

By way of a provisional summary, we can speak of a dialogical stance of relationism¹⁰; sense-making (understanding) is neither contained in an ‘inner (subjective) world’¹¹, nor in an ‘outer (objective) world’, but it lives in the relations between these, in an ‘inter-world’ (Merleau-Ponty, 1955) between the organism and the external world (see Linell, 2006b, for further references). This somewhat peculiar notion of the ‘inter-world’ should be adopted, because we want to avoid the choice between complete subjectivity (meanings are “in the head”) or external radical objectivity (meanings are “out there”) in theorising meaning and meaning-making; rather, meanings are (largely) intersubjective, linguistically and pragmatically established and sustained in and through interactions within cultural communities. Participation in communicative activities, games of coordination (Ross, this issue), becomes possible because members of the communicative community partially share the habits of meaning-making established in and through which we relate to each other and to objects, processes and circumstances around us. The external world offers ‘*affordances*’ for categorisation in the form of salience patterns (Gibson, 1979). These affordances and patterns are out there, in the world; they are what the environment provides or furnishes, but they must be dialogically recognised and appropriated by human subjects (Hodges, this issue). Hodges, following Reed (1991), characterises human cognition as the “collective appropriation of affordances”. Thibault (2005, p. 124) and Hodges extend the theory of social affordances to utterances: “In talking with each other (and ourselves) we create affordances, opportunities that invite the other into seeing and moving in certain directions that look promising.” (Hodges, this issue).

This is the dialogical stance. It does not posit an abstract, spiritual or Cartesian, mental world; on the contrary, it insists that meanings cannot occur unless there are human beings with their bodies, brains and minds acting in the external world. This holds, *a fortiori* as it were, to cognitive processes in thinking, imaging, etc., which are distributed over brain, body, and world. This implies a thoroughly *contextual* theory of sense-making.

5. From representation to intervention

The previous points imply that if we abandon cognitive internalism, the emphasis shifts *from representation to control, interaction and intervention*. I shall take up three points in this connection.

5.1. *Interaction and intervention*

The mind’s relation with the environment is built on *interaction* with it, rather than only on the representation of it. While we surely need knowledge of and assumptions about the world, the various corresponding ‘representations’ are largely subordinated to interaction and intervention in the world. Monologism, by contrast, has split phenomena, and reversed priorities, putting representation, logic and an abstract notion of language in the position of primacy.

¹⁰ Relationism is of course quite different from relativism (e.g. Linell, 2006b)!

¹¹ It may be remarked that Solms and Turnbull (2002), to whom I make numerous references, stick to the term ‘inner world’. Cf. footnote 5.

Our consciousness is relational, intended (or directed) to something in the world or in the body; the very motivation of the brain is to relate apperceptions of the world to the bodily states, to evaluate objects by means of affectual and attitudinal reactions. “The brain works to regulate the body’s sensori-motor activity in its ecosocial environment.” (Thibault, 2005, p. 150). In doing so, the mind/brain constructs, rather than registers, the environment (e.g. Solms and Turnbull, 2002, p. 155).

Speaking of languaging in terms of interaction and intervention, we recall that responsive and projective links are ubiquitous in sequences of connected, interlocking utterances in talk. But if utterances are interlocking links in chains, so are ideas and thoughts in thinking. There is no such thing as the self-contained ‘complete thought’. Yet, this has been a much cherished notion in the history of psychology, where it has been supported by literate practices; sentences in writing propositionalise thought (Linell, 2005, p. 66, 108).

Neuro-biology too stresses interaction, as we can see from the various points taken up in this paper. However, it must be conceded that many neuroscientific accounts still contain a lot of talk about mental representations and images. For example, Damasio (1994, 90) argues that we have (mental) images which are based on neural representations and raised to consciousness, and these images are “manipulated in a process called thought” (p. 90) (on ‘perceived’ vs, ‘recalled’ images, p. 101). This kind of discourse appears to me to be rather static in character, and one may miss the point that representations are there to serve the superordinate purposes of interaction with and intervention into the world.

5.2. *Facilitation and inhibition*

Once the emphasis has been shifted to interaction and intervention, it becomes natural to highlight the balance (or tension) between facilitation and inhibition. While we all agree (I think) that brains allow us to inhibit, code models of language have missed out on this point. Inhibition allows dynamics and adaptability in different scales, and related neural processes occur in invertebrates as well as in full-blown dialogue. One function of interaction is to allow us to learn where *not* to go and what *not* to do (Stephen Cowley, personal communication).

The tension between facilitation and inhibition is ubiquitous in brain functioning, from the neuronal level, strengthening vs. weakening of synapses (Damasio, 1994, p. 104), to more global levels. At the behavioural level, we may compare tendencies towards both fight and flight as reactions to threatening situations (Solms and Turnbull, 2002, p. 126). There is a struggle to strike a balance between reinforcement and inhibition. In dialogue and discourse, we have a tension between the will to select-and-display and the will to conceal-and-silence. Related to this are contradictions and tensions in meanings and messages (Hermans and Kempen, 1993), and in social representations that characterise human discourse and thinking (Marková, 2003).

Another important point is that inhibition does not imply eradication or elimination; traces can be resuscitated. The inhibition of a certain interpretation does not preclude its possible appearance in later moments or situations (cf. below on unfinalisability).

Related to these issues are the *implicit–explicit* distinction and different *levels of awareness*. A lot of meaning is conveyed indirectly, shown rather than said, given off rather than given; we may try to inhibit expression at one level, while the appearances of these very

attempts leak out at other levels. Related to this are aspects of vagueness, indeterminacy and even ineffability in communication, phenomena which have usually been underestimated or even ignored in semantics, especially of course in formal semantics.

When we look for counterparts of implicitness and indeterminacy in neuroscientific theory, what comes to mind is perhaps the varying levels of consciousness: many psychic processes are not conscious or ‘explicit’. There are differences between immediate and later responses by ‘attentional systems’ (Lewis, 2002). In the domain of emotions and feelings, vague sensations may alternate with or develop into conscious perceptions, the latter corresponding to the engagement of more brain structures. Similarly, many aspects of meaning are only pre-conceptual or pre-conscious. Processes in language use are also in many respects rapid, automatic and ‘reflexive’, rather than ‘reflective’ (Carston, 2005). This applies to the appearance in consciousness of word recognition and meaning assignment in listening; one cannot describe introspectively how these apperceptions arise. On the other hand, there is also consciousness that is (per definition?) linguistically explicit, and interdependence with social, other-oriented processes. In discourse, we argue and negotiate meanings. Yet, even explicitly rendered meanings presuppose a multitude of tacit meanings.

5.3. *Unfinalisability and never terminating activities*

Networks are a fundamental principle of neural organisation, and so are lexical networks in semantics. All of the brain’s components are characterised by continuously ongoing activities (Damasio, 1994, p. 87) in neural networks with a potential for parallel processing. In the same spirit, Hodges (this issue) points to Gibson’s (1979) remarks on perceptions as endlessly exploring the environment.

The multiple parallel and converging streams of neural signals never “terminate”, says Damasio (p. 93); processes are not completed, nor simply switched on and off. We might compare this to the Bakhtinian notion of ‘unfinalisability’ (or ‘openendedness’; Bakhtin, 1981, p. 426), which implies that there is no finalised, complete (correct, etc.) interpretation of a given utterance. Of course, in practice we do not keep on interpreting a normal mundane utterance in conversation for very long, but we rather leave it, seemingly also forgetting it, as we go along. But there is always a possibility that the mind keeps working for extended time periods on some topics or problems brought up in interaction. Examples can be drawn from the continued unconscious word searches that take place when we have not been able to retrieve words (the tip-of-the-tongue phenomenon); words may pop up in consciousness minutes, hours, even days later. Other examples come from other phenomena, such as dreams during sleep processing experiences of the previous day, etc.

Going back to Damasio’s “streams of neural signals” that “never terminate”, he explains this in the following terms: “because, from the vicinity of each point to which project forward, there is a reciprocal projection backward. It is appropriate to say that signals in the stream move both forward *and* backward. Instead of a forward-moving stream, one finds loops of feedforward and feedback projections, which can create a perpetual recurrence” (p. 93; italics in original). Brains are not just reactive or responsive, but anticipatory too. Similarly, in a sense, you do not just begin and complete insulated utterances in conversation, but utterances are in interaction with prior events (actions and utterances), responding to them, and they anticipate possible subsequent actions and utterances (Sacks et al., 1974). As we have pointed out earlier, there is an *anticipatory dynamics* in the

interactional potential of the utterance; rather than being merely representations of something in the world, utterances exhibit an explorative orientation to future potentialities, to possible courses of upcoming developments of discourse (Thibault, 2005).

6. Functional systems

Other dialogical points concern overarching structures and redundancy of information in communicative processes.

6.1. *Constrained holism*

The history of neuropsychology and neurolinguistics partly revolves around the issue of modularity vs. holism. Currently, most neuroscientists adopt a modularity view; brain parts are functionally specialised. However, these parts contribute to large, integrated and dynamic ‘functional systems’, which are systems dispersed over many brain regions but forming structural and functional ‘ensembles’ in continuous interaction (Damasio, 1994, p. 14, *et passim*). Thus, we are at the same time faced with a form of *constrained* holism.

Most psychic functions depend on the operation of highly complex functional systems, involving both ‘high-level’ and ‘low-level’ brain regions, such as cortices, in particular pre-frontal cortices, and the hypothalamus and brain stem, respectively. There is an *integration* of different levels, of different ‘systems’, and this claim holds for language, just as for reason and emotions (at least according to neurobiologists like Damasio (1994)). Edelman (1992) speaks of ‘neuronal group selections’ responsible for higher-order consciousness, that is, our ability of being conscious of being conscious (Thibault, 2000).

In this context, we also recall Lewis’s (2002) discussion of the dialogical self, with its two frontal attentional systems of the brain, “the orbitofrontal system and the anterior cingulate system” with their connections in the limbic system. Language and languaging involve many types of linguistic resources and communicative abilities, and these too involve many parts of the brain. Nonetheless, formal and representational theories of language based on structural (including generative) linguistics have often assumed the existence of highly circumscribed ‘modules’ of language, allegedly corresponding to brain ‘modules’ or ‘centres’, exclusively responsible for language. Such theories do not seem to do justice to the above-mentioned ‘constrained holism’. Functional systems were assumed already by Luria (who had an intellectual heritage in (partly) dialogical theories, such as those of Vygotsky), and their existence has become further substantiated by modern neuro-biology (neuro-physiology), e.g. in the ‘dynamic’ theories of Damasio, Solms and Turnbull, and others, etc.

6.2. *Redundancy*

From a neuro-biological point of view, the brain is characterised by plasticity. This builds upon parallel processing (Damasio, 1994, p. 84) at several levels. Information is encoded at many places (Solms and Turnbull, 2002, p. 149). This is what linguists and information theorists would call redundancy.

Redundancy is a property that is highlighted in usage-based linguistics, i.e. theories contending that most of the properties of languages can be explained in terms of how

humans use language in thinking and communication.¹² Languages do not just exhibit generalised patterns, but also a large amount of item-specific knowledge (Bybee and McClelland, 2005). Many theories, e.g. construction grammar, meaning potential theory, and lexical network theory, go for some kind of semantic ‘maximalism’, arguing that the meanings that language users must have access to are both abstract and overly rich (Recanati, 2004, p. 140–141).

In various branches of formalist linguistics, by contrast, we have been brought up to prefer and prioritise full explicitness (formalised description) and parsimony (maximal economy). Similarly, semantic ‘minimalism’ (lexical and grammatical resources are abstract and minimally specified) remains a preferred stance for many, such as relevance theorists, or the ‘insensitive semantics’ of Cappelen and Lepore (2005). These theories face difficulties with such phenomena as inhibition, varying levels of awareness, the embeddedness of languaging in pre-conceptual processes, etc. (cf. above). It seems unlikely that natural language in real social life and in real brains fits descriptions of minimalist, context-free (‘insensitive’) semantics.

7. Summary and conclusion

Language and meaning are not exclusively spiritual, nor are their representations completely localised in a few cortical areas. Psychology has for long been plagued by a dichotomy between a rather ‘mindless’ neuro-psychology and a ‘body-less’ cognitive psychology. To some extent, this is the heritage from what Damasio (1994) calls ‘Descartes’ error’, the complete separation of mind and body.¹³ Within linguistics, particularly structuralist and generative theories have portrayed linguistic structures as purely abstract, and dubbed them ‘mental’ (i.e. ‘spiritual’, to use a somewhat more loaded term). For example, in the history of phonology, some theoreticians have proposed that phonology has nothing to do with phonetic substance (Linell, 1979). The theorisation of purely ‘mental’ structures is even more evident in syntax and semantics. But dialogism and neuro-biology both argue that language is inextricably intertwined with the mind, and cannot be exclusively spiritual; language, mind and brain are embodied.

The abstract structuralism of monological cognitive science and mainstream linguistics, in particular generative linguistics, actually has a long past in the history of linguistics. There has been a ‘written language bias’ (Linell, 2005) (or ‘scriptism’, in Taylor’s (1997) terms) in the language sciences, which comes from the traditional preoccupation with written language and other static modes of representing phenomena, including picture theories of language. These approaches are not viable as theories of embodied, interactional languaging.

It has been suggested in this paper that there is a powerful convergence between neuro-biology and cognitive dynamics, on the one hand, and dialogism on the other. This comprises points like other-orientation, relationism and context-interdependence, embodiment of language, responsive understanding, potentialities, unfinalisability, implicitness and degrees of awareness, and redundancy of processing. A general dialogical framework

¹² Some references are Halliday (1975), Langacker (1987), Hopper and Thompson (1984), Croft and Cruse (2004), Bybee and McClelland (2005), and Tomasello (2003, 2005).

¹³ Descartes suggested an answer to the question “How do body and mind communicate?” that was truly ad hoc: the pineal gland theory.

has something to offer to cognitive science and evolutionary psychology, not in the least because dialogue and dialogical interaction appear to be more fundamental than language (at least if language is traditionally defined as a system of resources or even as abstract objects).

Language develops in the presence of interaction and dialogue (Tomasello, 2003; Spurrett and Cowley, 2004). How basic is dialogue then? The answer depends on what we take the term ‘dialogue’ to mean. Certainly, the concrete situated interactions – by various semiotic means – between two or more mutually co-present individuals remain important. But what we have really been arguing for is a more abstract notion of ‘dialogue’, or rather: ‘dialogicality’: the dynamic abilities to take part in interactions with others and with socio-cultural contexts as well as physical environments.

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