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Language, Vision, and Music

Report on the Eighth International Workshop on the Cognitive Science of Natural Language Processing (CSNLP-8)

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Occurring during the solar eclipse of 1999, the Eighth International Workshop on the Cognitive Science of Natural Language Processing (CSNLP-8) was a success. The delegates enjoyed not only the academic content but also the surplus of social events and expressed their congratulations on the program and organization. CSNLP-8 attracted a large number of delegates and papers from abroad, including many from Britain, Europe, the United States, and Asia.

CSNLP-8 was hosted by the Information Technology Centre at the National University of Ireland (NUI) Galway, Ireland, The Cognitive Science Society of Ireland (CSSI), and the Artificial Intelligence Association of Ireland (AI)^2, in cooperation with IntelliMedia 2000+, Aalborg University, Denmark. It was run just before "MIND-IV: Two Sciences of Mind," the Annual Conference of the Cognitive Science Society of Ireland (CSSI), at Dublin City University, Dublin, Ireland, 15–18 August.

CSNLP-8 was advertised internationally to mail groups and on usenet as well as by placing information at the Information Technology Centre, NUI Galway, on the World Wide Web. Paul Mc Kevitt was program chair for CSNLP-8, with Conn Mulvihill and Micheal Colhoun as local organization chairs and Seán Ó Nualláin as the general chair for CSNLP. More details on the workshop are available at www.it.ucg.ie/csnlp8.

The Information Technology Centre at NUI Galway has a research focus on cognitive science and AI, with research on topics such as creativity, natural language processing, robotics and embedded systems, information filtering and retrieval, image processing, and human-computer interaction. The workshop was held in the lecture room (oratory) of the St. Anthony's College building, which was used as a seminary in previous years; it was appropriate for this event, which had numerous religious leanings.

■ Language, vision, and music: What common cognitive patterns underlie our competence in these disparate modes of thought? Language (natural and formal), vision, and music seem to share at best the following attributes: a hierarchical organization of constituents, recursivity, metaphor, the possibility of self-reference, ambiguity, and systematicity. Can we propose the existence of a general symbol system with instantiations in these three modes, or is the only commonality to be found at the level of such entities as cerebral columnar automata?

The Program

The Program Committee for CSNLP-8 consisted of about 80 members from Ireland and abroad, including a large number of internationally renowned researchers. CSNLP-8 had 4 invited speakers, 30 papers split into 9 oral sessions (multimodal communication interfaces, multimodal communication and music, multimodal system formalisms and architectures, language and vision, language and music, language and music [semantics], synaesthesia, and creativity I and II), a panel session (on creativity), and 5 poster sessions.

Of note in his presentation entitled "Tonality in Irish Traditional Music," Ó Nualláin argued that Irish music is modal, and instead of having a triad of 1-3-5, that is, a major and minor chord, it relates to a single note, a center of tonality. He hastened to add that none of the music associated with the *Riverdance* dance show is traditional Irish music! Mc Kevitt presented the CHAMELEON system from Aalborg University, Denmark, which is a general platform for performing the integration of speech and image processing. CHAMELEON has an application where people can ask questions about two-dimensional building plans such as "Whose office is this?" Mc Kevitt introduced his presentation by showing a postcard from his mother that had a picture of the Brian Boru harp, a fiteenth- or sixteenth-century harp that is the oldest surviving Irish harp and on which the national government seal of Ireland (the harp) is based; Mc Kevitt noted that many states rather have birds or animals as their government seals. He also showed a picture of the Irish 10 pound note on which there is a picture of James Joyce (1882–1941). Finally, Mc Kevitt blessed the workshop proceedings with some sprinklings of Irish whiskey.

Invited Papers

We had a distinguished group of invited speakers from both Europe and the United States: Sheldon Klein (Computer Sciences Department and Linguistics Department, University of Wisconsin at Madison, www.cs.wisc.edu/~sklein/sklein.html), Stephen Nachmanovitch (Free Play Productions, Los Angeles, California, www.freeplay.com), Gerard Sabah (LIMSI-CNRS, Orsay, France, www.limsi.fr/Individu/gs/), and Ipke Wachsmuth (Faculty of Technology, University of Bielefeld, Germany, www.techfak.uni-bielefeld.de/~ipke/).

Sheldon Klein currently teaches

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courses on natural language and multimedia and analogy in language, culture, and cognition. His paper, entitled "The Analogical Foundations of Creativity in Language, Culture, and the Arts: The Upper Paleolithic to 2100CE,'' proposed that real-world knowledge systems might have evolved in forms that make combinatoric processing problems linear because of the combinatoric problems associated with unrestricted models of human language processing. Klein's presentation was during a creativity session on Wednesday, 11 August, at the maximum of the solar eclipse.

Stephen Nachmanovitch is an author, musician, computer artist, and educator. Nachmanovitch gave three presentations: (1) "The Computer and the Violin," (2) "Visual Music Tone Painter (Synesthesia Software)," and (3) "Creativity: Stone and Lava." "The Computer and the Violin'' focused on the range of experiences that are captured in analog and digital media in musical, visual, and verbal art forms. Nachmanovitch noted that with each kind of coding and each kind of practice, we gain something and lose something. He points out that various codings and practices explain why there are so many arts and not just one, many sciences, many religions, many languages and cultures. He asked the question, "How does the medium you choose affect your thoughts and feelings?" With "Visual Music Tone Painter (Synesthesia Software)," Nachmanovitch demonstrated visual music tone painter, a new art form that merges sound, light, and touch. The user uses the program to paint with sound. The visual forms respond not only to pitch but also to finger pressure, and musical dynamics are reflected through visual transformations in size, movement, hue, saturation, and value. The work taps into a tradition dating back to Pythagoras, where the interrelations of sound, color, and form are reflections of archetypal number patterns, giving us a feel for the underlying spiritual unity of our universe.

"Creativity: Stone and Lava" focused on creativity, which Nachmanovitch said, like life itself, is a balancing act. We melt down structures that are too settled or habitual and solidify intuitions that are too loose and incohate—a flux of give and take between lava and stone. Nachmanovitch pointed out that this is why the archetype of the creative personality is often portrayed as a blacksmith or an alchemist: heating, reshaping, hammering, cooling molten metal. Being too rigid makes us tyrants wrapped up in conformity and fear, and being too loose, our dreams remain unrealized. Nachmanovitch drew on material from William Blake, Buddhism, Taoism, and the history of Western music and other traditions. This third presentation was during another creativity session on Wednesday, 11 August, when the solar eclipse was ongoing. He made reference to the eclipse a number of times, showing pictures of lions eating the sun, which heralded "a new beginning." Nachmanovitch's presentations brought a lot of life to the workshop, and his style of presentation was lively, showing mainly pictures through slide presentation to make his points.

Gérard Sabah's presentation entitled "The Respective Role of Consciousness and Subconscious Processes for Interpreting Language and Music" focused on the CARAMEL architecture, which was developed to account for three aspects of natural language understanding: (1) dealing on the fly with unpredictable situations; (2) simulating unconscious (automatic) processes; and (3) dealing with true semantics (not only formal), with consciousness as a bridge between the preceding aspects. He summarized the architecture; provided neurological and computational evidence for its validity; and pointed out the commonalities between language, vision, and music. He took the example of a musician, showing how CARAMEL can mimic some of the underlying processes; the example involved interpretation and production as well as vision, hearing, and gesture. CARAMEL has a new data structure, the SKETCHBOARD, an extension of the blackboard, allowing different modules to collaborate while solving a problem; this format allows feedback from higher levels to lower ones without requiring any explicit control.

Ipke Wachsmuth's presentation entitled "Communicative Rhythm in Gesture and Speech'' focused on the fundamental role that rhythms apparently play in speech and gestural communication among humans. Wachsmuth focused on how multimodal interfaces are conceptualized on the basis of timed agent systems and how multiple agents are used to poll presemantic information from different sensory channels (speech and hand gestures) and integrated into multimodal data structures that can be processed by application systems. Wachsmuth presented work that exploits rhythmic patterns in the development of biologically and cognitively motivated mediator systems between humans and machines. He covered a number of projects at his laboratory in Bielefeld as well as the large SFB-360 project, "Situated Artificial Communicators." This project focuses on the integration of speech, vision, and robotics, demonstrating the importance of rhythm in systems. Mc Kevitt pointed out when he introduced Wachsmuth that the SFB-360 project's focus is on intelligent multi-

media and that this project is one of the largest projects in this area in Europe, if not in the world. Wachsmuth gave an exciting presentation, bringing in examples of music from the Irish Rock musician Rory Gallagher and an example video of Marvin Minsky gesturing fervently to demonstrate rhythm.

Plenary Panel Session: What Is Creativity?

The panel session on creativity was held in the afternoon of the solar eclipse on Inis Mor (Big Island), the largest of the Aran Islands. Members of the panel were Sean Day, Sabah, Wachsmuth, Paul Hodgson, Julia Lonergan, Nachmanovitch, Mc Kevitt, Klein, Riccardo Antonini, Francisco Camara Pereira, Colhoun, and Mulvihill.

Mulvihill asked a number of questions on creativity in the call for papers, the central one being "What is creativity?" He also contributed a paper on creativity and asked the question, "Is creativity algorithmic?" Mulvihill used these two questions to kick off the panel discussion as well as sang the song *Raglan Road*, the words of which were written by the poet Patrick Kavanagh and the tune of which is *The Dawning of the Day*. Mulvihill's paper points out that any language is taken to be characterizable through form and content, and creativity occurs where form and content mix. Paradoxes mix form and content in a special way, and ambiguity and diagonalization appear where form and content mix, whereas algorithmic studies are mainly concerned with space-time metrics and not with form-content interplay. It is posited in the paper that any language-supporting creativity should mix form and content and be marked by ambiguity and reflective arguments; hypertext might be considered an example.

Local Organization

Local organization was coordinated by Mulvihill and Colhoun, who, together with Josephine Griffith and Colm O'Riordan, made up the local organizing committee. Mulvihill and Colhoun took responsibility for social events; Colhoun also focused on equipment and web pages and Mulvihill on accounts. Griffith dealt with registrations and accommodations, and O'Riordan worked on the proceedings and the participants list. The registrar and deputy president (now the president), Iognáid Ó Muircheartaigh started off the workshop with a light-hearted introduction, welcoming all the delegates in both Irish and English.

The workshop had many attendees from abroad, and we hope that this trend will continue so that CSNLP remains an international meeting. We had around 50 delegates for CSNLP-8, a large number for a focused workshop, which made this meeting the largest ever. We were glad that delegates such as Glorianna Davenport, Paul Nemirovsky, and Kris Thórisson from the MIT Media Lab, who are leaders in intelligent multimedia, were able to come, especially now that MIT MediaLabEurope is established in Dublin, Ireland, and funded initially with IR28 million pounds by the Irish government (see www.mle.ie). A full picture gallery for the workshop is available at www.it.ucg.ie/csnlp8, and clips from Davenport's camcorder are available at wwwic.media.mit.edu /About_IC/GID-Iceland/ and viewable with REAL PLAYER, which can be downloaded from www.real.com.

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