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Abstracts are organised alphabetically by author surname, except for symposia which are in a separate section at the end of the booklet.

Please note that the list of papers shown in this booklet may be subject to unavoidable change.

Opening address

Professor John Davies, University of Strathclyde

Keynote addresses

Visual objects, affordances and attention

Dr Rob Ellis, University of Plymouth

Active perception and perceiving action: The shared circuits model.

Prof. Susan Hurley, University of Warwick

The Meaning of the Body

Professor Mark Johnson, University of Oregon

Modules, genes and evolution: what have we learned from atypical development?

Professor Annette Karmiloff-Smith, University College, London

Parallel conscious functioning of the human brain
"Emotional Regulation ↔ Multitasking Ability"

Ishroop Singh Aneja (ICE University of Madras, Chennai, India)
AE 24 Tagore Garden
New Delhi – 110027
India
91-9818464849
ishroop@mp2.cjb.net

The concept of parallel conscious functioning of the human brain is an effort to study the potential of brain to work on more than one task in parallel & multitasking fashion. Dwelling down the ability of brain to multitask we suggest another parameter of personality that we call the "Switching Ability". Switching ability is defined as the capability of brain to voluntarily control the switching of thought from one cognition to another. This ability to switch thoughts is found to be the guiding force behind emotional regulation / control and is also positively correlated to the ability to concentrate on any cognitive task. Based on the switching ability we define the state in which a person is i.e.:

=>If switching is effective the person can think in normal state.

=>If this switching is more rapid a person is in a hyperactive state

=>If this switching is low or none (not possible at will) the person enters a mania state (depressed state).

We therefore propose the switching ability to be used for treatment of emotional (BPD), personality (attention) and mood disorders including stress. The treatment gets it roots from the prevailing distraction / imagery therapy of CBT.

For details please refer to http://www.freewebs.com/ishroop

From life to cognition: from metabolic to behavioral autonomy.

Xabier E. Barandiaran.
Information, Autonomy and Systems Research Group,
Department of Logic and Philosophy of Science,
University of the Basque Country,
Spain.

Throwing away the central role played by representations on the characterization of cognitive processes within the cognitivist paradigm leaves non-representational approaches with the issue of how to justify the specificity of cognitive processes. More specifically put the question is: how do we draw the boundaries between the cognitive and the non-cognitive dynamical systems? Francisco Varela's work on biological autonomy stands for one of the most complete post-cognitivist, biologically inspired and dynamical frameworks to characterize cognition. Nonetheless it is still unclear what the relation is between life and cognition within the autopoietic-enactive framework while the emphasis on closure and conservation severely limits the autopoietic interpretation of current situated and dynamical system perspectives. We review Varela's notion of autonomy in behavioral systems putting interactive dynamics at the core of cognitive activity and substituting the qualitatively notion of closure by that of a quantitatively complexity-asymmetry between internal (neural) and interactive dynamics. We further develop a minimal characterization of cognition in terms of the autonomy of a metabolically decoupled recursive dynamical system (that of the nervous system) embodied and situated in the biological domain but dynamically underdetermined by it. This underdetermination opens a space of dynamic sensorimotor freedom upon which behavioral dynamic structures are created and accommodated on a developmental process that generates cognitive identity. Agency is characterized by the quantitatively notion of complexity-asymmetry between internal and interactive dynamics in the maintenance of behavioral structures. The web of stability dependencies created between these structures provides the basis for a genuine cognitive self-construction and normativity (an specific source of value and sense-making different from its adaptive biological substrate). We show how current simulation models on evolutionary robotics and neural-complexity based analytical tools provide an experimental framework for a further development of this characterization.

An ecological model for understanding and influencing behaviour in virtual communities

Jonathan Bishop
University of Glamorgan

Virtual communities are constructed by the individuals that use them. There are several types of users that carry out actions in these environments, the most differing of which are lurkers, who do not participate; and elders, who take a leading role. This paper proposes an ecological model to describe what drives such individuals to carry out an action such as helping another community member (level 1), the cognitive elements that enable them to choose to carry out that action (level 2) and the means by which they perceive their environment and go about carrying out the action through external representations that offer affordance (level 3). Finally the model is applied to the problem of encouraging members to participate by discussing the methods by which people can be persuaded to participate by changing the way they interpret their desires and their environment. Future research is recommended to further investigate the role of an actor's beliefs and plans in perceiving affordances and the beliefs of specific virtual community members to further investigate the effect these beliefs have on them carrying out actions such as posting messages.

Embodiment *vs.* Memetics

Joanna J. Bryson

Artifical models of natural Intelligence
University of Bath, United Kingdom, BA2 7AY
http://www.cs.bath.ac.uk/~jjb

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Theme: **Representations: Do we really need them?**

As we build a new, post-cognitive field in psychology, we need to be sure to learn from the mistakes of *all* our predecessors — not only the logic-heavy traditional approaches to cognitive science and artificial intelligence, but also the representation-free experiments of 'new AI'. Any agent that can adapt its behaviour — that is, can learn — must have a means of storing experience and using that stored information to affect its expressed behaviour. That 'means of storing' is a representation. What AI has come to realize is that representations and online computations cannot be entirely eliminated. The attempt to *minimise* them, however, has been productive. We have much more parsimonious explanations of intelligence accounting for what needs to be learned, and when an agent can instead rely on its environment.

For social agents, this environment includes culture. Given the right replicative substrate, culture can evolve much faster than complex biological systems such as mammals. Human behaviour is consequently be far more elaborate than that of species that have nearly the same innate problem-solving capacity, because we can exploit cultural artifacts – not only physical ones such as cars and books, but cognitive/behavioural ones such as successful patterns of social organisation or even reasoning.

My talk will describe the interaction between memetics (the evolution of culture) and embodiment (the 'intelligence' derived by a situated agent from the deterministic ways its body interacts with its environment) in one of their key areas of overlap, semantics. Semantics is the meaning of words. Many roboticists claimed that embodiment would be the key to producing machine semantics, but they too have failed to pass the Turing test with conversant AI. I will argue that human semantics consists of an interaction between concepts formed through embodied experience and the unsupervised learning of memetically provided patterns of usage. This implies that people may truly understand little of what they talk about, but still play an active role in increasing the intelligence of our culture and therefore ourselves.

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Artificial Emotion: Simulating Affective Behaviour

Eduardo Coutinho - Eduardo Reck Miranda - Angelo Cangelosi

University of Plymouth
Plymouth PL4 8AA
{eduardo.coutinho, eduardo.miranda, angelo.cangelosi}@plymouth.ac.uk

Artificial Life (A-Life) is new area of research within Artificial Intelligence and Cognitive Sciences which focuses on the role of bottom-up processes in the self-organisation of behavioural and cognitive processes.
This paper describes an A-Life simulation of emotional behaviour in autonomous agents. It aims to model part of the emotional process where self-survival tasks and embodiment influence behaviour and affective states. The model consists of a population of agents with complex cognitive, emotional, and behavioural abilities. Agents live in an environment where they can interact with several objects related to their behavioural and emotional states.
The agents' cognitive systems can be described as consisting of three main parts. (1) The Perceptual System receives information from the environment through a retina. (2) The Behavioural System, organised in a Motivational and a Motor Control sub-systems, which define the agents' interaction with its environment. (3) The Emotional System, which considers the role of emotions as part of the homeostatic mechanisms.
An agent internal body state is defined by a set of physiological variables that vary accordingly to their interaction with the world, and a set of internal drives. The agent is controlled by a feed-forward neural network that integrates visual input and information on its internal and emotional states to interact with objects and explore the world. The network learns through a reinforcement learning algorithm.
Simulations aim the analysis of the agent ability to regulate its homeostasis. Results show that the agent manage to organize its behaviour towards an "*equilibrium*" state (homeostatic regime). Specifically, when simulating different drives variations (different body needs), we observed a bias for the agents' motivations, reflecting drives urgency, cycles, and emotional state.
Current simulations are focusing on modelling higher level emotional structures. As an example, we are currently looking at differences between different emotional and motivational processes, such as temperaments and complex drives (e.g. social drives), as well the influence of music in emotional states.

Keywords: emotions, neurobiological modelling, artificial life, reinforcement learning, affective computing, music.

Symbols without rules: A computational model of language acquisition using distributional analysis

Steve Croker (s.croker@derby.ac.uk)
Centre for Psychological Research in Human Behaviour
School of Education, Health & Sciences
University of Derby, DE3 9GX

There has been much debate over the ability of connectionist models to support constructivist accounts of language acquisition. Symbolic models, however, have not received as much attention. There tend to be two types of computational approaches to language – those that attempt to solve a particular problem within the domain and those that attempt to inform our knowledge of the empirical data. MOSAIC (Model Of Syntax Acquisition In Children) is a symbolic computational model of early grammatical development that represents both approaches. MOSAIC has been used to explain a number of errors that children make, including optional infinitive errors, case-marking errors, agreement errors and negation errors. MOSAIC extracts distributional information from large naturalistic datasets, which enables an understanding of the data and also provides a learning mechanism that can go some way toward explaining how children acquire language. The model constructs a network consisting of nodes that represent words or sequences of words present in the input. It is sensitive to the distributional properties of items occurring in the input and is able to create 'generative' links between words that occur frequently in similar contexts, building pseudo-categories. The only information received by the model is that present in the input corpus. Some of the errors children make in their early multi-word speech can be explained by rote learning. Others can be simulated by utilising the generative links to create novel utterances. The pattern of children's speech errors can be explained without assuming domain-specific knowledge of linguistic structure, suggesting that any claim that this pattern can be taken as evidence for innate grammatical knowledge is too strong and that at least some aspects of children's early language can be explained in terms of a distributional analysis of the statistics of the language being learned.

Empty Shells: Elementary Particles of Creativity

Tom Erez, Anna Deters, Uri Hershberg and Sorin Solomon, Fondazione ISI and Yale University

In recent years the question of creativity has gained increased scholarly attention, particularly in the field of cognitive science. Many theoretical approaches have attempted to address the vastness and complexity of the phenomenon of human creativity. Seeking a mechanism that describes some of the fundamental cognitive processes underlying idea formation, we propose the theory of “empty shells”.

In the associative “network” of ideas and concepts of our mind, the empty shell is a node with no title and no content, a would-be idea. This pre-concept has, however, a well-defined neighbourhood, linking together several ideas. Thus, it is endowed with meaning solely by its context (i.e., location in the network). Subsequently, the empty shell is "filled" with content acquired directly from its neighbours. We hypothesize that creativity in symbolic domains (e.g. advertising, stories, jokes, and so forth) can be represented through the dynamics of such empty shells.

The synthetic operation of adding an empty shell is in itself devoid of radicalness. Thus, the juxtaposition of existing concepts may take place unawares, and allow the ideation process to proceed without confrontation with inhibitory facilities such as self-criticism. Yet, by its mere appearance at a specific locale and its subsequent filling, the empty shell may provoke the generation of a new idea, to be presented later to the conscious mind with seeming instantaneity. This being said, the empty shell phenomenon may be the source of creative “inspiration”, a means to shortcut of potential creative blocks by "tunnelling under" them (as opposed to facing and overcoming them).

Post-modular developmental psychology: re-conceptualising participation, membership and mastery of language.

Michael Forrester
Department of Psychology
University of Kent
Canterbury

By way of contributing to the emergence of a post-cognitivist developmental psychology this paper considers ethnomethodologically informed notions of participation and membership during early parent-child interaction. To this end a number of ideas originally outlined by Garfinkel and Sacks (1970) are presented, and by way of extension and clarification, discussed with reference to transcript extracts from everyday interactions between two parents and their pre-school child[1]. The proposal is that membership, or what might constitute being a member, involves possessing a mastery of language and being able to produce and recognise glossing practices – defined as 'assemblages of practices whereby speakers in the situated particulars of speech mean something different from what they can say in just so many words'. The argument being proposed is that for post-cognitivist conceptions of interaction, a member is someone who recognises that the actions which make conversations possible are reflexively accountable practices. By looking at extracts where a child is 'learning how to talk', evidence is provided in support of the suggestions that: (a) membership is a dynamic and concerted *accomplishment* in context; (b) adults often treat children as 'good-enough' members; and (c) infants can attain membership status not only with reference to displaying a mastery of language, but also by displaying a mastery of communication.

Discussion concludes by noting that one of Garfinkel and Sacks' (1970) particular insights was that in displaying mastery of language speakers display membership, but mastery of language is itself a concerted accomplishment in occasion precisely because speakers display membership by not drawing attention to the fact that they are indeed a member. Observations on what we can surmise from ethnomethodological informed post-cognitivist notions of membership are drawn out, particularly with respect to contemporary notions of subjectivity and inter-subjectivity.

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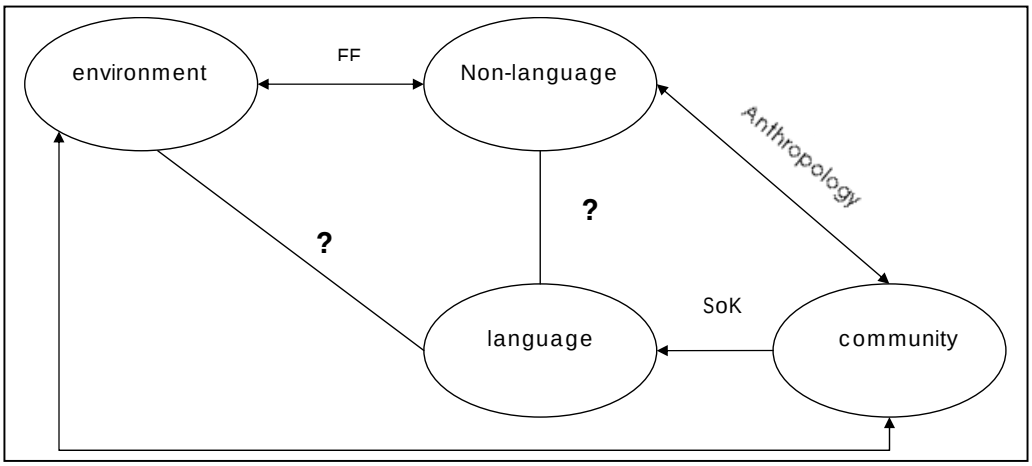
[1] Data extracts are taken from a longitudinal single-case study of a child learning how to talk between 1 and 3.6 years of age (ESRC Award ref: RES-000-22-0068).

Descartes, all over again

Nathalie Gontier

Fund for Scientific Research - Flanders
Centre for Logic and Philosophy of Science
Free University of Brussels
Pleinlaan 2
1050 Brussels
Belgium
Nathalie.Gontier@vub.ac.be
Tel: 02.629.27.84



This scheme represents the way in which knowledge in general is comprehended in Western society. Quine was the last one to state that the reference problem consisted of (1) searching for the relation between neural input and observational sentences and (2) the relation between observational sentences and theories. Because of the second part of his thesis, part of language got reduced and repressed to the community, resulting in an ontological relativism, leading the way to Sociology of Knowledge. Concerning the first part of his thesis: Developments within neuroscience have shown that the neural input we receive, does not carry any language labels. Therefore Evolutionary Epistemology was born, which states that the only thing we are sure of is that we, as organisms, live and interact with an environment. Not by being conscious about it, nor by thinking the relation, but by living it. We know that our silent/unconscious neural processes partly respond to stimuli from the environment. We do however not know what the link between these silent processes and language/conscious thought is. And to know what the link between language and the environment consists of, is to study it, via these non-linguistic processes. It will be argumented that the distinction made between language and non-language roughly consists with the distinction between consciousness/unconsciousness and the mind first/body first dichotomy. Western thinking now studies knowledge, and knowledge gaining from within the body, through silent unconscious (neural) routes, thereby raising questions like whether there is something like (un)consciousness. It will be argumented that all we have done is reverse and repeat Descartes scheme, we should try and think beyond this dichotomy.

Emotion as implicit evaluations

C. Herrera Perez,
Glasgow Caledonian University

Emotion theory has for a long time debated the role of cognition and representation in the appraisal process. This debate has given rise to cognitive and perceptual theories of emotion. Cognitive theories claim that an evaluation, perhaps unconscious but a cognitive process with propositional content, is the source of emotional responses. Perceptual theories do not deny such evaluation, but, rather than claiming emotion is its result, they claim that emotion is itself a form of non-propositional evaluation. "Affective judgements may be fairly independent, and precede in time, the sorts of perceptions and cognitive operations commonly assumed to be the basis of these affective judgements" (Zajonc 1980). This question has been clarified by Frijda (1993) by distinguishing content and eliciting conditions (antecedent) of emotional appraisal. The content or significance of emotions is not a reflection of the eliciting conditions. This paper investigates the nature of the implicit cognitions that underlie the appraisal process.

For some authors, this form of cognition is better described as subjective: it signifies more the state of the agent that any objective property of the world ("mind-to-world direction of fit" and conative orientation, Searle 1983). Pure cognition, on the other hand, is objective because it signifies properties of the world. One of the founding notions in post-cognitive psychology is nevertheless to consider agent and world as a whole system. In this view, the emotions are informative of world and agent as a coupled system, and not of any of the two as an objective entity – agents are situated.

One of the main empirical fields in this new approach is situated robotics. By designing robots that are coupled with the environment and which react dynamically to environmental stimuli we can explore the principles of situated behaviour. In this presentation we will present an experiment with Khepera robots, evolved in simulation to develop emotional responses (following a dynamic model of appraisal, Herrera 2005). This experiment will demonstrate the nature of the implicit evaluations involved in appraisal. The evolved robot, guided by a neural controller with no propositional content, has the task of approaching an object whilst avoiding a predator: both entities, nevertheless, produce undistinguishable stimuli. The robot’s actions and internal values are sufficient to distinguish between three different emotions, desire, fear and joy, which lie between the coupled relationship between agent and world. In particular, they can be considered non-objective forms of categorisation of the world (fear-predator, joy-target object).

The elusiveness of cognition.

Erik Hollnagel
CSELAB, Department of Computer and Information Science
University of Linköping, Sweden
Email: eriho@ida.liu.se

The escape from the constraining influence of behaviourism was primarily due to the appearance of the information processing paradigm and specifically the digital computer. Although the latter provided a powerful metaphor for thinking about mental processes, it soon itself became as constraining as behaviourism had been. Cognition was treated either as information processing or, at best, as an epiphenomenon of information processing. Since it was commonly agreed, at least by the mainstream of research, that human information processing was not only necessary but also sufficient to understand human action, the study of cognition also became dominated by 'cognition in the mind'. Although studying cognition under reasonably controlled conditions has a respectable pedigree in the history of psychology, it was gradually realised that the study of cognition could not be pursued without including the socio-technical context. The need to understand cognition as more than a mental process and to study it under more natural conditions led to a development that in the 1980s and 1990s culminated in the formulation of the principles for 'cognition in the wild'.

Although the two approaches differ considerably, both take for granted that there is some underlying process called cognition that it is meaningfully to study. Yet cognition can also be seen as an aspect of what people do, rather than as something that goes on in their individual or collective minds. In this view of cognition as control, the main interest is in finding out what the regularities of performance are and how they can best be described and explained. In contrast to human information processing it is not assumed a priori that cognition, whether human or artificial, is the most important determinant. The bulk of the evidence from studies of joint systems at work, indeed, lends support to the view that the influence of working conditions and the situation as a whole are greater than the influence of cognition seen as the processes of thinking and reasoning. The unit of analysis must therefore be the performance characteristics of the joint cognitive system rather than the cognition that may – or may not – go on inside.

This view forms the basis of cognitive systems engineering, and the paper will outline how this can be turned into practical guidance for research.

What can post-classical computation do for post-cognitivist psychology?

Colin G. Johnson
Centre for Cognitve Neuroscience and Cognitive Systems
Computing Laboratory
University of Kent at Canterbury
Email: C.G.Johnson@kent.ac.uk

Traditionally, computational modelling in cognitive science has focused on a *computational functionalist* stance towards mind. Firstly, that we can understand aspects of mind by considering the activity within the mind regardless of the substrate in which that activity is realised (functionalist). Secondly, that a computer is a sufficient medium for the realisation of the activity that is realised in neurally-substrated minds (what we might call *computationalism*).

There has been much analysis and criticism of the functionalist side of this stance. However the computationalist side of the stance has received less attention. In this paper I would like to embark on such an analysis.

The computationalist stance must needs be grounded in some model of what computation is. In work to date this has been a *classical* stance on computation, which delineates the scope of what we call computation by giving an abstract mathematical model of a computer (e.g. a Turing machine) and takes as an axiom the notion that all computers are physical realisations of that abstract mathematical machine.

In recent years a new approach to the foundations of computing has been devised, known as *post-classical*, *non-classical* or *reality-based* computing (Stepney et al., 2005a; Stepney et al., 2005b). This has its origins in the ideas of Feynman on simulating the world (Feynman, 1982), who suggested that when we find a phenomenon in the world that is difficult/impossible to simulate on a computer, this implies that we could build a new kind of computer based on that phenomenon. Thus in this stance we ground computing by assessing the computational capabilities of physical systems in the world, rather than basing computing on a mathematical model of computation.

My intention in this paper is to explore the consequences for the study of mind of this stance on computation. If we take computation in this reality-based sense, what does the computational functionalist stance on mind tell us? What implications does this have for the relationship between neurally-realised mind and body states (e.g. in the heart or gut) that are not traditionally regarded as providing a substrate for aspects of mind (Johnson, 2005)? Can this inform the debate on the role of the body in affect (Damasio, 1994)? How can we use these ideas in building theoretical models and computational simulations of mind?

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Simple distributional accounts can explain key language phenomena

Gary Jones (g.jones@derby.ac.uk)
Centre for Psychological Research in Human Behaviour
School of Education, Health & Sciences
University of Derby, DE3 9GX

One of the simplest methods of examining language acquisition is to see to what extent child language phenomena can be explained solely from the input the child receives. This approach works on the premise that mechanisms need only be created for phenomena that lie outside what can be explained by the input. MOSAIC (Model of Syntax Acquisition in Children) represents a constructivist computational model of such an approach, utilising very simple mechanisms to provide what is largely a simple distributional account of the input. In contrast to many computational models of language acquisition, MOSAIC is trained on large-scale naturalistic speech (the mother's utterances from mother-child interactions), producing child-like utterances that enable easy comparison to the data. Two areas of language acquisition are compared here: vocabulary acquisition and verb learning. The acquisition of vocabulary represents a key phenomenon in language acquisition, but is still poorly understood. Gathercole and Baddeley (1989) claim that the phonological store, one of the components of working memory, offers a critical mechanism for learning new words. Simulations show that MOSAIC can account for the nonword repetition task described by Gathercole and Baddeley (1989), a task often presented as a powerful diagnostic of vocabulary learning. The verb-island hypothesis (Tomasello, 1992) states that children's early grammars consist of sets of lexically-specific predicate structures (or verb-islands). However, Pine, Lieven and Rowland (1998) have found that children's early language can also be built around lexical items other than verbs, such as pronouns (contradicting a strict version of the verb-island hypothesis). Simulations show that the output from MOSAIC: (1) more closely resembles the child's data than the child's mother's data on which MOSAIC is trained; and (2) can readily simulate both the verb-island and other-island phenomena which exist in the child's data. Taken as a whole, MOSAIC provides a powerful distributional account of the data that is able to simulate several key phenomena in language acquisition.

The influence of sounds on affective meanings: an exploratory study

Shigeto Kawahara, Kazuko Shinohara, Akira Nakayama,
Ikuyo Kaneko, Jistuko Odate, Shinsuke Oshida

Saussurre (1916/1959) denied an inherent sound/meaning relationship, contra previous views as old as Plato (Harris and Taylor 1989). Ever since, this view - that the relation between meaning and the sound is arbitrary - has been predominant, with a notable exception of Sapir (1929) and a few other works (e.g. Hinton *et al*. 1994). However, this position has recently been challenged by Perfors's (2004) experiment which shows that the choice of vowels in names affects people's perception on facial attractiveness: sounds thus might have inherent images, which affects people's attractiveness judgment.

We replicate Perfors' result in Japanese in a more systematic way by employing the SD method: 82 native speakers of Japanese were asked to judge images associated with non-existing names, by rating thirty scales. Two conditions were varied in the stimuli: sonorancy (sonorants=[r], [m], [n]; non-sonorants (obstruents)=[k], [s], [t]) and vowel backness (front=[i], [e]; back vowel=[u], [o]). Thus there were four types of stimuli (i) sonorants with front vowels (e.g. *rini*), (ii) sonorants with back vowels (e.g. *muru)*, (iii) obstruents with front vowels (e.g. *seke*) and (iv) obstruents with back vowels (e.g. *toso*). The exploratory factor analysis was used for the analysis.

The results reveal the following factors associated with each sound type:

(i) sonorants induce the image of *softness* and *sincerity.*
(ii) obstruents cause the image of *muscularity*, *nobility,* and *non-approachability*.
(iii) back vowels are associated with *softness* and *wise-ness.*
(iv) front vowels are associated with *nervousness.*

We also interpret the results from a new perspective; that is, as an instance of *embodiment* in language in the sense of Lakoff and Johnson (1980) and Johnson (1987). The configuration of vocal tracts for articulating sounds might evoke particular images (Sapir 1929 *et seq*): e.g. obstruents are characterized by hard constriction; hence the image of *hard* and, further, *masculine*.

Pragmatic features of child-directed speech facilitate language acquisition in multiple domains: The case of diminutives.

Vera Kempe
University of Stirling

In many languages, child-directed speech (CDS) is characterised by pragmatic elements that convey endearment and affection. One such element is the diminutive. I will present cross-linguistic evidence showing that, in addition to their pragmatic function, diminutives facilitate language acquisition in children. A series of elicitation experiments shows that 3-4 year old Russian and Serbian children produce fewer gender agreement and case-marking errors with diminutives compared to simplex nouns suggesting that diminutives facilitate the acquisition of inflectional morphology. Similarly, adult second language learners of Russian show faster learning and better generalisation of gender agreement when trained on diminutive, rather than simplex, nouns. These benefits are assumed to come about because diminutives tend to regularise inflectional patterns, and because they constitute a morpho-phonologically homogeneous word cluster which serves as a low-level schema (Dabrowska, 2004). Furthermore, implicit learning experiments with native English speakers show that exposure to pseudo-words resembling Dutch and Russian diminutives facilitates word segmentation, mainly due to the invariance in word endings induced by diminutive suffixes. Thus, diminutives provide distributional cues which aid children in statistical learning on multiple levels.

Given the pervasiveness of diminutives in CDS, I will also address the question as to why these pragmatic elements can acquire such a prominent status in the CDS of some languages. I propose that pragmatic elements used by the adult to express positive affect will be reinforced by the child if they facilitate statistical learning and language acquisition. This, in turn, will encourage imitation by the adult to maintain communicative rapport. It might in fact only take a small initial statistical benefit from some affectively coloured pragmatic element to engage a communicative feedback loop that will amplify the frequency of that element in CDS. This idea supports a dynamic systems perspective which emphasises mutual interaction between language acquisition and adult-child communication.

Animate and/or Inanimate: "The Psychology of (Everyday) Things"*

Sandy Lovie, School of Psychology, **University of Liverpool**

Abstract
The relationship between the animate and the inanimate has always been ambiguous in the sense that, for many, the inanimate seemed little more than an extension of the animate, for example, hand tools which are often characterised as augmenting natural physical abilities, while others argued for an absolute distinction between the living and the non-living. What I want to argue in this paper is for a rich integration of the animate and the inanimate, where each reciprocally, and mutualistically, creates and influences the other. Although this notion has some novelty as far as psychology is concerned, it has been accepted in one form or other in sociology and related disciplines for some time (see work by Bruno Latour and Steve Woolgar, for instance, dating from the 1990s).

My present purpose is to outline a psychological take on this integration by arguing for a heavily augmented neo-Gibsonian/neo-Skinnerian position, whereby the distinctive properties of each are used by the other to create this synthesis, resulting in the holistic generation of something which is *different* from the parts. For example, you will sometimes find the message "OUCH" written in the dirt very close to where a car has received some damage, or the admonition "DIRTY PLEASE CLEAN ME" on the back of a grimy white van. Here the inanimate has been given a (morally freighted) voice by the animate in order to *jointly* signal a social breech *and* achieve an appropriate action, both being aspects of the situation which would not have emerged without the voicing. And, symmetrically, without the damage or the dirt, the moral messages would not have been proffered, or even thought necessary. This analysis will be illustrated by a range of voicings from the memorial messages on the benches dotted around the Malvern Hills to a body fat monitor.

*Donald Norman, 1988

Embodiment in emotion metaphors; its universality and variety

Yoshihiro Matsunaka[1] and Kazuko Shinohara[2]
(**[1]Tokyo Polytechnic University, [2]Tokyo University of Agriculture & Technology**)
ymats@bas.t-kougei.ac.jp

Emotion metaphor has been one of the most argued conceptual metaphors since Lakoff and Johnson (1980). Recent trend in this field covers both the pursuit of universality and the consideration of cross-linguistic or cross-cultural variety. This study explores cross-linguistic variety of emotion metaphors by analyzing examples from English and Japanese, and claims that these languages share several conceptual metaphors of emotion, though certain differences can be found between them.

Among previous studies, Kövecses (2000, 2002) compares emotion metaphors in many different languages, arriving at a universal master metaphor; EMOTION IS FORCE. He explains the cross-linguistic similarity in emotion metaphors (e.g. EMOTION IS INTERNAL PRESSURE IN A CONTAINER) in terms of the physiological processes (e.g. blood and its pressure) that all people share when they have the same emotion. To this well-known blood-oriented analysis, our previous studies (Matsunaka & Shinohara (2001, 2003, 2004) and Shinohara & Matsunaka (2003)) add other source domains for emotion metaphors in Japanese; the digestive system (EMOTION IS THE DIGESTIVE SYSTEM) and meteorological phenomena (EMOTION IS METEOROLOGICAL PHENOMENA). This paper argues that these metaphors have some physiological motivations that might be peculiar to the Japanese, suggesting that physiological motivations can be language/culture-specific in contrast with universal nature of embodiment as discussed earlier in the field of cognitive semantics. In order to examine this claim and see whether those emotion metaphors are really peculiar to Japanese, this paper analyzes the data of other languages (especially English) and discusses that emotion metaphors which are often found in Japanese data are not quite unique to the Japanese language and can be seen in other languages while there is also difference. We attribute this similarity and difference to the difference of elaboration of this metaphor and the difference of original physiological (embodied) experience.

The reification of phonological storage: Short-term memory as a sensory-effector system

Bill Macken and Dylan Jones
School of Psychology, **Cardiff University**
Contact: Macken@Cardiff.ac.uk

Traditionally, performance on verbal short-term memory tasks is seen as being based on the operation of a bespoke, temporary phonological storage system. This store is generally regarded as a cognitive 'primitive' and its functioning is seen as determining proficiency of higher order functions such as language, reasoning, and mental arithmetic. In this paper we show that key empirical phenomena argued to reflect the operation of such a store can be exhaustively accounted for by processes associated with speech output planning and auditory perceptual organisation, without recourse to the notion of temporary phonological storage. For example, we show that the influence of 'phonological' similarity on short-term memory performance (poorer serial recall of similar sounding material relative to dissimilar) is due to the joint action of errors in speech planning (articulatory similarity) and perceptual organisation (acoustic similarity). We also show that the influence of long-term linguistic knowledge (e.g., effects of frequency, lexicality, neighbourhood density) on short-term verbal memory (usually taken to reflect lexical redintegration of partially decayed temporary phonological representations) may be parsimoniously explained in terms of effects of articulatory (especially co-articulatory) fluency, again without recourse to temporary phonological representation. We present an account of performance on short-term verbal memory tasks which emphasises the flexible co-opting of linguistic skill and perceptual affordance as determinants of that performance that obviates the need to posit temporary phonological storage.

Playing the game of go without representations
Magnus Persson, Max Planck Institute

Computer go is difficult. In contrast to chess the long term challenge for computer go programmers today is to the beat the average player in any amateur go club.

A typical go program today builds complex representations of the game state using algorithms specific to go in order to evaluate a position. As a consequence most go programs rely on knowledge rather than full board search to play well.

Recently many go programmers and researchers have started to use a radically different approach: Monte Carlo go (MCG). The purest form of MCG is a program that plays 1000's of random games from the current position. A MCG program selects the move that won most of the games from the current position.

The MCG approach works very well on a 9x9 go board and smaller, and the playing strength is a challenge for any beginner. The moves played are often strategically profound (for a computer program). The moves played in tactical fights have good shape (good style), although the moves do not always work. In summary, pure MCG plays robust go. Although the moves played are not the best, they are rarely very bad.

Pure MCG can be improved by adding simple but fundamental go knowledge. The program, Viking, can compete with state of art computer go programs and human beginners, without any complex representations.

MCG programs cannot be seen as plausible models of how humans play go. However it can be argued that the knowledge used by humans to play go is not used to build mental representations nor is it systematic search. Rather, robust move selection by humans, is strongly influenced by a partially random search guided by fundamental knowledge that avoids severe mistakes.

Semantic memory as a system for deriving function

Fiona Phelps and Bill Macken
School of Psychology, **Cardiff University**
Contact: PhelpsFG1@Cardiff.ac.uk

Many contemporary accounts of semantic memory conceive of meaning in terms of abstract, amodal featural representations, such that the meaning of a given concept is given by activation of a set of such defining features for that concept within a unitary semantic space (e.g., Caramazza et al, 1990; Tyler & Moss, 2001; Devlin et al., 1998). On the other hand, embodied accounts of meaning (e.g., Glenberg & Robertson, 2000; Gibbs, 2003) emphasise the importance of knowledge *modality*, such that meaning emerges from grounded perception and action. In this paper, we show that modality is a critical aspect of semantic processing, and in particular, we argue that functional knowledge has a privileged role in meaning in two respects: First, functional knowledge about a concept is more readily accessed than sensory knowledge, and second, functional knowledge becomes activated in an obligatory fashion whenever any semantic judgment is made about a concept. For example, in a speeded feature verification task (is <feature x> true of *CONCEPT A*?), judgments about functional features were made more quickly than judgments about sensory features. Further, a second functional judgment about a given concept was facilitated to an equal degree by both a prior, different functional judgment and a prior sensory judgment, suggesting that functional knowledge was activated obligatorily when the initial sensory judgment was made. On the other hand, while prior functional judgments did facilitate later sensory decisions about a concept, they did so to a lesser degree than did prior sensory judgements. These results suggest an asymmetric, modality-based organisation of meaning, such that an object's *function* is the primary determinant of its meaning, and further that the activation of that functional knowledge is the purpose of the semantic system, such that functional knowledge becomes obligatorily activated whenever any semantic processing takes place.

Time as a Factor for Semantic Motivation in Grammatical Structure

Dr Yanna B. Popova
University of Oxford
Hertford College
Oxford OX1 3BW
yanna.popova@hertford.oxford.ac.uk

Interest in the bodily/biological mechanisms underlying human cognition has produced in the last twenty years a view of language as an embodied system closely connected with cognition and action. A linguistic framework called cognitive linguistics claims, among other things, that language is not describable without essential reference to cognitive processing and that grammar is inherently symbolic. Within a cognitive framework this presentation aims to explore the question of the relationship between semantic content and particular linguistic classes or, in other words, the conceptual foundations of grammatical structure. Following work by Givon (1979, 1984) and Langacker (1987), it argues that linguistic categories are experientially motivated and thus represent conceptions grounded in everyday experience: sensory, kinaesthetic, and emotive. According to Givon (1979), the main grammatical classes reflect a scale of temporal stability from most stable (nouns), to relatively stable (adjectives), to these denoting change (verbs). A more interesting and largely unnoticed claim by Givon is his observation that in human conceptualization time occupies a privileged position in relation to space: while temporal entities exist outside of space, spatial entities exist in both time and space.

Contrary to more recent claims that the spatialization of time dominates the way we think and speak of it, I will argue that time is in fact fundamental to our understanding of entities and events (including motion). Our experience of temporal entities need make no reference to space while our experience of spatial entities cannot exist without reference to time. The significance of this observation will be elaborated in terms of its consequence for grammatical structure.

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Dialogism and Psychology: Towards a conjunct principle of mind

Colin T Schmidt
Sorbonne University & Le Mans University

Colin.Schmidt@univ-lemans.fr

Symbols and rules psychology is no longer *en vogue* as a way of explaining human thinking (pace J. Fodor, N. Chomsky, etc.). Embodiment (F. Varela, the epigenetic robotics movement, etc.) has been a concept on the rise in the study of mental phenomena ever since H.L. Dreyfus splashed his critique of artificial reason (1972) all over the Artificial Intelligence field. And in spite of the light other branches of cognitivism have been able to shed on the problem of demonstrating mental activity through simulation techniques or simply by "explaining the myth of it away" with the help of materialistic theories (i.e. the Churchlands), philosophers taking into account the dialogical essence of our being (P. Ricoeur, F. Jacques, R. Harré, Taylor, etc.) and/or the interest of the concepts of *reference* and *relation* (Jacques, Putnam, Russell, Sir P.F. Strawson) have immensely increased seductive illustrations of the discursive nature of our minds. Just as cognitivism represents post-behaviourism, the author fully believes that obtaining a full definition of the conjunct principle of mind based on these recent discursive theoretical developments will be the turning point in establishing a veritable *post*-cognitivist psychology. The intention at the Conference in Glasgow is to attempt a definition of this principle using familiar Systems Science and Set Theory techniques along with lesser familiar philosophical pragmatics. Augmenting the attention humans allot to the dialogical aspect of their lives is meant to combat the individualism that leads to absurd uses of scientific knowledge. As so, the author seeks to challenge the widely approved idea of simulating phenomena from the realm of human mental life by applying his post-cognitivist principle of mind to one of Man's obsessions. Negating human will to simulate oneself through *reductio ad absurdum* logic would definitively change the face of Psychology as we know it today: it will annul one of the reasons we use its theories.

Spatial Perception and Embodied Cognition

Maurice K.D. Schouten
Faculty of Philosophy
Tilburg University
P.O. Box 90153
5000 LE Tilburg
The Netherlands
e-mail: m.k.d.schouten@uvt.nl

In this paper, I will investigate the importance of bodily action for spatial perception. Piloting of the body through space requires that spatial perception is a plastic and continuous process with visuotactile representations constantly being updated. This implies that the perception of space is not a 'purely perceptual' function, but should be understood as being action-oriented. Spatial perception is the result of the integration of proprioceptive, somatosensory and visual information with information about the external environment in a use- or task-dependent way. I will illustrate this point by looking at recent work on the relation between tool use and (spatial) cognition. It appears, for instance, that the active manipulation of tools in extrapersonal space extends the neural representation of peripersonal space, in normal subjects as well as neglect and extinction patients. These findings offer, I submit, further support for the approach known as situated cognition: it does not suffice, for explanatory purposes, to focus exclusively on the representational and computational processes that take place in the brain. Perception-action couplings are crucial for spatial cognition. In fact, I also claim that the evidence presented strongly suggest that the tools used, and the actions they afford, should be taken as parts of the cognitive system. The view I defend has been labeled vehicle externalism, which is a relatively strong version of situated cognition. In this paper, I will also discuss and dismiss a number of objections that can be raised against vehicle externalism.

The Disambiguation of Disruptive Behavior: Self-regulation, Working Memory and Language

John C. Schuremann

The *prima-facie plausibility* of dynamical integrated, High Order intelligent distributed agency, with Low Order sensory-motor imputes, holds significant interest for contemporary neuroscience, psycholinguistics and philosophy. Intrinsic to the issue, some persons consider such phenomena as a self evident, situated, and experiential reality. People with neurodevelopmental impairments lack the *automasized* capacity for perception or conceptualization of routine abilities normally taken for granite. Various Formal Symbolic Representational Processes, necessary for accomplishing social adaptation can be absent, often with out an articulated understanding by the person or society. Effective psychosocial functioning requires a relatively complete complement of representational competencies. Because of the function's *automasized* nature, societies tendency to attribute pejorative qualities to persons with asynchronous neurological development prevalent. Impaired persons struggling to survive and prosper with in an activity flow, which is felt as confusing, painful, and overwhelming, confront a confounding predicament. Despite such adversities, some impaired, manage to naturalistically construct High Order compensatory strategies through a process of *"boot strapping".* Generally, though, the morbidity of this population remains tragic and costly for both society and the afflicted.

Contemporary psychotherapeutic perspectives, scientifically informed and driven have begun to disambiguate neurologically anomalistic behavior labeled by society as disruptive. The presentation will explore clinical utilization of intentionally constructed, High Order Self Monitoring systems of complex compensatory protocols with disruptive disorders. Forms of augmented cognition include pharmacological agents, psychosocial scaffolding, assistive technologies, conceptual prosthesis's and accommodations with in the social ecologies of the impaired. The goal of treatment processes is the integration of multimodal interventions, as components of the patient's cohesive self-narrative. The treatment framework is dialogically narrative, incorporating self-directed intelligent agency with in a situated, real time process of psychosocial adaptation.

Diminutives aid the acquisition of case-marking in Serbian

Nada Ševa[1, 2] and Vera Kempe[1]
[1]Department of Psychology, **University of Stirling**
[2]Laboratory of experimental psychology, **University of Belgrade**

The acquisition of noun morphology in highly inflected languages like Russian, Serbian, or Polish includes learning the declension of nouns. Previous research demonstrated that diminutives (e.g., *Stevie*, *doggy*) facilitate the acquisition of case-marking in Russian and Polish (Kempe, 2005; Dabrowska, submitted).

In this study, we extended the crosslinguistic comparison of the effects of diminutives to case acquisition in Serbian. Twenty-two children (mean age 3;7 years) were presented with 24 familiar and unfamiliar objects and a toy elephant, which was standing at, or moving away from an object. Half of the objects were labelled with masculine, and half with feminine nouns presented either as simplex forms or diminutive derivations. The unfamiliar objects were labelled with phonotactically legal Serbian non-words like *frobinMAS (DIM:frobinić)* or *tompaFEM (DIM:tompic*a). The experimenter demonstrated the movement or position of the elephant followed by the questions *Odakle ide slon? (Where does the elephant come from?)* and *Gde stoji slon? (Where does the elephant stand?)* to elicit genitive and locative case production.

The results revealed a main effect of noun familiarity, demonstrating that children produced more correct case marking for familiar nouns compared to novel nouns. In contrast to Russian and Polish, there was no main effect of derivational status, probably due to performance close to ceiling on familiar nouns. However, a two-way interaction between derivational status and familiarity showed that in the novel nouns, children made fewer errors with diminutives than with their simplex counterparts.

This finding confirms a facilitative effect of diminutives on the acquisition of noun morphology in three languages. This effect shows that a form that is prominent in child-directed speech for semantic and pragmatic reasons can aid the acquisition of noun morphology because it promotes the extraction of lexically and phonologically homogeneous word clusters which serve as low-level schemas for the acquisition of inflectional morphology.

'Representations of intended actions in children with DCD compared with their age matched peers and a younger developing group'.

Charikleia Sinani (Leeds Metropolitan University and Leeds University) and David Sugden (Leeds University)
Leeds Metropolitan University, Faculty of Health, School of Health Allied Professions, Civic Quarter, Leeds, LS1 3HE
Tel. 441132832600 ext.5709, Email: C.Sinani@leedsmet.ac.uk

This study aims to explore the hypothesis that children with Developmental Coordination Disorder (DCD) have difficulties in generating an accurate visuospatial representation of an intended action. The task, requiring decisions about correct object use (based on Chainay and Humphrey's 2002) included a series of photographs (48 photographs, 4 photographs for each of the 12 objects) of the objects been used correctly or incorrectly. The three types of incorrect usage that were used were: wrong grip, wrong spatial position or wrong object orientation and wrong context. The task involved detecting the correct use of the object and stating the reasons why the photographs were incorrect. Participants included three groups of children. Group 1 (n=28), mean age=118.16 months, involved children identified according to the DSM-IV criteria as having DCD. Group 2(n=24), mean age=121.17 months included an age matched control group randomly selected from school registers. Group 3(n=23), mean age=71 months provided a developmentally younger group for comparison. All children were assessed on the Movement ABC test and completed the task requiring decisions about correct object use. The results showed consistent differences between the DCD group and age matched controls on the overall score and for the incorrect grip usage. No differences were found on the incorrect spatial and content action. When compared to younger children, the DCD group did not differ on the overall score of correct answers and incorrect grip and content action. When aged matched controls were compared to younger children significant differences were found on all measures. These results are discussed in terms of the core motor deficit and perceptual problems in children with DCD.

Cognitive Linguistics and L2 idiom instruction

Sophia Skoufaki , University of Cambridge.

Idiom theorists have made two proposals for idiom instruction. Cognitive Linguists have explored experimentally the traditional proposal, the presentation of idioms in thematic groups (e.g. Boers 2000). Their experiments indicate that presenting figurative language in groups according to the Conceptual Metaphors thought to underlie them leads to better form retention than their presentation in terms of functional groups. The more recent proposal is to ask learners to guess at the meaning of idioms before presenting them with their definitions. Although Cognitive Linguists have supported it theoretically (e.g. Kövecses and Szabó 1996), they have not tested it experimentally. Moreover, these proposals have not been compared in terms of their relative effectiveness. Another issue that has been ignored is that both methods seem to guide the learner's attention to the meaning rather than to the form of the input. Therefore, a method focusing on the idioms' form might lead to better form memorization. The study presented here aims to fill these research gaps.

Greek adult advanced-level learners of English learn VP idioms incidentally in three conditions. In all of them idioms appear in metaphoric groups. The second condition, moreover, begins with an idiom-meaning guessing task. Conditions also differ in terms of the practice exercise following the input phase. In the first two conditions it draws attention to idiom meaning, while in the third more to the form than to the meaning of idioms. All conditions end with the test phase, a cloze test where some of these idioms are partly missing.

Results indicate that starting VP-idiom instruction with a guessing task leads to higher form retention than the simple metaphoric-groups presentation. The results of the conditions differing in terms of their practice exercise do not differ significantly, suggesting that these comprehension-focused methods do not need to be complemented by production exercises.

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Chomskyan Linguistics meets Cognitivist Psychology

Alona Soschen

Interdisciplinary developments are required to achieve a better understanding of the mind's basic principles governing 'a perfect system' (Hauser 2002, Chomsky 2004). So far, two major directions – theoretical linguistics and cognitive psychology - provided many valuable insights about the nature of mental representations. However, an explanatory adequate integration of these results has not been achieved yet.

Chomsky's *Syntactic Structures* in 1957 marked a transition from cumulative observation to systematic methods in linguistics. Since then, the field evolved in the direction of a unifying and explanatory adequate theory. The recent 'minimalist' approach is based on simple and empirically justifiable assumptions - the restriction of grammatical operations to Merge (Chomsky 2001, 2004). This presupposes a level where a set of basic regulations creates a 'skeletal' structure without labels.

As transformational operations undergo simplification, the advances in cognitive science bring the study of mental representations to a new level. An important issue in cognitive linguistics is *metaphor* as a highly structured form of interconceptual mapping (Lakoff 1987, Lakoff & Johnson 1999). Lakoff and Núñez (2000) contend that metaphors drawn from human experience represent mathematical ideas. However, minds not only observe nature, but also are an essential part of it.

We offer a possible explanation of how complex aspects of cognition such as language can be accomplished by a small set of rules. Language Faculty is viewed as a formal system of rules similar to algorithmic models. At the same time, syntactic representations are intrinsically connected to concept formation. The proposed mechanism's universal applicability is supported by a broad range of cross-linguistic data. This interdisciplinary approach to mental representations combines the results from psychology, philosophy, linguistics, and mathematical theory, and promotes the view that contributions from disparate fields are vital to the study of human mind.

Culturally Mediated Perception, Action, and Conceptualization: How Distributed Cognition Creates Intra-Cultural Similarities and Inter-Cultural Differences in Thinking.

Norman Steinhart, University of Toronto

Recent experimental research has shown that people living in North American and Asian cultures show significant differences in many fundamental perceptual processes such as change blindness and field dependence. (Nisbett and Masudo). This paper will explore the significance of these findings for an understanding of the human mind as dependent on socially learned, culturally mediated interaction processes, as well as on individual epigenetic development. I propose an elaboration of activity theory that can help us understand how the skills that allow us to use aspects of the outer world as a field or context to intentionally probe, understand, and transform our environment, by providing a common distal artifact/environment interface, bind various perceptions and viewpoints into coherent objects and concepts, and bind our intentional actions into unified selves. We will examine the possibility that sequential versus iconic processing such as encountered in western alphabet versus Chinese ideograms will preferentially and selectively develop specific brain/mental functions to be dominant, and so different systems of writing may lead to distinct 'neuro-cultural circuits'. Therefore, ongoing use of culture-specific mediated perceptions and actions could lead to the generalization of culture-specific distributed cognition within each culture that helps account for Nisbett et al's findings. As well, the cultural-dependent model of mind predicts that the complementary process of socially shared cognition will occur *within* a cultural group. Tools, as well as language and material symbols embody people's intentions. Tomasello proposes that in learning the conventional use of cultural objects and activities, the child must learn to take on the viewpoint and intention of others, which greatly extends their innate ability to understand another's thinking. In effect, we employ certain aspects of the world as a 'common ground' that can serve as an external extra-personal 'shared thought space' rather than relying on private internal representations as our basic form of cognition.

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Unifying Approaches to the Unity of Consciousness

Susan Stuart,
Department of Philosophy,
University of Glasgow

My concern is with the binding problem and how information, that is stored across the brain, is integrated into one unitary conscious experience. I will draw together the common themes from a diverse body of work, including Cotterill's neurophysiological approach [1995, 1998], Kantian metaphysics [1929], Sloman's cognitive architecture theory [2003, 2004], Aleksander's engineering approach that entails the integration of cognitive faculties into architectures [2003], and robotics [Bowling et al. 1998, 2004].

Cotterill claims that consciousness is primarily associated with the necessary co-ordination of movement and response requiring a unity of conscious experience. In muscular movement we ask questions about our world and Cotterill suggests that a master node draws together afferent/efferent information into coherent thought and action, identifying the anterior cingulate as the possible 'site' where this activity occurs. Kant's critical philosophy focuses on describing the logically necessary prerequirements for a unity of consciousness, emphasising the role of the cognitive imagination in the act of synthesis. Like Cotterill, Kant is committed to an active, sensorimotorily enmeshed view of consciousness, realising the act of synthesis or binding in some embodied system.

Early hybrid cognitive architectures represented knowledge symbolically as rules and facts but had a neurally-based activation process that determined which facts and rules got deployed in which situations. [Anderson 1983, 1990, 1993.] Sloman's Cog-Aff and H Cog-Aff architectures provide a more holistic approach, arguing that both cognitive and affective components must be combined in one architecture. Unlike early architectures H Cog-Aff is not algorithm and representation based. In the robotics work of Bowling et al. the integration of information operates on the basis of probability algorithms which must occur in both a temporal and a spatial framework if the system is to act appropriately in real time.

Embodiment, animation, perception, and imagination, are fundamental to each of these approaches, and these require a system that has (i) the ability to bind its experiences as experience for it, (ii) the ability to order its experience temporally, and (iii) some element of affective processing that makes some things more desirable than others and provides the system with a will to act.

Martin Thiering, University of Alberta

The Cognitive Semantic Interface in the Construction of Spatial Mental Spaces

Mental spaces are individual and culturally depending representations that are shaped by the environmental input. I propose in this paper that if one only looked at a handful of European languages, it might seem that universal perceptual mechanisms take over and speakers everywhere encode spatial relations on relatively similar and objective grounds, i.e., we might expect similar cognitive domains. Using (a) the *Topological Relation Markers* (Pederson, Wilkins & Bowerman 1998), and (b) the *Caused Position* test by Hellwig and Lüpke, enables the comparison of cross-linguistic data that relies on perceptual stimuli.

In both experiments the speaker is asked to describe the scene. Speakers of the languages in (1) generally encode the picture in Figure A as static whereas Dene speakers tend to describe the scene as dynamic (2).

Figure A: CLOUD ABOVE MOUNTAIN

(1) a. *Die Wolke ist über dem Berg.* [German]
the cloud is above the mountain
'The cloud is above the mountain.'

b. *Sky-en er over fjell-et.* [Norwegian]
cloud-the is above mountain-the
'The cloud is above the mountain.'

c. *Un nuage est au-dessus d'une montagne.* [French]
a cloud is above a mountain
'The cloud is above the mountain.'

d. *La nube está arriba de la montaña* [Spanish]
the cloud is above/over of the mountain
'The cloud is above/over the mountain.'

(2) *tthesheth daghe yak'odhaz ghe-shet* [Dene]
rock.hill above cloud IMPF.3sgS–AM.move
'A/the cloud above a/the mountain is moving.'

The examples in (1) suggest that the cloud is construed as being located above the mountain in a static, neutral and relatively non-perspectivized relation. Speakers of Dene tend to express that a 'cloud' is never simply 'over' the mountain, but rather that it floats in the sky. The scene is generally encoded as a motion event and not as a static spatial relation in the first place, i.e., we find a mapping process from a spatial- to a time-related cognitive domain.

I want to challenge a speaker-independent if not visually based set of features in the encoding spatial categorization. Instead, I argue for a subjective and perspectivized construction of spatial categorization depending on a subjectivized mental spaces. These spaces can be ego- and socio-centric and, thus, all viewing arrangements are ultimately anchored to the human body (Svorou 1993; Talmy 1983). Finally, this paper focuses on the cognitive semantic interface of the mapping processes involved in the encoding and categorization of spatial relations.

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Agency and communication

Maurizio Tirassa
Università di Torino
Dipartimento di Psicologia & Centro di Scienza Cognitiva
via Lagrange, 3
10123 Torino (Italy)
email tirassa@psych.unito.it

An agent is a conscious organism who lives in a situation, striving continuously to make it more to its liking. The situation is a dynamical landscape of meanings, that is, a subjective, open, and changeable representation of the world. Meanings are relational: they result from the interaction between the dynamics world and those of the agent's mind/brain; that each meaning depends on and contributes to the dynamics of the overall situation. For an agent to act is to interfere with the spontaneous dynamics of the world in some crucial joint, altering it so to try and improve the situation.
A social agent is one whose possible actions include interfering with other agents' situations. Mentalist communication occurs when an agent overtly tries to interfere with another's situation, possibly letting him to do the same in reverse. Overtness means that a partial understanding of the other's situation becomes part of each agent's situation, so that each understands, accepts, and acknowledges the other's attempts to interfere with her situation. Communication thus becomes a circular and cooperative interference in each other's situation. Part of the evolution of each agent's situation is therefore subject to the scrutiny and the partial control of the other; this also accounts for various social phenomena, including face. The whole process is only possible between agents capable of mindreading and of externalizing a description of aptly selected features of their situations.
Communicative actions are the external result of the processes outlined; whatever an agent interprets as an overt attempt to interfere with her situation (including silence where something else is expected) bears a communicative meaning. The semantic relations that an agent entertains with her situation may be divided into epistemic, motivational, and intentional; analogously, the modifications that an agent may induce in another's situation also belong to the same categories.

On biological constructivism

Maurizio Tirassa
Università di Torino
Dipartimento di Psicologia & Centro di Scienza Cognitiva
via Lagrange, 3
10123 Torino (Italy)
email tirassa@psych.unito.it

The mind is the control system of an agent's interaction with the world. Three perspectives can be adopted for the description of such interaction: from the outside (behaviorism), from nowhere (cognitivism), and from the inside. I will outline and defend the third perspective, couching it in a biological view of cognition. My main claims are: (1) the mind/brain is a conscious, representational organ; it is a material property of the body; (2) interaction can be understood in terms of representations plus agency; (3) cognitive causation goes from mind/brain "states" to mind/brain "states". The mind re-creates itself from instant to instant; each "slice" of this re-creation is generated by the preceding one; thus, each "slice" is literally the product of the previous history of that mind/brain. The patterns with which the mind/brain re-creates itself are rooted in the organism's evolutionary and individual history. Since interaction at t(n) depends on all the interactions at t(n-i), memory and learning can be understood as modifications of each possible future representation, rather than independent "cognitive functions". An organism's interaction consists in the relationship between its internal dynamics and the dynamics of the external world. The latter are the stream of events that are subjectively relevant to the orgamism, i.e., the contingencies and opportunities it "views" in the external world. The former are the flux of mental representations that "create" the external dynamics and control the organism's relationship to them. In a cognitively sophisticated ("metarepresentational") species like ours, the internal dynamics (i.e., the landscape of contingencies and opportunities represented by the mind) include the mind itself. This leads to several phenomena, including the possibility of a (partial) control of the mind over itself, the "internal narrative" that humans entertain, and other features of our cognitive and social life.

Children's construction of grammar and the cultural evolution of language

Paul Vogt
Language Evolution and Computation Research Unit
School of Philosophy, Psychology and Language Sciences
University of Edinburgh
40 George Square, Edinburgh EH8 9LL
paulv@ling.ed.ac.uk

It is a well known phenomenon that children show a remarkable and seemingly effortless ability to acquire grammatical structures in their native languages. Moreover, it has been suggested that children may even be the driving force for the creation of new grammatical structures, such as observed in Nicaraguan Sign Language [3].

Yet, as Chomsky observed, children are faced with the *poverty of the stimulus*, which has led him to claim that the universal structures of language are innate [1]. If this innateness is – indeed – the case, that could help explain the rapid development of grammar in children. Recent analysis of input received by children, however, suggests that children do not construct syntactic expression they had never seen before, suggesting that the poverty of the stimulus is perhaps less prominently there [2].

This paper presents a computational model in which 'children' construct compositional structures based on structures they had observed before, but where they actively exploit voids in the knowledge they acquired [4, 5]. In a way, they use a poverty in the stimulus to acquire compositional structures. The model lacks any predefined or innate language structure, however, the question remains whether or not the universals of this language are innate by means of the learning mechanisms the children have. My hypothesis is that, although the learning mechanisms restrict and even bias the languages that can be learnt, the language evolves culturally, since there are no principles or parameters to be set.

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Spreading the Word: Linguistic Competence and the Extended Mind

Michael Wheeler, University of Stirling

In Reconstructing the Cognitive World, Michael Wheeler argues that we should turn away from the generically Cartesian philosophical foundations of much contemporary cognitive science research and proposes instead a Heideggerian approach. Wheeler begins with an interpretation of Descartes. He defines Cartesian psychology as a conceptual framework of explanatory principles and shows how each of these principles is part of the deep assumptions of orthodox cognitive science (both classical and connectionist). Wheeler then turns to Heidegger's radically non-Cartesian account of everyday cognition, which, he argues, can be used to articulate the philosophical foundations of a genuinely non-Cartesian cognitive science. Finding that Heidegger's critique of Cartesian thinking falls short, even when supported by Hubert Dreyfus's influential critique of orthodox artificial intelligence, Wheeler suggests a new Heideggerian approach. He points to recent research in "embodied-embedded" cognitive science and proposes a Heideggerian framework to identify, amplify, and clarify the underlying philosophical foundations of this new work. He focuses much of his investigation on recent work in artificial intelligence-oriented robotics, discussing, among other topics, the nature and status of representational explanation, and whether (and to what extent) cognition is computation rather than a noncomputational phenomenon best described in the language of dynamical systems theory.

Wheeler's argument draws on analytic philosophy, continental philosophy, and empirical work to "reconstruct" the philosophical foundations of cognitive science in a time of a fundamental shift away from a generically Cartesian approach. His analysis demonstrates that Heideggerian continental philosophy and naturalistic cognitive science need not be mutually exclusive and shows further that a Heideggerian framework can act as the "conceptual glue" for new work in cognitive science.

Michael Wheeler is Senior Lecturer in Philosophy at the University of Stirling. He was formerly Lecturer in Philosophy at the University of Dundee.

Symposia
Situating Representation within Post-Cognitivist Psychology

Convenor: James Good

Contributors:
Alan Costall (University of Portsmouth)
James Good (University of Durham)
Nancy Nersessian (Georgia Institute of Technology)
Lisa Osbeck (University of West Georgia)
Arthur Still (University of Durham)

Symposium abstract

This symposium on representation brings together three strands of post-cognitivist psychology: the ecological psychology of James Gibson; socio-cultural theory; and work on distributed cognition. Informed by a pragmatist sensibility, the papers explore the place of representational practices in post-cognitivist psychology. Over the past fifteen years, the work of ecological psychologists has begun to converge with that of sociocultural and discursive researchers in the development of a non-cognitivist account of cognition (Edwards, 1997; Reed, 1991, 1996; Still & Good, 1998; Wertsch, del Rio & Alvarez, 1995). Cognitive scientists and philosophers have also begun to look beyond the boundaries of the skin in their attempts to formulate an approach to knowledge representation that is focused on the organism - environment transaction (Burke, 1994; Haugeland, 1998; Nersessian, 2005; Putnam, 1999; Rouse, 1996). A focus on the situated and embodied nature of cognition has also begun to challenge the individual representational theory of mind (Clancey, 1997 ; Clark, 1997). The turn to practice has also helped focus attention away from the mental representations of the knower (Pickering, 1992; Schatzki, Knorr Cetina & von Savigny, 2001). While knowledge is now more likely to be seen as embodied and embedded in social and cultural practices, such work can still be seen as new form of representationalism, distributed among the collective rather than located within the individual, a view advocated in the opening paper. Taking a cue from John Dewey's early critique of the spectator view of knowledge (Dewey, 1929) and James Gibson's radical attempt to transcend subject-object dualism (Gibson, 1979), the author maintains that there is a residual representationalism within socio-cultural approaches to cognition. It is argued that if we are to move beyond 'pre-post-cognitivism', we need to reject the subject-object dualism that keeps raising the seemingly fundamental 'problems' for which representationalism continues to be deemed the only answer. In the second paper, the authors contrast the traditional Cartesian cognitivist approach to representation with an approach that has its roots in the transactionalism of John Dewey and Arthur Bentley (Dewey and Bentley, 1949) and, more recently, in the work of Maurice Merleau-Ponty (1992) and James Gibson (1979). Employing a notion of 'troc', borrowed from the art historian Michael Baxendall (Baxandall, 1985), a transactional account of knowledge in terms of representational practices that 'point both ways' - to organism and environment is presented. Because representations are used and evolve in the service of troc, this frame, the authors suggest, can in principle provide a full account of the use of representations. In the final paper, an attempt is made to move beyond the impasse between cognitive and socio-cultural accounts of scientific practice. The authors argue that nothing less than a reconceptualization of both 'cognition' and 'culture' will be required such that each is implicated in the other. They find much promise in recent attempts within cognitive science to broaden the boundaries of the epistemic system. Drawing upon an extensive empirical project that uses ethnographic and cognitive-historical methodology to investigate the 'social-cognitive-cultural' practices of interdisciplinary research laboratories (Nersessian et al.,

2003), the authors attempt to formulate new ways of understanding the nature of 'representation' in science, compatible with a distributed cognitive framework.

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The 'antithesis' of the subjective and objective:
Representationalism in cognitive and socio-cultural theory.

Alan Costall
Department of Psychology,
University of Portsmouth.
Portsmouth, PO1 2DY
alan.costall@port.ac.uk

Although critics have long voiced fundamental objections to 'representational theory' within perceptual and cognitive theory, it is only recently that its limitations have been widely acknowledged, such as, the 'symbol ground problem' and the failure to explain how rules and representations can be applied to specific situations. However, in its opposition to the stark individualism of standard cognitive theory, socio-cultural psychology and related approaches have seemed to offer a radical and promising alternative. Yet, representationalism is also remarkably widespread within socio-cultural theory. So why is representationalism, despite all its difficulties, so prevalent within the human sciences? Drawing upon the work of John Dewey and James Gibson, I will argue that representationalism is a consequence of a more fundamental commitment of cognitivism: the antithesis of the subjective and objective, and the relegation of meaning either to individual 'mental representations' or else to collective symbolic systems. If we are to move beyond 'pre-post-cognitivism', we will need to reject the subject-object dualism that keeps raising the seemingly fundamental 'problems' for which representationalism appears the only 'solution'.

Representational practices in post-cognitivist psychology:
Choc and troc?

James Good and Arthur Still
Department of Psychology
University of Durham, UK
Science Laboratories
South Road
Durham DH1 3LE
j.m.m.good@durham.ac.uk
arthur.still2@ukonline.co.uk

In this paper we contrast the traditional cognitivist approach to representation (hereafter *choc*) with one based on a more transactional view (*troc*). On the first, some form of representation has seemed necessary in order to maintain contact causality (*choc*). John Dewey (1896) suggested the possibility of a radically different view. More recently, Maurice Merleau-Ponty (1962) and James Gibson (1979) independently arrived at a view that the instantaneously present has no priority in perception, as is implied by the doctrine of *choc*. To deny that mental representations form the basis of human thought and action is, of course, not to deny that representations are pervasive in modern human life. But they are themselves in need of explanation. How is this to be done? A start towards answering this question was made by Ed Reed and we review his notion of representational systems (Reed, 1991, 1996). The representational power of an artifact does not stem from the object taken in isolation, but from its part in a cultural system. In developing Reed's work we borrow from the art historian Michael Baxandall the term *troc* (Baxandall, 1985). This underpins the relationship between an individual painter and his or her contemporary culture. It means exchange or barter, and unlike *choc*, *troc* is inconceivable in isolation. It is always part of a system of exchange, and this can be generalized to include exchange between organism and environment. In this general form, sometimes it involves the use of representations, sometimes not. Representations are used and evolve in the service of *troc* and this frame can in principle give a full account of the use of representations. Much recent work in the philosophy and sociology of science indeed attests to the social and embodied nature of the representational practices which lie at the heart of this notion of *troc* (Lynch & Woolgar, 1990 ; Rouse, 1996; Nersessian, 2005). The notion of *troc* also reflects the mutualist ontology we have elaborated elsewhere (Still & Good, 1998).

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The distribution of representation

Lisa M. Osbeck
Department of Psychology
University of West Georgia
losbeck@westga.edu

Nancy J. Nersessian
Program in Cognitive Science
College of Computing
Georgia Institute of Technology
Atlanta, Georgia 30332
nancyn@cc.gatech.edu

Perceptions of impasse between cognitive and social-cultural accounts of science practice detract from the effort to provide rich and satisfying accounts of scientific knowledge production. Accounts are required that move beyond both the 'black-boxing' of cognition and the compartmentalizing of the social and cultural as 'elements' that 'enter in' to the analysis of scientific practice at definable points (Longino, 2002; Nersessian, 2005). Such integration requires nothing less than to reconceptualize both 'cognition' and 'culture' such that each is implicated in the other. Newer paradigms of cognitive science attempt just this, broadening the boundaries of the epistemic system to encompass networks of interacting persons, shared resources (including technology) and traditions of practice (e.g, Hutchins 1995, Greeno 1998). Reconceptualizing cognition as distributed requires either discarding traditional cognitive concepts such as representation, or reconceptualizing them as well. We believe that the notion of 'representation' is useful to a coherent account of scientific innovation and conceptual change. However, traditional accounts of representation focus principally upon internal (mental) representation. Among the many reasons this is problematic is that external representations (such as diagrams) seem to provide the scaffolding for science (Giere, 2002). This paper thus strives to articulate new ways of understanding 'representation' in science that are compatible with a distributed cognitive framework. We draw upon a wide-scale, multi-year project that uses ethnographic and cognitive-historical methodology to investigate the 'social-cognitive-cultural' practices of interdisciplinary research laboratories. We construe each laboratory as an 'evolving distributed cognitive system' within a dynamic 'problem space.' Ethnographic field notes and interviews with scientists at varying levels and stages of experience have led us to develop new interpretive concepts that include internal/external representational 'coupling', 'distributed model-based reasoning', and 'cognitive partnerships' among persons and with artifacts. We examine representation's nature and specific roles in a distributed system in relation to these concepts, and consider possible constraints upon a description of representation as distributed.

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Symposium: Formulating Minimal Requirements for Cognition

Coordinator: **Fred Keijzer**
Section of Theoretical Philosophy
University of Groningen
Oude Boteringestraat 52
9712 GL Groningen
The Netherlands
Phone: + 31 (0)50 363 6162
Email: f.keijzer@philos.rug.nl

Symposium abstract

What is cognition? Interestingly, this question does not have a ready answer. During the rise of cognitive science, cognition was used in a loose way to refer to a host of processes, including perception, rationality, memory, and action. Roughly, the criterion for anything being considered 'cognitive' was whether it related to some aspect of human mentality, with common sense intuitions acting as a judge. Thus arose the situation where it became a matter of painstaking research and debate whether or not certain animals exhibit cognition (Allen & Bekoff, 1997), while chess-playing AI-programs were assumed to fall within the cognitive domain.

The rise of embodied cognition, with its intrinsically evolutionary perspective, shifted the emphasis away from complex human processes as the paradigm. The new examples consist of insect-like robots, the dynamical modeling of perception-action coupling, sensorimotor coordination, and so on. While these are clearly examples of intelligent problem solving—the necessary preconditions for human cognition—the relation to the human mind is sometimes tentative at best. In an increasingly mosaic picture, however, the lack of a clear theoretical construct becomes more problematical. What do we take cognition to be? How are we even to approach such a question?

One important upshot of embodied cognition is that the basis of cognition shifts from human rationality to perception-action coupling in general. Agency thus becomes plausibly cast as the key feature of cognition. For psychology, human agency is of course the core topic, and recent years have seen increased attention to the conceptual foundations of agency. However, agency (like cognition) is often interpreted in an anthropocentric manner, which induces an artificial dichotomy between genuine cognizers/agents and reflexive/instinctive organisms. Thus the question of the minimal requirements for cognition remains open and unresolved.

In this symposium we aim to contribute to these foundational issues from a more biologically oriented perspective, which seeks the bounds of cognition among the lower branches of the phylogenetic tree. The first paper will first introduce the problem of formulating a conceptual foundation for cognition and put forward the option of casting agency—perception-action coupling—as the physical and conceptual basis. The other two papers will develop this theme in more detail. The second paper will discuss recent and highly surprising discoveries concerning bacterial intelligence and their import for the notion of cognition. The third paper will discuss to what extent nervous systems might be considered as a necessary component to turn metabolic activity into *cognitive* agency.

The foundational problem for cognition
Fred Keijzer and Pamela Lyon
(**University of Groningen**, The Netherlands, and **Australian National University**, Australia)

What is cognition? Despite the existence of a science of cognition there is no clear agreement on what makes certain phenomena cognitive, and others not. Within cognitivism the issue was neglected. Human intelligence was used as a standard, and any process—natural or artificial—that fitted this standard sufficiently could be considered 'cognitive'. For post-cognitivist psychology the situation is different. It cannot rely on the 'human standard' in the same way. One might even say that the need for a post-cognitivist psychology arose because cognitivism began with this most complex of all cognitive systems without a good understanding and appreciation of more basic, biological cases. Embodied cognition approaches remedy this anthropocentric bias by addressing a more varied set of processes that are not strictly limited to humans. Under these circumstances the question what we take cognition to be is more urgent. Are phenomena like insect walking (Brooks) and goal-seeking missiles (O'Regan and Noë) examples of cognition or not? What criteria do we use to answer such questions? Given this problem, the notion of perception-action coupling (or sensorimotor contingencies) becomes an important and fairly obvious option to provide a foundation for the notion of cognition. However, and intriguingly, the same problem occurs again: What are perception-action couplings? What would make something an example of perception-action coupling? Where are we to draw a line, if anywhere? It is self-evident that O'Regan and Noë's (2001) example of a goal-seeking missile is controversial, but why exactly? What is missing? Can we ever do more than making intuitive judgments here? A way out of this dilemma may be found by developing the claim that perception-action coupling must be grounded in a biological context (Keijzer, 2001), and following what Lyon (2005) calls a biogenic approach. This option raises a whole new field of issues and topics that is of central concern for a post-cognitivist psychology.

The cognitive cell (provisional title)
Marc van Duijn (**University of Groningen**, The Netherlands)

Abstract to follow.

Metabolism and neural agency
Alvaro Moreno, Arantza Etxeberria and Jon Umerez
(University of the Basque Country, Spain)

We analyze the conditions for the origin and evolution of agency. Starting from basic (prebiotic) autonomous systems, agency appears as an interactive process sustained by the internal self-constructive organization. At this minimal level, however, self-construction and interaction are not separable processes. The next step is living unicellular systems, in which the adaptive form of agency appears. Adaptive agency requires a certain decoupling from strict constructive processes, but both are supported by the same metabolic organization. A crucial step in the evolution of agency appears when behavioral and constructive processes get functionally separated. This fact is related to the size increase of some groups of organisms whose adaptive abilities depend on motility. Here a specialized (sub)system develops which, in the sensorimotor aspect, is hierarchically decoupled from the metabolic organization, although it remains dependent of it in the global functioning of the organism. This hierarchical decoupling is what allows the unfolding of an unlimited complexity of agency and therefore, the emergence of cognition.

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