1-1-1989

Volume 2, Number 1 - CogSci News (Spring 1989)

Lehigh University Cognitive Science Program

CogSci News

Cognitive Science Program, Lehigh University, Bethlehem, PA 18015

Volume 2, Number 1
Spring 1989

Editorial Policy

This newsletter is published twice each year, in fall and spring issues, by the Cognitive Science Program at Lehigh University. Its purpose is to inform faculty and students about the interdisciplinary and rapidly growing field of cognitive science and to report the activities of Lehigh's Program.

The newsletter is distributed free of charge in the United States and Canada to academic programs and individuals interested in cognitive science. Anyone who would like to be added to the mailing list should notify the Editor.

The Editorial Staff welcomes readers' comments and *solicits materials* dealing with cognitive science. We are especially pleased to consider course syllabi, book reviews, short essays, brief descriptions of scholarship and research in progress, and original art work (e.g., cartoons, line-drawings, computer-generated images).

Address all submissions, comments, and subscription requests to: John B. Gatewood, CogSci News, Price Hall #40, Lehigh University, Bethlehem, PA 18015. Electronic mail can be sent via Bitnet to jbg1@lehigh.

"CogS 102"—Formal Tools for Cognitive Science

Robert F. Barnes

Early in the development of Lehigh's cognitive science curriculum, the planning committee decided that an introductory-level, "intellectual foundations" course with an explicitly interdisciplinary approach was needed to give the program coherence and to orient the students. We also felt that majors should have a minimum competence in discrete structure mathematics, in addition to the standard introductory course in calculus. After some reflection, we concluded that the program's mathematical needs were not well served by any existing course, so it would be necessary to incorporate the relevant "formal tools" in our own course. At the same time, it seemed impossible to get sufficient amounts of both cognitive science content and mathematical content into a single semester. Thus, we designed Lehigh's introduction to cognitive science as a two-semester sequence: CogS 101—General Concepts (fall), and CogS 102—Formal Tools (spring).

Barbara Malt and Norman Melchert described their problems and choices regarding CogS 101 in the last issue of this newsletter. Here, I recount the maiden voyage of CogS 102. I can't report on the course completely, because the semester is still in progress, but it seems fair to describe it as a qualified success. This is not to say everything has been smooth sailing, for a number of difficulties became readily apparent.

The first was that our first crop of cognitive science majors and minors tended to be students in their junior year. Thus, some of them had already taken the somewhat more advanced discrete mathematics course required for the computer science major, which is also an elective in one of the areas of specialization. (I might remark that the College distribution requirements for the B.A. make a major in cognitive science particularly attractive in conjunction with a B.A. major in computer science, so this development was not surprising.) After some discussion, we decided that since this overlap seemed largely a temporary phenomenon, we would allow these majors to take CogS 102, relying on the differences of aim in the two courses to prevent complete duplication of the material. This seems reasonably well borne out—in fact, one student explained his marginal performance in CogS 102 as a consequence of presuming, since he'd taken the other course, that this one would be easy going. For the minors, we allowed the other course to substitute for CogS 102, with the provision that an additional approved course be taken. At this point, both decisions seem satisfactory.

The next problem dealt with the selection of a text. None of the discrete mathematics texts I saw seemed especially appropriate for a cognitive science course. My final choice was *Discrete Mathematics* by Kenneth P. Bogart (published by D.C. Heath, 1988). I view the choice as a mixed bag. The book is generally quite good, although a number of minor errors in exposition and exercise answers were noted. Somewhat more seriously, a great deal of the book is devoted to topics that seem less appropriate for a course in cognitive science than for one in computer science. At the end of the semester, students will be asked for comments on the book (as well as the course), and I will gladly pass on their remarks to anyone who contacts me. Conversely, I would be

(continued on page 2)

"CogS 102" (cont.)

delighted to hear from anyone who has found a text, whether especially good or especially bad, for this sort of course.

The third problem was the disparity in mathematical experience and ability among the students. One student had a great deal of trouble with even the simplest concepts in the beginning. (Incidentally, all those at the lower end of the scale have made substantial progress through the term.) At the other extreme, one student was especially talented mathematically. Because of the initially anomalous group of students enrolled in the course, I expect this problem of heterogeneous background to lessen to some extent in future years. Nevertheless, it seems to me that cognitive science is a field that will inevitably draw students with widely varying mathematical experience and ability, so I do not expect the problem to go away. Any suggestions for coping with this phenomenon would be welcome.

Perhaps because of the widely varying backgrounds of the students in the class, I have not been able to cover all the material that I had originally planned. The material I now expect to have covered by the semester's end is essentially the following:

- Naive Set Theory
- Sentential Logic
- Predicate Logic
- Binary Relation Theory
- Functions
- Mathematical Induction *
- Trees
- Graphs and Digraphs
- Automata Theory and Formal Grammars
- Matrix Algebra
- Basic Probability Theory

----

* Although number-theoretic induction is conceptually simpler, I emphasize the more general set-theoretic form arising from inductive definitions, since this is much more broadly applicable in a natural way.

None of these topics has been covered in great depth, but the students are now familiar with the concepts and are able to manipulate them. I had intended to finish with some basic measurement theory, since the assumptions underlying various type of commonly used measurements ought to be more widely understood. That seems impossible at this point, but in the future with a more homogenous class and with a better sense of when the students need to slow down and when they can speed up, I may be able to do that, too.

One final concern. As I remarked above, the decision to offer our own course in formal tools arose from the concern that existing courses in discrete mathematics, taught in the Mathematics and Computer Science departments, did not serve cognitive science well. As the semester comes to an end, I'm not altogether certain that I've done much better. That is to say, although here and there I've given a cognitive science slant to the material, it seems to me that I haven't done it enough. In part, this is probably due to inexperience with the course—I simply didn't foresee the difficulties. In part, however, it seems a problem intrinsic to the field. Currently, we know some areas of mathematics that a future cognitive scientist will need to know and, roughly, how they will be used. Still, we're planning for an unknown future, and we're simply betting that in some way these are the areas of mathematics that will prove to be useful. Even if our bets are right, we can't as yet say how those areas will actually be used, so how do we teach them?

I would like to hear from readers about any or all of these questions. Answers will be particularly welcome, but perhaps that's too much to hope for; hence, other questions will be (almost) equally welcome. Perhaps we can get some discussion going.

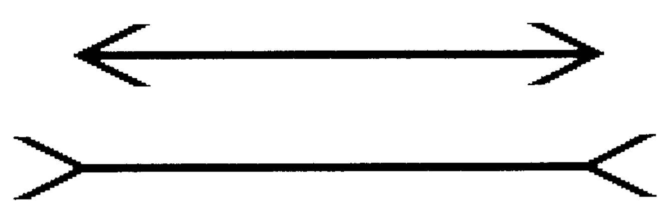
EDITOR'S NOTE: We are very interested in publishing commentary and discussion of this sort. Please send correspondence to Robert F. Barnes, Philosophy Dept., Bldg. #15, Lehigh Univ., Bethlehem, PA 18015 (rfbl @ lehigh.bitnet).

COOPERATION COLUMN

The Cognitive Science Society is seeking to assemble information concerning all **existing** university or college- based **cognitive science programs** of any description at both the graduate and undergraduate levels. Please send any information, including catalogue copy, in-house or internal documents, and so forth, to Ken Livingston, Director, Program in Cognitive Science, Vassar College, Box 479, Poughkeepsie, New York 12601.

"Teaching Cognitive Science to Undergraduates: A Directory of Programs and Courses" is **now available.** To obtain copies, contact Director, Cognitive Science Program, Vassar College, Poughkeepsie, New York 12601.

Charles Laughlin, Department of Sociology and Anthropology, Carleton University, Ottawa, Ontario K1S 5B6, Canada, has started an international **neuroanthropology network** and publishes a quarterly **Neuroanthropology Network Newsletter**. The network is concerned broadly with the relations among brain, cognition, and culture, and the newsletter publishes short, pithy reviews and mini-articles designed to set members off in interesting directions. Membership, as well as the newsletter, is free to interested individuals and organizations. Contact Dr. Laughlin via e-mail (charlesl@carleton.bitnet) or snail-mail.



Developments in Biogenetic Structural Theory

Charles D. Laughlin
Carleton University
Ottawa, Ontario

Over the years a group of us have developed a body of theory we call biogenetic structuralism. The original book of that title (Laughlin & d'Aquili 1974) represented an interdisciplinary merger of anthropology, psychology, and the neurosciences. It presented the view that the universal structures characteristic of human language, cognition about time and space, affect, certain psychopathologies, and the like were due to the genetically predisposed organization of the nervous system. It seemed to us preposterous (and still does) that the invariant patterns of behavior, cognition, and culture being discussed in various structuralist theories could be lodged anywhere other than in the nervous system. After all, every thought, every image, every feeling and action is demonstrably mediated by the nervous system. Moreover, it seemed possible to develop a theoretical perspective that: (1) was nondualistic in modeling mind and body, (2) was not reductionistic in the positivist sense (i.e., that the physical sciences can give a complete account of all things mental/cultural), and (3) was informed by all reasonable sources of data about human consciousness and culture.

This project had to be lodged within an evolutionary frame due to: (1) the evidence of dramatic encephalization found in the fossil record of extinct human ancestors, and (2) the fact that cultural variation was conceived as the primary mode of human adaptation. We thus explored the different areas of the nervous system that seem to have evolved during the course of hominid encephalization and that produce the distinctly human quality of mentation, learning, communication, and social action characteristic of our species today.

Neurognosis and the Cognized Environment

Our first book presented some general concepts which were later refined and used in other studies. One important concept was "neurognosis," a term we coined to label the inherent, rudimentary knowledge available to cognition in the initial organization of the pre- and perinatal nervous system. A human baby was conceived as taking its first cognitive and perceptual stance toward the world from the standpoint of a system of initial, genetically predisposed neurognostic models that come to develop in somatosensory interaction with the world.

The principal function of the human nervous system at the level of the cerebral cortex is the construction of a vast network of these models. We came to call this network of neural models an individual's "cognized environment," contrasting this with the actual operational environment that includes both the real nature of that individual as an organism and the effective external environment (see Laughlin & Brady 1978:6; d'Aquili et al. 1979:12; Rubinstein et al. 1984:21; Laughlin, McManus & d'Aquili 1990). Our views began to take on a more developmental perspective as we came to realize the importance of the works of Jerome Bruner, Jean Piaget, and others. We now understand that not only the initial organization of neural models is neurognostic, but so too is the course of development of those models and patterns of entrainment of models.

Major Foci: Ritual and the Symbolic Function

The first book-length application of biogenetic structural theory was an account of the evolution and structure of human ritual. In The Spectrum of Ritual (d'Aquili et al. 1979), we generated a theory of ritual behavior as a mechanism by which intra- and interorganismic entrainment of neurocognitive processes are evoked, thus making concerted action among social animals possible. We used the general model to examine formalized behavior among animals generally, then specifically among mammals, primates, and humans, and finally looked at the various neurocognitive processes mediating arousal, affect, physical and social cognition, etc. As it has turned out, ritual has been a major focus of our work (see also d'Aquili 1983; d'Aquili & Laughlin 1975; Laughlin & McManus 1982; Laughlin et al. 1986; Laughlin 1989) because of its ubiquitous nature and its role in controlling cognition and experience.

Another major focus of biogenetic structural analysis has been the symbolic function (see Laughlin, McManus & Stephens 1981; Laughlin & Stephens 1980; MacDonald et al. 1989; Young-Laughlin & Laughlin 1988). We have been particularly interested in how sensory stimuli as symbols are able to penetrate to those neurocognitive models mediating meaning and significance, and how models express themselves in symbolic action and artifact. Among other things, we have developed a theory of the evolution of the symbolic function that proceeds from primordial symbol, through cognized symbol systems to sign systems, and finally to formal sign systems, any or all of which may operate at any moment in adult human cognition (Laughlin, McManus & Stephens 1981).

Recent Trends in Biogenetic Structural Theory

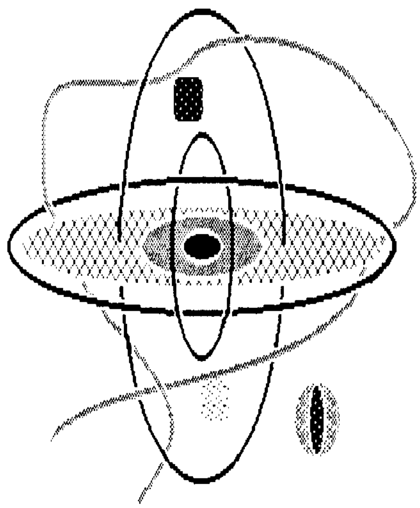
There have been three recent trends in biogenetic structuralism that might be of interest to cognitive scientists. One trend is toward a greater attention to transpersonal experience; that is, to extraordinary experiences and states of consciousness, and the relation of these to invariant patterns of symbolism, cognition and practice found in religions and cosmologies cross-culturally (see d'Aquili 1982; Laughlin 1985, 1988a, 1989b; Laughlin et al. 1986; Laughlin, McManus & Shearer 1983; Laughlin, McManus & Webber 1984; MacDonald et al. 1989; Webber et al.

(continued on page 4)

1983). We have tried to track the greatest range of human experience and relate this to transformations in neurocognitive, autonomic, and neuroendocrinal entrainment. By doing this we hope to understand: (1) the maximum potential genetic and developmental limits to patterns of entrainment and therefore to human experience, (2) the mechanisms by which societies condition patterns of entrainment so as to control (limit or extend) the range of human experience, (3) the mechanisms by which societies produce recurrent extraordinary experiences in some or all of their members so as to verify and vivify those societies' world views, and (4) by extrapolation, the possible future limits of human consciousness (Laughlin & Richardson 1986).

Another trend has been to extend the age at which society influences neurocognitive development back into very early life. In our opinion, there is now sufficient evidence from clinical psychology and developmental neurobiology that experiences occurring in pre- and perinatal life (in the womb, during birth, and during early infancy) are formative on later patterns of neurocognitive entrainment and adaptation. We wish to urge anthropologists and others interested in the ontogenesis of cognitive systems to look more carefully at how society conditions the environment of the human being during that early period (see Laughlin 1985, 1989a).

Our most recent interest has been in making a case for the importance of a neurophenomenology to the study of brain, consciousness, and culture—an approach that is antithetical to the anti-introspectionist bias of positivist science, and particularly of some schools of cognitive science (Laughlin, McManus & d'Aquili 1990). Phenomenology (a la Edmund Husserl, Maurice Merleau-Ponty, Aron Gurwitsch, and others, as well as eastern mystical and cross-cultural shamanic traditions) is the study of the essential (invariant) processes of consciousness by mature contemplation. Neurophenomenology is thus the attempt to explain such processes by reference to what is known about the brain. Two recent studies by the author exemplify this merging of contemplative and neuroscientific perspectives. One study discusses the essential intentionality of consciousness (noted by all phenomenologies) in terms of a systemic dialectic between prefrontal cortex and sensorial cortex (Laughlin 1988b). Another study suggests the relationship between invariant temporal patterns of perceptual sequencing and the neuropsychological literature available on "perceptual framing" (Laughlin 1988c).



Biogenetic Structuralism and Cognitive Science

Many scholars have found it rewarding to encourage a dialogue between cognitive science and the neurosciences (e.g., LeDoux & Hirst 1986). Biogenetic structuralism is one such dialogue in that we have attempted wherever possible to integrate the findings of cognitive science into our more neuroanthropological analyses. We feel the most profitable approach to the study of our species and its unique consciousness is the one that casts the widest possible net—one that is open to and incorporates: (1) data derived from all relevant naturalistic, anatomical, clinical, and experimental sources, (2) data with the widest experiential and phenomenological grounding, and (3) data that pertains to the total context within which the vastly complex phenomenon being studied is embedded. From this perspective we welcome and wish to encourage an enhanced dialogue with cognitive scientists.

References

d'Aquili, E. G. (1982) Senses of Reality in Science and Religion: A Neuroepistemological Perspective. *Zygon* 17(4):361-384.

d'Aquili, E. G. (1983) The Myth-Ritual Complex: A Biogenetic Structural Analysis. *Zygon* 18(3):247-269.

d'Aquili, E. G. & Laughlin, C. D. (1975) The Biopsychological Determinants of Religious Ritual Behavior. *Zygon* 10(1):32-58.

d'Aquili, E. G., Laughlin, C. D. & McManus, J. (1979) *The Spectrum of Ritual.* New York: Columbia University Press.

Laughlin, C. D. (1985) Womb=Woman= World: Gender and Transcendence in Tibetan Tantric Buddhism. *The Pre- and Peri-Natal Psychology Association Journal*, Spring issue, pp. 18-26.

Laughlin, C. D. (1988a) On the Spirit of the Gift. *Anthropologica* 27(1-2):137-159 [delayed 1985 issue].

Laughlin, C. D. (1988b) The Prefrontosensorial Polarity Principle: Toward a Neurophenomenology of Intentionality. *Biological Forum* 81(2):245-262.

Laughlin, C. D. (1988c) Time, Intentionality, and a Neurophenomenology of the Dot. Manuscript.

Laughlin, C. D. (1988d) Brain, Culture and Evolution: Some Basic Issues in Neuroanthropology. Departmental Working Papers, Department of Sociology and Anthropology, Carleton University, Ottawa, Canada.

Laughlin, C. D. (1989a) Pre- and Perinatal Anthropology: A Selective Review. *Pre- and Peri-Natal Psychology Journal* [in press].

Laughlin, C. D. (1989b) Transpersonal Anthropology: Some Methodological Issues. *Western Canadian Anthropologist* [in press].

Laughlin, C. D. (1989c) Ritual and the Symbolic Function: A Summary of Biogenetic Structural Theory. Manuscript.

Laughlin, C. D. & Brady, I. A. (1978) *Extinction and Survival in Human Populations.* New York: Columbia University Press.

Laughlin, C. D. & d'Aquili, E. G. (1974) *Biogenetic Structuralism.* New York: Columbia University Press.

(continued on page 5)

Laughlin, C. D. & McManus, J. (1982) The Biopsychological Determinants of Play and Games. In R. M. Pankin, ed., *Social Approaches to Sport*. Rutherford, NJ: Farleigh Dickinson University Press.

Laughlin, C. D., McManus, J. & d'Aquili, E. G. (1990) *Brain, Symbol, and Experience: Toward a Neurophenomenology of Consciousness*. Boston: Shambhala New Science Library [in press].

Laughlin, C. D., McManus, J., Rubinstein, R. A. & Shearer, J. (1986) The Ritual Control of Experience. In N. K. Denzin, ed., *Studies in Symbolic Interaction: Part A*. Greenwich, Conn.: JAI Press.

Laughlin, C. D., McManus, J. & Shearer, J. (1983) Dreams, Trance and Visions: What a Transpersonal Anthropology Might Look Like. *Phoenix: The Journal of Transpersonal Anthropology* 7(1/2):141-159.

Laughlin, C. D., McManus, J. & Stephens, C. D. (1981) A Model of Brain and Symbol. *Semiotica* 33(3/4):211-236.

Laughlin, C. D., McManus, J. & Webber, M. (1984) Neurognosis, Individuation and Tibetan Arising Yoga Practice. *Phoenix: The Journal of Transpersonal Anthropology* 8(1/2):91-106.

Laughlin, C. D. & Richardson, S. (1986) The Future of Human Consciousness. *Futures*, June issue, pp. 401-419.

Laughlin, C. D. & Stephens, C. D. (1980) Symbolism, Canalization, and P-Structure. In M. L. Foster & S. Brandis, eds., *Symbol as Sense*. New York: Academic Press.

LeDoux, J. E. & Hirst, W. (1986) *Mind and Brain: Dialogues in Cognitive Neuroscience*. Cambridge: Cambridge University Press.

MacDonald, G. F., Cove, J., Laughlin, C. D. & McManus, J. (1989) Mirrors, Portals and Multiple Realities. *Zygon* [in press].

Rubinstein, R. A., Laughlin, C. D. & McManus, J. (1984) *Science as Cognitive Process*. Philadelphia: University of Pennsylvania Press.

Webber, M., Stephens, C. D. & Laughlin, C. D. (1983) Masks: A Reexamination, or Masks? You mean they affect the brain? In N. R. Crumrine & M. Halpin, eds., *The Power of Symbols*. Vancouver: University of British Columbia Press.

Young-Laughlin, J. & Laughlin, C. D. (1988) How Masks Work, or Masks Work How? *Journal of Ritual Studies* 2(1):59-86.

George Shortess's Neural Art

As an artist/psychologist, I use both computers and traditional art media to create works that explore the relationships among art, perception, and the nervous system. These creations include interactive sculptures, which respond to the position of the viewer, and paintings, which depict realistic images through the overlay of a structured network.

Recently I have been experimenting with the medium of artists' books. The computer-generated image reproduced below—done with Dr. Halo III on a Zenith 151 equipped with a Tecmar Graphics Master Board—is based on a combination of the paintings and books, in the use of words as picture elements. All of my work is conceptually based on the activity of the nervous system, which is its unifying theme.

"LOOKING" by George Shortess (1988)

EVENTS

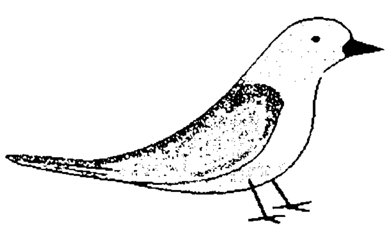
2 March 1989
"Computer Supported Collaborative Work"
Robert Fish
BellCore

Proximity is the most crucial variable in explaining collaborative efforts among office workers. In futurist visions of society, it is often thought that electronic communication should enable people to work with others at great distances, i.e., isolated workers can simply "plug in" to the world. This model of scattered workstations is not yet a reality, however, because presently available electronic media are designed for exchange of formal messages. Yet, it is informal conversations, e.g., chatting in the hallway, dropping into offices, and so on, that seem to account for the large majority of work-related communication during a day.

The speaker described an experimental software, video, and voice system that allows users to "browse" around and "chat" with one another. In this way, the system facilitates long-distance informal interchanges, which, in turn, should increase collabortion among remote workers.

30 March 1989
"Human and Computer Information Retrieval"
Peter Foltz
BellCore

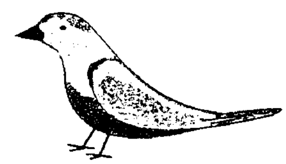
While there has been a great deal of research in the field of information retrieval, the problems of how to design a large database and how to construct queries to retrieve what one wants are often far from trivial. Users often approach these information stores without a precisely defined idea of what they want. As in many problem solving tasks, articulating a precise goal of what to find appears to be a difficult aspect of the task. The presenter discussed how human memory organization can help us in designing computerized information stores.



7 April 1989
"Cross-Cultural Variation, Intracultural Variation, and Expertise in Organismic Similarity Judgment"
James S. Boster
University of Pittsburgh

Recent investigations of patterns of intracultural variation by cognitive anthropologists have been motivated by a number of questions: how is cognition socially shared; how is the product of cognition (knowledge) socially distributed; and how do collective understandings of the world emerge in social groups? One consistent finding of this research is that inter-informant agreement often reflects shared knowledge. In other words, variation is often patterned such that there is a strong consensus on the culturally appropriate response to a query or task and departures from the consensus reflect differences in respondents' opportunities to learn. This insight has been formalized by Romney, Weller, and Batchelder (*Amer. Anthrop.*, 1986) in their cultural consensus model. If individuals share a common culture, their answers are given independently, and their competences are constant over all questions, then the expected agreement between any pair of individuals is simply the product of their competences.

One of the questions that follows from this finding concerns the relationship between patterns of intra- and inter-cultural agreement. When will collective understandings be limited to particular groups and when will they be more generally shared? To help answer this last question, this paper reviews some recent studies examining patterns of intracultural variation in a domain characterized by strong cross-cultural universals: folk biological classification. In each of the seven studies of organismic similarity judgment, concrete stimuli (line drawings, color plates, color photographs, stuffed specimens) of vertebrate species (mammals, dinosaurs, fish, birds) were presented to a variety of informant groups (expert/novice, age groups, regions, cultural groups). Similarity judgments of the organisms were elicited using the triad test, the free pile sort, and the successive pile sort.



The results of the studies were as follows. (1) In all cases, the patterns of inter-informant variation fit the cultural consensus model. (2) The relationship between expertise and competence is variable; sometimes experts clearly have higher competences than novices, sometimes they clearly do not, and sometimes it depends on what we mean by "expertise" and how we treat the data. (3) When "experts" have higher competencies than "novices," they generally also more closely approach the scientific taxonomy. (4) The aggregate is always closer to the taxonomy than is the average individual. (5) Competence tends to be highly correlated with approach to the taxonomy. (6) Competence also tends to be strongly correlated with approach to aggregates of responses of other groups of informants. (7) Aggregates tend to be closer than individuals are; the level of intra-cultural variation is much larger than the level of cross- cultural variation. It appears that all groups of informants are aiming at similar targets.

These results suggest that when learning opportunities are freely available, culturally diverse groups of informants can converge on a single consensus; they can share "culture" without the benefit of soial

(continued on page 7)

contact. It is ironic that cultural consensus model may work best when information is not culturally transmitted. However, experience and expertise can make a difference: if what experts learn reinforces the judgments one would make on the basis of morphological criteria, then experts will agree more than novices. On the other hand, if expertise leads to acquisition of numerous alternate bases of judgment, the truth will set the experts free; they will vary in their responses to the similarity judgment task as much as novices.

13 April 1989
"Multi-Domain Semantic Theory"
John F. Sowa
IBM Systems Research

Wittgenstein's theory of language games has major implications for both computational linguistics and semantic theory. It suggests that the ambiguities of natural language are not the result of careless speech by uneducated people. Instead, they result from the fundamental nature of language and the way it relates to the world: language consists of a finite number of words and related lexical patterns that are used to express a potentially unlimited number of things, events, and situations as well as people's reactions and intentions towards them. To accommodate multiple language games that all use and re-use the same lexical resources, this talk suggests a multi-domain semantic theory. The central question is how a limited vocabulary can be adapted to such a complex, changeable world. The proposed answer is that the words are associated with a fixed set of lexical patterns, whose meanings vary from one conceptual domain to another. By means of metaphor and conceptual refinement, those lexical patterns can be modified and adapted to construct an unlimited number of conceptual patterns.

3 May 1989
"Connectionism and Computationally Effective Knowledge and Reasoning"
Lokendra Shastri
University of Pennsylvania

Any generalized notion of inference is intractable, yet we are capable of drawing a variety of inferences with remarkable efficiency. These inferences are by no means trivial and support a broad range of cognitive activity such as classifying and recognizing objects, understanding spoken and written language, and performing common sense reasoning. Any serious attempt at understanding intelligence must provide a detailed computational account of how such inferences may be drawn with requisite efficiency.

The speaker discussed some work within the connectionist framework that attempts to offer such an account. The discussion was grounded in two connectionist systems that represent structured knowledge and perform precise inference based on this knowledge with extreme efficiency:

(1) A connectionist semantic memory that computes optimal solutions to inheritance and recognition problems in time proportional to the depth of the conceptual hierarchy. This connectionist formulation leads to a principled treatment of exceptions and multiple inheritance, as well as recognition based on partial information.

(2) A system that represents knowledge in terms of rules and facts and draws a class of inferences in time proportional to the length of the proof. This system incorporates a solution to the "variable binding" problem.

5 May 1989
"Reasoning about the User's Plans and Goals in Natural Language Information Systems"
Sandra Carberry
University of Delaware

An information system's ability to provide cooperative responses is enhanced if the system builds a model of the user incrementally as the dialogue progresses. One of the most important components of a user model is a representation of the system's beliefs about the underlying task-related plan that motivates the information-seeker's queries. Dr. Carberry described a model of plan inference for information-seeking dialogues, illustrated how reasoning on such a model can enhance the ability of a natural language system to understand problematic utterances, and discussed the limitations of current models of plan inference as well as research directed toward overcoming these deficiencies.

MEETINGS OF INTEREST

Bar-Ilan Symposium on the Foundations of Artificial Intelligence

Bar-Ilan University will hold its first "Symposium on the Foundations of Artificial Intelligence" on June 19-21, 1989. The Symposium is intended to become a bi-annual event which will focus on a range of topics of concern to scholars applying quantitative, combinatorial, logical, algebraic, and algorithmic methods to AI areas as diverse as decision support, automatic reasoning, knowledge-based systems, machine learning, computer vision, and robotics.

For further information, Dr. Ariel Frank, BISFAI-89, Dept. of Mathematics and Computer Science, Bar-Ilan University, Ramat Gan, Israel (ariel @ bimacs.bitnet).

International Joint Conference on Neural Networks

The 1989 IEEE/INNS International Joint Conference on Neural Networks (IJCNN-89) will be held at the Sheraton Washington Hotel in Washington, D.C., from June 18-22, 1989. IJCNN-89 is the first conference in a new series devoted to the technology and science of neurocomputing and neural networks in all of their aspects. The series replaces the previous IEEE ICNN and INNS Annual Meeting series and is jointly sponsored by the IEEE Technical Activities Board Neural Network Committee and the International Neural Network Society (INNS).

For details, write to Nomi Feldman, IJCNN-89 Conference Coordinator, 3770 Tansy Street, San Diego, CA 92121, or phone (619) 453-6222.

Association for Computational Linguistics Annual Meeting

The annual meeting of the Association for Computational Linguistics will be held June 26-29,

(continued on page 8)

Meetings (cont.)

1989, at the University of British Columbia in Vancouver, Canada. For information, contact Julia Hirschbert, AT&T Bell Laboratories, 2D-450, 600 Mountain Avenue, Murray Hill, NJ 07974.

International Conference on Cognitive Neuropsychology

The International Conference on Cognitive Neuropsychology, sponsored by the British Psychological Society Cognitive Section, will be held in the Cairn Hotel, Harrogate, England, on July 20-23, 1989. Topics include memory, language disorders, reading and writing disorders, visual recognition, attention, action and movement, childhood disorders, and remediation. For additional information, contact John Beech and Ann Colley, Conference Organizers, Dept. of Psychology, Univ. of Leicester, Leicester LE1 7RH, England.

11th Annual Conference of the Cognitive Science Society

The Cognitive Science Society's 11th annual conference will be held Aug.16-19, 1989, at the University of Michigan in Ann Arbor, Michigan. The conference will feature symposia and invited speakers on such topics as induction, decision theory, situated cognition, applications of cognitive science, language processing, problem solving, cognitive development, and parallel distributed systems. This year, for the first time, a pre-conference tutorial will be offered, with David Rumelhart and Jay McClelland providing an overview of connectionist research. For more information, contact Gary M. Olson via telephone at (313) 747-4948 or e-mail at gmo @ csmil.umich.edu.

9th Distributed Artificial Intelligence Workshop (sponsored by AAAI)

Distributed Artificial Intelligence deals with cooperative solutions to complex problems by decentralized groups of intelligent agents. The central problem in this field is a design of organizations that promote effective cooperation among the agents: organizations that enable rather than hinder synergy, where the interaction among agents achieves more than the agents individually.

The workshop will be held Sept. 12-14, 1989, at Rosario Resort, Orcas Island, Washington. For further information, write to Miroslav Benda, Knowledge Systems Lab, Boeing M/S 7L-64, P.O.Box 24346, Seattle, WA 98124, or phone (206) 865-3244.

1989 Annual Meeting of the Psychonomic Society

The dates of the annual meeting of the Psychonomic Society for 1989 have been changed. The meeting will be held in Atlanta, Georgia, on Nov. 17-19 (changed from Nov. 10-12).

IEEE Conference on Neural Information Processing Systems

This is the third inter-disciplinary conference on natural and synthetic neural information processing systems. Plenary, contributed, and poster sessions will be held on Nov. 27-30, 1989, in Denver, Colorado. Several days of focused workshops will follow at a nearby ski area. Mail requests for further information to Kathie Hibbard, NIPS89 Local Committee, Engineering Center, Campus Box 425, Boulder, CO 80309-0425.

Cognitive Science Program
Lehigh University
Price Hall, Bldg. 40
Bethlehem, Pennsylvania 18015
U. S. A.

Non-Profit
Organization
U.S. Postage
PAID
Bethlehem, Pa.
Permit #230