INTRODUCTION

Distributed language and dynamics

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Language is coordination. Pursuing this, the present Special Issue of Pragmatics & Cognition challenges two widely held positions. First, the papers reject the claim that language is essentially ‘symbolic’. Second, they deny that minds (or brains) represent verbal patterns. Rather, language is social, individual, and contributes the feeling of thinking. Simply, it is distributed. Elucidating this claim, the opening papers report empirically-based work on the anticipatory dynamics of reading, their cognitive consequences, Shakespearean theatre, what images evoke, and insight problem-solving. Having given reasons for rejecting linguistic autonomy, the papers turn to theory building. Initially, attention is given to a possible origin for semiotic cognition. Then, it is claimed that language functions by realizing values. Next, it is argued that human dynamics are co-regulated by cultural and biological symbols. Finally, in a review article, the distributed view of language is used to contrast Clark's (2008) organism-centered cognition with what is here called ecologically extended cognition.

Keywords: biosemiosis, cognition, distributed cognition, distributed language, dynamical systems, embodiment, general linguistics, semiotic cognition

Human cognition connects with both artifacts and social events. These nudge us as we decide how to act, express ourselves, and what should be said. Our social lives are permeated by a cultural dimension. Like cognition, language is social and yet run through with the feeling of thinking (Harnad 2005: 501). While communication uses symbolic constraints, we are not physical symbol systems. Rather, we make sense of verbal patterns. How can language be social, individual, and feeling-based? Addressing this, we turn to how language is distributed. Sentience and expression are brought into play as we co-ordinate around verbal patterns which others also perceive. While dynamical, words can inform thoughts. Social events and language exploit how human coordination links circumstances, experience, and verbal patterns.

Standardly, linguistics emphasizes language-systems. Considered in relation to populations, this claim can be innocuous. Dialogue, however, happens in time,
shapes experience, and drives social events. To come to terms with this, instead of evoking (hypothetical) language-systems, the distributed view focuses on human coordination. Stressing how language functions between people, the Special Issue turns to contemporary cognitive science. Linguistic symbols (and artifacts) are taken to constrain real-time dynamics. The theme emerged at a workshop on the *Dynamics of linguistic material* where five of the authors presented (Kravchenko, Fioratou, Tylén, van Heusden, and Rączaszek-Leonardi). While none take Clark’s (1998; 2008) view that material symbols extend the mind, all concur that coordination is the ‘glue’ of cognition (Kirsh 2006:250). Pursuing this, the Special Issue includes three other papers (and a review article). First, Järvilehto and colleagues use measures of gaze to show the power of anticipatory dynamics. Next, Tribble treats languaging as the basis for Shakespeare’s theatre. Then, from ecological psychology, Hodges claims that the dynamics of linguistic coordination realize human values. Far from being material, words are virtual entities that, in themselves, lack causal powers. Human activity is directed at linking experience, material events and culture. Like sport, music, dance, and computer mediated activity, language (and words) realize values only within a body (as feeling) or with reference to utterances, thoughts, and actions.

Classic views of cognition used serial computational models to link Shannon’s (1948) information-processing with Eighteenth century views of mental representation. Cognition is attributed to a mind that mediates input and output. Dynamics are assumed. Like behaviorists, mentalists overlook how autonomous organisms engage reciprocally with their surroundings (Kravchenko 2007a).

Today, it is increasingly recognized that neural development is embodied and embedded. Since perception and action are linked, they are irreducible to input and output (or stimulus and response). Bio-systems perform information processing without having to be Turing compatible. As robots, bacteria, squid, and human subjects show, systems can adapt to (and change) their worlds. For example, Hoffmeyer (2008) describes a species of squid (*euprymna scolopes*) that hunts by moonlight. To counteract the shadow that would frighten its prey, it has evolved counter-illumination camouflage. Its symbiotic relation with light emitting bacteria (*vibrio fischeri*) pre-empt observation. The squid manages bacterial reproduction to match their luminescence with moonlight. Then, when the sun rises, 90–95% of the bacteria are excreted. The squid adjusts the oxygen supply to its mantel cavity, calibrating the density of bacteria for the next night’s hunting. In bio-systems, adaptive behavior is situated. This applies to arms races, niche construction and, crucially, social cognition. In many species, individuals mutually affect each other. They draw on the results of interactions between development, circumstances, and evolutionary history. For example, young vervet monkeys learn about predators as alarm calls set off neural events, cries, and coordinated action. Individuals learn
as they move, hear and experience events. Cognition depends on dynamics. In many species, individuals also monitor their own bodies. In humans, action and perception are managed with respect to the presence of others. In dialogue, the words that are actually spoken exploit other-orientation (Linell 2009: 13). Human sense-making links current circumstances with the deliverances of individual and collective experience. Our kinds of cognition are culturally distributed. In contemporary terms, human cognition uses deeds (Walmsley 2008). It is dynamical, embedded, embodied, distributed, and situated.

Flexible, adaptive behavior appeared with bacteria. Their context sensitive activity integrates events that can be perceived with events inside the organism. Adaptive decision-making does not use a central controller. While vertebrates use intra-neural processes, cognition is based in body-world coordination. Skills emerge as we act, perceive, monitor, and anticipate events. In Piaget's terms, we accommodate and assimilate. By so doing, we can ground language dynamics. While functioning in populations, language coordinates brain-body systems with the feeling of thinking. At all times, it plays a dual social and individual role (Cangelosi 2006: 275). Accordingly, it is gratuitous to assume that language is brain-bound. Rather, higher level verbal patterns constrain lower-level coordinated movement. As a result actors engage with each other and develop — not inner knowledge — but social skills. Recognizing this, while some reject Western epistemology (Varela et al. 1991), others use sources such as Wittgenstein, Heidegger, Marx, and Hegel. Simply, as we engage with each other, language dynamics play out in social, dyadic, and neural time-scales.

Where not localized, phenomena are distributed. In language, the term has two main applications. People concert activity and, in development, language emerges as bodies engage with both each other and the world. Language is coordinated between us. Were this not finely managed, we would fail to understand rituals, institutions, texts, and artifacts. As Hutchins (1995) shows, language is culturally distributed. It is, however, also distributed in another sense. Coordination gradually insinuates language-experience into the brain. Since brains control actions (Glenberg 2006: 263), language permeates a significant part of human life. Accordingly, its effects come to be distributed within the brain (see Anderson 2008: 245–246). This ensures that the influence and function of language can vary between different types of tasks (roughly, types of 'language-use'). Indeed not only do areas of the brain connect up in many ways but, as is increasingly recognized, neural resources used in language have many other functions. In spite of linguistic tradition, language is neither 'autonomous' nor separable from people.

Public language is often identified with 'communication.' This rhetorical move has dangers because, if communication is public, 'cognition' is often relegated to a hypothetical private realm. While useful in describing (say) reaction-time
experiments, everyday life is dominated by slower thinking. We do not hear sequences of syllables (+/−200 ms. bursts) but, rather, ‘what people mean’. The said informs experience even as we are speaking. Utterances are feelingful activity that is, run through with what we expect (and anticipate). During dialogue, we rely heavily on monitoring and modifying real-time expression. Public linguistic acts are both communicative and cognitive. The ‘internalism’ of folk psychology is no less misguided than the view that human beings are physical symbol systems. Intelligence cannot depend on (private) thoughts that, in Locke's terms, arise within one's 'own Breast, invisible and hidden from others' (1975: 3.2.1). We therefore also reject his view of symbols or 'external signs':

The Comfort and Advantage of Society, not being to be had without Communication of Thought, it was necessary that Man should find out some external, sensible Signs, whereby these invisible ideas, which his thoughts are made up of, might be known to others (Locke 1975: 3.2.1).

In the late 19th century, logicians and engineers implemented these odd ideas. While semantic atoms were ascribed to propositions, engineers used Morse equivalents in radio transmission. In Lockean terms, sensible signs transmitted invisible ideas. It is striking that, soon afterwards, de Saussure (1916) defined ‘language-systems’ as akin to man-made codes (i.e., sets of signs that, combined in a linear way, map onto meanings). And, it is beyond dispute that system/use or ‘code’ views dominated linguistics. In behaviorist guise, habits were said to permit use of linguistic forms. Mentalists, by contrast, attributed this to the function of an inner grammar. In parallel, computers were designed with programs that exploit relations between symbols.3

The distributed perspective contrasts language with codes like Morse (Love 2004, 2007; Kravchenko 2007; Cowley 2007). While man-made codes use determinate forms, in language syntactic relations function alongside semantics, coordination, and feeling. Formal analysis is a mode of description. As can be argued on mathematical grounds (Rosen 1991), this cannot be true to life. To stress formal descriptions of sentences and utterance-types shows written language bias (Linell 2005). Specifically, it conflates second-order entities (and/or inscriptions) with human activity or languaging. As living beings, we do not encode/decode but, using our senses, concert activity while orienting to second-order constructs. Biology and language are thus irreversible (Hoffmeyer 2008: 54): we can neither reverse time nor unsay what is said. Wittgenstein (1958) thus makes language part of how we act or our forms of life. Far from using inner processes, we talk, sing, argue, write novels, programme computers, and so on. While we can call this 'use' of words, we act as co-ordinating bodies. Our forms of life are able to sustain many kinds of languaging.
Language skills emerge as experience of coordination teaches us to hear second-order constructs ('words'). Given linguistic reflexivity (the fact that we can talk about talk), we later report what we hear. Unlike machines that process ungrounded symbols, we act as we language. The feeling of thinking emerges in co-ordinating with living beings. While grounded in bodies, language evokes historically derived patterns. By vocalizing (and moving), we use cultural resources. Phylogenetically, ontogenetically, and neurally, language is dynamic first, symbolic second. Describing what is said (or seen) depends on how linguistic reflexivity has co-evolved with practices based on talking about talk. Our biologically-based capacities to hear and repeat utterances (as verbal patterns) permit a ‘synchronic’ point of view. In linguistics, the phenomena called ‘words’ came to be identified with language. In fact, however, physical coordination echoes how circumstances permeate utterance. What we hear (or see) influences feelingful movement. Unlike man-made codes, language requires neither rules nor material symbols. In biology, bodies — not physical invariants — mediate action. Language can thus play a role in constituting organisms as individual-collective agents or people. To self-organize we integrate structures with different histories. Emphasis on symbols draws heavily on literacy. The error of 20th century linguistics lay in exaggerating the importance of formal analysis of language-behavior.

Many are converging on a distributed view of language. Instead of relying on a priori units, human activity also draws on judgments, coordination, and the feeling of thinking. Linguistic patterns, norms and forms, index experience of life. Dialogue or linguistic coordination is managed around wordings and other second-order constraints (Linell 2009). By putting dynamics first, real-time conversations become primitive. Words play a part in such events by virtue of how people relate to each other as they enact articulatory and other movements. Physics constrain biology as neuro-dynamics drive both action/perception and first-person experience. While Love (2004) calls this first-order language, others echo Maturana (1978) and Becker (1988) who independently wrote of languaging. As coordination, language insinuates itself into most human ways of doing things together.

Since language is public and distributed, it does not reduce to dynamics. We hear (and, if literate, see) arrangements of verbal patterns. By definition, a linguistic community orients to a fuzzy set of such entities that index norms used in social life. Second-order constructs serve in stabilizing what we do and say. Taken together, they constitute an evolving language meshwork. This galaxy of norms serves in both reproducing social reality and also displaying our changing selves. Far from relying on words and rules inside brains (or minds), we hear them (using first-person experience). Actions are coordinated within a meshwork of activities and verbal patterns whose changes shape our modes of life.
Stressing linguistic heterogeneity deflates both the speaker/hearer and verbal patterns. Since language is dynamical and patterned, the distributed view impacts on not only linguistic topics but also human agency, biosemiosis, robotics, and neuroscience. Indeed, if dynamics come before symbols, language enacts cognition and communication. Further, there can be no single theory of distributed language. Recognizing this logic, about 100 scholars self-organize as the Distributed Language Group (DLG). Challenging both disembodied cognitivism and cognitive embodiment (i.e., tracing human cognition to an individual body), language is viewed as complex coordination. Using sensorimotor action-perception and our sense of what happens, people orient to verbal patterns. Language spreads across social and physical worlds. Of course, many outside the DLG (including contributors to this issue) share this general view. The community propose the goal of transforming the language sciences. Rejecting linguistic autonomy, we seek connections with, say, cognitive psychology and cultural studies. Accordingly, the Special Issue presents linguistic coordination in relation to reading, insight problem-solving, and aesthetic phenomena (visual art, Shakespeare, and cultural meaning). Next, the focus turns to how values connect time-scales and how, in a physical world, nature gave us new kinds of coordination.

Authors give different emphasis to individual, interactional and collective factors. While some emphasize second-order constructs (e.g., verbal patterns, photographs), others focus on first-order activity. Human experience arises as we engage with artifacts and each other. Literal meanings sometimes have priority only in fields like law, religion, and science. This is, as Järvillehto et al. show, because brains do not decode (material) symbols. Even in reading aloud, cognition relies on anticipatory dynamics. Far from extending the mind, verbal patterns constrain how gazing connects current and past experience. As we generate meaning, written signs test out expectations. Textual inscriptions take on sense as we couple dynamics with the feeling of thinking. This conforms to the theory of the organism-environment system (Järvillehto 1998). In the same vein, Kravchenko considers reading in relation to social change in Russia. He considers the cognitive effects of new reading (and teaching) strategies. Rejecting code models, he is pessimistic. Collectively, we are losing inferential skills that arise from intensive study of (above all) literary texts. As we develop new literacy practices, we transform our cognitive abilities. Reading and dialogue use quite different skills. As we engage with social reality, Kravchenko argues, we construct different cognitive domains. He argues that extensive experience with close reading extends our cognitive skills. For example, we refine our beliefs as we orient to selves who are simultaneously the observers of what we read.

The next papers focus on how material artifacts influence cognitive dynamics. Using an insight experiment, Fioratou and Cowley report on how solutions
differ between concrete and abstract versions of the task. First, it is more easily solved with material artifacts and, second, success is not explicable by the artifacts themselves. We do not rely on material items (as such) but, rather, solve cognitive problems ‘in the act’. Body-world coordination enables us to stumble on (and see) solutions. By analogy, documents, programs, books, and carvings come alive as we read (or make signs). Coordinated activity evokes virtual symbols as we make sense of what we see. As Tylén et al. show, this resembles how we construe photographic images. Building on fMRI investigation, they contrast descriptions of ordinary and signal-like images. While the former evoke memories, the latter prompt both language-like neural processes and special verbal accounts. Rather than recount what they see, experimental subjects tend to treat the images as language-like. They take a language stance by describing signal-images in intersubjective ways. They reveal preferences that are related to collective norms and values. While responses to the images are largely aesthetic, the same logic may apply in the axiological domain.

Tribble reconsiders Elizabethan/Jacobean performances of Shakespeare’s plays. Enacting a performance was more important than reiterating verbal (or coded) content. Company sharers, together with hired men, used material resources to improvise. Far from reciting texts, they recreated what they had imagined. Exploiting what Hutchins (1995) calls a distributed cognitive system, performances integrated verbal patterns, gestures, metrical patterns, and use of public space. Given how the plays were enacted, we can understand feats such as performing 6 plays in one period while also learning a new one every fortnight. It seems likely that participation in this collective world influenced Shakespeare’s writing. Continuing the artistic theme, van Heusden turns to cultural theory. While recognizing that signs transform cognition, he chooses to emphasize intra-cranial resources. On his double processing hypothesis humans use cognition and culture to develop internal signs that draw on perceived differences. Though not corresponding to events, memories stabilize reality by releasing us from the flowing present. However, they also introduce doubt. This grounds mimetic semiosis which, Donald (1991) claims, underpins linguistic and technological development. In separating language from behavior, van Heusden’s view stands apart from that of the other contributors.

Having considered the cognitive life of things, the final papers take a ‘one-system’ view of language. Tracing lived experience to coordination, Hodges views language as a caring system. He rejects appeal to rules (or value-free norms) to argue that language augments our perceptual and actional powers. Since these are both individual and collective, linguistic acts realize values. This is ecologically special and shapes human modes of being. Next, Rączaszek-Leonardi addresses how language can be both symbolic and dynamic. Using biosemiotics, she suggests
that, like a living system, symbols enable the language meshwork to use dynamics to self-sustain and grow. This depends on social activity. Symbol function depends on the dynamics that they measure, the control they exert and, most crucially, the human measuring device. Since the ‘same’ symbols are interpreted differently, it is nonsensical to posit a single function. Symbolic language depends on substructures which function in time-scales as diverse as communication, development, and evolution. Finally, Steffensen closes the Special Issue with a review article on Clark’s (2008) *Supersizing the Mind*. Given a concern with cognitive embodiment, Clark adopts a conservative approach to language. He reifies symbols, underplays phenomenological sharing, and adopts the individualism of cognitive psychology. Appeal to material symbols, Steffensen believes, undermines the extended mind hypothesis. Clark’s failure to link verbal patterns with real-time dynamics or languaging blinds him to the ecologically extended nature of human cognition.

Since language is distributed, we need neither the symbol processor’s disembodied cognitivism nor Clark’s (2008) organism-centred cognition. Rather, as Ross (2007) suggests, *homo sapiens* may be ecologically special. Social skills depend on integrating virtual patterns with first-order activity. Unlike most animals, human dynamics are concerned under the constraints of highly developed cultures. Given species-specific forms of life, our ecology has extended embodied (primate) cognition. We work and coordinate in species-specific ways. While English lacks a term for how humans concert activities, in isiZulu, this is called *Imbumba*.

Broadly, a history of acting together — *Imbumba* — shapes human language and culture. While several contributors share versions of this view, van Heusden alone posits *semiotic cognition*. For the others, like other animals, we actively anticipate what we are likely to perceive. While empirical work is needed, the conceptual difference is clear. Whereas van Heusden posits evolved brain-bound processes, Järvilehto and others use cognitive ecology. Thus, Kravchenko, for example, posits that the language meshwork enables us to use draw on contrasting connect cognitive domains. In reading, much is gained from orienting to our changing selves. For Hodges (2009:641), the affordances of *words* ‘reflect cultural preoccupations and ecological interests’. In human cognition, biological constraints prompt mutual engagement in a world of norms and institutions. Verbal patterns — and hearing — prompt us to individuate within social groups: who we are depends, above all, on a history of coordination.

Semiotic cognition is compatible with human heterogeneity. For van Heusden, this is because semiotics indexes absence. There are no determinate linguistic entities and, equally, no sign possesses a (fully) specifiable meaning. Cultural phenomena are fuzzy or, in Hodges’ terms, values emerge from first-order languaging. This rich view permits theatre to be seen as a place where shared visions are re-enacted. History may have ensured Shakespeare’s work was poised ‘between performance
and poem’ (Tribble 2009: 608). This, she suggests, shows in not only textual details but, equally in the performers’ practices and resources. Their heterogeneity exploits sensitivity to flow and, perhaps, human alienation (the inability to get signs quite right). Indeed, regardless of whether due to brains or a cultural ecology, there is convergence. Several contributors invoke use of doubleness. While explicit in *semiotic cognition*, a duality of symbols and dynamics reappears in Rączaszek-Leonardi’s biology. In another form, it features in Tylén et al.’s contrast between images that set off personal response and ones that evoke an intersubjective attitude.

Deeper analysis calls for explanation of how we can hear utterances, see texts, and perform plays. Echoing Ross (2007), Tribble posits that distributed resources open up shared *meaning spaces*. While we are individuals, we also act together. In *Imbumba* moments, we engage in flow and, at times, experience alienation. We deal with non-recognition of signs and, sometimes, learn to look differently. Meaning arises as, together, we manage dynamics. Indeed, this is entirely lacking in Clark’s (2008) static concept of ‘material symbols’. By contrast, real-time language is inherently creative. To make the most of *Imbumba*, we adapt and, as we do so, language influences our thoughts, feelings and habits. As Rączaszek-Leonardi suggests, while individuals cognize the world, symbols become part of who we are. This happens because they constrain biodynamics as we speak, listen, think and, indeed, read/create texts. Far from extending an inner mind, coordination need only seem meaningful. While the empirical papers make no reference to why subjects are willing to act as they do, it is clear that reading aloud and solving problems realize values.

In reading aloud, languaging occurs when we do not inhibit. As shown by Järvilehto et al.’s measure of *Fixation Speech Intervals*, how we read depends on anticipation. Far from processing data, readers seek out what they expect (and can articulate). In dialogue too, we anticipate what other people will say (and do). Just as for insight, we monitor opportunities. Agency uses material structures that invoke norms and, in problem solving, we anticipate. While sometimes seeing solutions, experimental subjects also use serendipity (Fioratou and Cowley 2009: 561). Given our capacity to take a language stance, events can generate valued outcomes. As Tylén et al. report, we use signal-like images to concoct accounts that others value. Over the lifespan an individual’s experience of languaging leads to redeployment of neural resources. As brains ready us for interpretation, Tylén et al. argue, Broca’s area contributes to interactive sense-making and meaning constructing.

In emphasizing coordination, readers are invited to change their view of language. Most will concur that that language is distributed and that brains are for action. Fewer will grant dynamics primacy. Trusting the folk belief that we and/or brains control thinking, we place words ‘in the head’. Yet, in Imbumba moments, we language with objects and, often, hold them in mind.

Language is verbal. Yet, in Imbumba moments, we language with objects and, often, hold them in mind.
Thus allusions to Heidegger, Wittgenstein, Hegel and others will prompt readers to integrate what they are looking at with relevant experience. Perspectives on language are, at once, dynamical and symbolic. As Rączaszek-Leonardi (2009: 654) assures us:

The two perspectives do look at a single phenomenon. The most fascinating challenge is coming to understand how they relate to one another. Out of dynamical languaging, we come to discern patterns of sound that yield to formal (albeit ‘leaky’) descriptions. In this way an ordered system of sounds connects with a rich dynamics.

Social reality can be traced to how, during first-order activity, voices set off sense-making. For Heidegger (1971: 195–196) “language speaks” or, in Wittgenstein’s terms, “concepts force themselves on us” (1958: 204e). By engaging with each other, we are brought face to face with inconsistencies. To make sense of these, we come up with thoughts (and texts) that display values. Thus, in social life, dialogue works through us. Human agents show how they care by drawing on *dynamics first, symbols afterwards*.

**Notes**


2. Drawing on the work of Bechtel et al. (1998), Lyon (2006: 11) claims that while we do not know what cognition is, we do know that it is for adaptive behavior. We need to understand how it works. Here the logic is applied to linguistic cognition.

3. These contrast with grammatical relations in that they are purely formal. Challenges to such views include Maturana (1978), Reddy (1979), and Harris (1981; 1998). In the *distributed language* tradition, code models are challenged by Love (2004; 2007), Kravchenko (2007), and Cowley (2007).

4. Embodied cognitivism is associated with, for example, Lakoff and Johnson (1999). On this view, linguistic forms are represented as embodied types.

5. *Imbumba* derives from *bumba*, cow-peas (*Vigna sinensis*) that are worked into a mash for eating. The noun applies to both physical and non-physical work. As a reflexive verb, *Bumban-isa*, means ‘hold together or unite’.

6. It is often objected that *words* can be imagined (or dreamt). Of course, this does not happen ‘in’ the head: rather, it is *activity* based on extensive experience with speech.
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