EUROPEAN SCIENCE FOUNDATION
SETTING SCIENCE AGENDAS FOR EUROPE

Exploratory Workshop Scheme

Standing Committee for the Humanities (SCH)

ESF Exploratory Workshop on

The Communication Of Deaf-Blind People As A Model For Exploring Language Modality, Social Communication, And Neural Plasticity

London (UK), 5-7 November 2009

Convened by:

Bencie Woll

SCIENTIFIC REPORT

Co-sponsored by

DCAL
ESRC DEAFNESS COGNITION AND LANGUAGE RESEARCH CENTRE

1. EXECUTIVE SUMMARY

The *Workshop on the Communication of Deaf-Blind people as a Model for Exploring Language Modality, Social Communication, and Neural Plasticity* took place in London from 5-7 November 2009, organised by Professor Bencie Woll of the Deafness Cognition and Language Research Centre at University College London. The theme of the workshop was to explore the communication of deaf-blind people as a model of human communication in which questions about the relationship of language structure to modality, the relationship of neural processing of language to the channels of communication, and the social dimensions of communication could all be explored. Most of the studies used as participants people with Usher syndrome, a condition in which congenital or early deafness is accompanied by progressive visual loss. About 1 in 7 children with prelingual deafness have Usher syndrome. The workshop brought together researchers working in a broad range of disciplines ranging from functional imaging of tactile communication through cognitive psychology to linguistics, with the aim of jointly developing an agenda for research. Participants came from Britain, Finland, France, Italy, the Netherlands, Norway, Sweden and the USA.

The workshop took place over 2 ½ days and was organised in 4 sections: Linguistics; Interaction and Turn Taking; Space; and the Brain, Sensory Input and Feedback. Each section consisted of presentation and discussion of a set of papers together with a commentary by a researcher from outside the field of deaf blind communication. There was a final session which explored agenda-setting for future research. As well as the formal activities of workshop sessions, the group were invited to a reception in their honour hosted by SENSE – the UK national association for deaf-blind people. As a number of participants and presenters were deaf or deaf-blind themselves, interpretation was provided in several sign languages. The workshop was attended throughout by Professor Carmen Picallo Soler of the ESF Standing Committee for the Humanities, who provided valuable support and advice.

2. SCIENTIFIC CONTENT OF THE EVENT

Session 1. Linguistics

This session comprised 3 presentations, all concerned with research on the relationship between language and modality. Dively & Petronio's paper showed how research on tactilely received sign language (TSL) could assist in rethinking analyses of grammar in visually received sign language (VSL), in relation to which modalities were used for conveying information. They had hypothesised that deafblind signers would use overt interrogative signs (e.g. signs marking sentences as questions) rather than by visual prosody (facial expression) as sighted signers do. However, by examining a corpus with a large number of Tactile ASL questions, they found that 89% of yes-no questions did not contain the manual question signs Q-wg or QUESTION. The fact that questions in Tactile ASL occur without a question or a wh-sign raises the question of how Deaf-Blind signers are able to identify questions. This in turn led them to re-examine the structure of questions in both Tactile ASL and visual ASL. In this presentation, we describe several common patterns and features of questions occurring in both the ASL and Tactile ASL data, and posit that it is these patterns and features, often in combination with the interrogative signs, that are used by Tactile ASL users to identifying questions.

Cecchetto et al also studied interrogatives, in Tactile Italian Sign Language (LISt). Their research indicated that linguistic study of LISt could provide insights into processes of language change, in particular, – grammaticalisation. They found occurrences in LISt of WHAT in domains unattested in LIS. Apart from standard *wh*-questions, WHAT was also found in yes/no questions, disjunctive questions and replacing or co-occurring with another *wh*-sign. They suggested that, in addition to its standard use as a regular interrogative pronoun, WHAT has become a generic marker for interrogative sentences, an instance of a commonly attested process in natural languages by which grammatical morphemes develop from lexical morphemes.

Viita presented a brief note on modality issues in relation to language: comparing written Finnish, Visual Finnish Sign Language and Tactile Finnish Sign Language. In the discussion session, Baker

summarised the talks and identified the questions which would form the basis for future research in this area, including the need for corpus-based research to identify linguistic features of both VSL and TSL.

Session 2. Interaction and Turn-Taking

The papers in the second session were concerned with how interaction is regulated when vision is not available for this purpose. Raanes started with a description of the methodological challenges posed when studying TSL interaction. She used a number of different methods, including video analysis and discussion of primary findings with informants. She provided evidence for the value of an approach taking both a sociocultural and dialogic framework, as it helped focus attention on sub-elements comprising turn taking and channels for perception of feedback signals. The research was specifically concerned with the physical elements of tactile communication, including the use of signing space and variation in feedback signals. The possibility of simultaneously producing and receiving sign language tactilely was discussed, leading to a theory of the role of simultaneous and partly co-constructed communication as important elements of conversation.

Mesch described variants in turn-taking building on her earlier research on tactile communication where signers use both hands for production and perception in the conversational dyad. In this paper she described one-handed signing, a particularly complex form of interaction to master. In this, one participant uses the left hand both for producing and receiving signing and the other uses her right hand for both. She compared turn-taking in three different types of deafblind signing: using one hand, two hands, or signing within a reduced visual field (tunnel vision), describing types of feedback signals used in conversational regulation, and management of turn-taking.

Schwartz also looked at turn-taking, but in terms of interactional synchronisation. She demonstrated that tactile French Sign Language (LSFT) is not a mere adaptation to receptive constraints, but that the tactile modality generates the emergence of communicational strategies, some of which are not attested in either VSL or spoken languages.

The final talk in this session was by Lahtinen, who moved on to applications of research by introducing intervention using *Haptices (*messages shared by touch on the body*) and haptemes* (grammatical variables related to touch) to convey environmental information interactively by adapting visual and auditory information to touch.

Campbell acted as rapporteur with a discussion of the elements of face-to-face communication, and how studies of deaf blind communication could illuminate how interaction, turn-taking and discourse are managed in all conversation. Discussion included issues such as linguistic and pragmatic perspectives and ethical considerations regarding exchange of research materials or open access to datasets.

Session 3. Space

This session was concerned with representations and uses of space in deafblind signing. Petronio summarised research on the effects of modality on language: the differences between use of the visual modality (sign languages) and the aural modality (spoken languages), in particular, how space is used for linguistic purposes in sign languages. These include: articulatory space – the location that is part of a signs phonological form; real space – the actual physical environment that is around the signer; surrogate space – typically life-size imaginary entities that the signer can 'become' and/or can interact with; depicting space – the space that represents objects in space using classifiers; and token space - the type of space that is often used for contrasting and comparing abstract entities.

Signers quickly and easily switch in and out of these different types of space and create blends that include more than one type. Liddell and others have argued that the use of a visual/gestural modality allows for the 'linguistic/grammatical' part of a language to interact and overlap with other cognitive systems.

Petronio addressed several questions that arise in relation to representations of space in deafblind signers through an analysis of the use of different types of space: What happens to the use of space

when American Sign Language is articulated within a restricted area (e.g. for someone with tunnel vision) or articulated tactilely? Will the same types of space be used as when signing using visual/gestural mode? If there are differences, what are these differences and do they impact the grammar of the language? Are there differences between Deaf-Blind signers who have Ushers Syndrome and learned VSL before they became blind compared to the use of space by Deaf-Blind signers who learned to sign tactilely?

Morgan and colleagues also looked at uses of space in the signing of people with Usher syndrome who had reduced visual fields, with a focus on how in narratives, signers use locations in signing space for person and object reference, and how characters in events are represented through facial expression and movement of the head and upper body. Their study explored the use of space and role play for discourse functions in Frog story narratives by signers with Usher syndrome and normally sighted signers. Analysis focused on the amount of information expressed across the narratives, the use of space for person and object reference, pointing, facial expression and use of classifiers.

Quinto-Pozos described the use of eyegaze in relation to space in deaf-blind signing. He found that the use of deictic points by signers with no use of vision was notably different than the use of points by signers with normal sight. Deafblind participants in the study used deictic points much less than normally sighted Deaf participants, and the use of pointing was primarily limited to second person singular reference within a quoted passage. However, they did use other methods of deictic referencing. These findings were sited within a broader discussion of the use of eyegaze in signed language for marking locations within the signing space and leads to consideration of whether loss of vision changes sign language grammars with regard to the use of space.

Woll, Rentelis and Gazarian's presentation complemented Quinto-Pozos. They compared uses of space for linguistic purposes in a task involving description of arrays of toys by deaf-blind signers and by normally sighted signers wearing blindfolds. The deafblind group showed differences in uses of pointing and reference marking using classifiers – suggesting that the differences were not directly related to inability to see while signing, but to longer term changes in the ability to create mental representations using vision.

The commentary by Sotaro Kita considered the role of vision in creating mental representations of spatial relationships, addressed commonalities between language and gesture in terms of representation and suggested that an integrated approach would provide important insights across these different areas of research.

Session 4. The brain

The final session was concerned with the brain, sensory input and feedback. Two papers, Emmorey and Arena & Woll considered the role of visual feedback in signing. Emmorey reported on a study comparing the size of signing space during conversations and narrative monologues for normally sighted signers, signers with tunnel vision due to Usher Syndrome, and functionally blind signers. Signers with tunnel vision produced a greater proportion of signs near the face than blind and normally sighted signers, who did not differ from each other. She hypothesised that signers use visual feedback to phonetically calibrate the dimensions of signing space, rather than to monitor language output.

Arena and Woll directly compared a quantitative measure of the space that signers use in conversation with individual signers' visual fields to test the calibration hypothesis. They found that the size of signing space directly reflected the size of the visual field, with signing crossing in and out of the periphery of vision, rather than occurring entirely within the visual field.

The final two papers were studies using functional imaging techniques. Capek described a study using fMRI to explore the neural correlates of language processing in signers with tunnel vision as a result of Usher Syndrome, processing fingerspelling (representation of English words using a manual alphabet) in two modalities: visually and manually. They found a common network for language

processing independent of the modality through which it is perceived as well as regions that are modality-dependent. The findings also provided evidence of cortical plasticity for language processing in visually impaired individuals.

Levanen discussed theories of brain function. Traditionally, the sensory areas of the brain were believed to be exclusively devoted for processing of sensory information from one set of sensory organs, *i.e*., uni-modal. Increasing evidence from both animal and human studies now suggest that even the very primary sensory cortices have the capacity to process information from the other modalities. She reviewed recent imaging studies on congenitally deaf adults showing that the deaf 'auditory' cortex can process both visual and tactile information. Her research on both vibratory tactile and visual movement processing suggests that the deaf "auditory" cortex is part of a multimodal spatially distributed neural network that encodes and maintains temporal information, concluding with the hypothesis that cortical functional plasticity was based on the processing demands of the incoming input rather than on the modality of the input.

The discussion was led by Sereno, who reviewed neuroscience research related to language processing and indicated the important contribution that research on deaf and deaf-blind communication could make to our understanding not only of language processing but of neural plasticity in general.

3. ASSESSMENT OF THE RESULTS, CONTRIBUTION TO THE FUTURE DIRECTION OF THE FIELD

A final session drew together the themes of the 4 sessions and discussed the setting up of a network for research in this field. There was wide agreement among the participants of the value of the workshop. This was the first ever meeting for researchers in this field, who are widely scattered and are often the only person in their country working in this area of research. Additionally, because the incidence of Usher syndrome is only about 1 in 7000 births, it is often difficult for researchers using experimental methodologies to access sufficient research participants. Pooling of expertise and participant databases across Europe can reduce this problem; collaboration across research disciplines will enable the emergence of new research questions, which can then be tested using the different research methodologies represented at the Workshop. There was enthusiasm for using the Workshop as a springboard for the creation of a network to achieve these aims, and this will be a priority for participants in the coming year. Issues of disability access should also be mentioned. It was noted that to ensure full participation of researchers who are deaf or disabled in activities such as European workshops and networks, that there is a need for a budget line to support additional costs incurred (such as interpreters and guides). Where such costs – which can be substantial – for example, where there are deaf participants from different countries using different sign languages – the budget available for science activities is considerably reduced if costs must be included in general network or workshop costs.

The participants in the workshop look forward to the challenge of developing this research field, building research capacity and collaborating in the future. We are grateful to the European Science Foundation for its support.

4. PROGRAMME

Thursday, 5 November 2009

Morning	Arrival
12.30 – 13.30	*Informal and optional lunch at DCAL*
14.00 – 14.20	**Welcome by Convenor in the Franks Room, Wellcome Collection Conference Centre** **Bencie WOLL** (DCAL, University College London, UK)
14.20 – 14.40	**Presentation of the European Science Foundation (ESF)** **Carmen PICALLO SOLER** (Universidad Autónoma de Barcelona Spain, Member of the ESF Standing Committee for the Humanities)
14.40 – 17.30	**Afternoon Session: Linguistics**
14.40 – 15.10	**Presentation 1 What are Indicators of Questions in ASL and Tactile ASL,** **Valerie DIVELY** (Gallaudet University, USA) & **Karen PETRONIO** (Eastern Kentucky University, USA)
15.10 – 15.30	*Coffee / Tea Break*
15.30 – 16.10	**Presentation 2 Question formation in LISt: a case of grammaticalization?** **Carlo CECCHETTO** (Università degli Studi di Milano-Bicocca, Italy) & **Alessandra CHECCHETTO** (Lega del Filo d'Oro, Milan, Italy)
16.10- 16.25	**Presentation 3 Effects of contact with Finnish Sign Language on Written Finnish** **Heli VIITA** (Finnish DeafBlind Association Resource Centre, University of Tampere, Finland)
16.25 – 16.45	*Break*
16.45 – 17.20	**Comment** **Anne BAKER** (University of Amsterdam, Netherlands)
17.20 – 17.50	**General discussion**
18.30 – 20.00	*Reception : SENSE, 101 Pentonville Road, London N1 9LG*

Friday 6 November 2009

09.30 – 13.00	**Morning Session: Interaction and Turn-Taking**
09.30-10.00	**Presentation 1 Simultaneous adjustment and negotiations in a tactile modality: Findings from conversations with users of Tactile Norwegian Sign Language** **Eli RAANES** (University College of Sør-Trøndelag, Trondheim, Norway)
10.0-10.30	**Presentation 2 Variations of turn-taking systems in tactile signing** **Johanna MESCH** (University of Stockholm, Sweden)
10.30-10.50	*Coffee / Tea Break*

10.50-11.20	**Presentation 3 Interactional synchronization in dialogues between deafblind users of tactile French Sign Language** **Sandrine SCHWARTZ** (CNRS / Université Paris 8, France)
11.20-11.50	**Presentation 4 Haptices and haptemes - environmental information through body and touch** **Riitta LAHTINEN** (The Service Foundation for the Deaf, Helsinki, Finland)
11.50 – 12.00	*Break*
12.00 – 12.30	**Comment** **Ruth CAMPBELL** (University College London, UK)
12.30 – 13.00	**General Discussion**
13.00 – 14.00	*Lunch*
14.00 - 17.30	**Afternoon Session: Space**
14.00 - 14.30	**Presentation 1 Types of space used when signing tactually** **Karen PETRONIO** (Eastern Kentucky University, USA)
14.30 - 15.00	**Presentation 2 Use of space for discourse functions in narratives produced by signers with and without Usher syndrome** **Gary MORGAN[1], Sarah REED, Joanna ATKINSON[2], Sotaro KITA[3] & Bencie WOLL[2]** ([1]City University London, UK [2]University College London, UK ; [3] University of Birmingham, UK)
15.00 - 15.20	*Tea / Coffee Break*
15.20 - 15.50	**Presentation 3 The role of eyegaze for aspects of the use of space** **David QUINTO-POZOS** (University of Texas, Austin, USA)
15.50 - 16.20	**Presentation 4 The role of vision in sign language** **Bencie WOLL, Karine GAZARIAN & Ramas RENTELIS** (University College London)
16.20 – 16.30	*Break*
16.30 - 17.00	**Comment** **Sotaro KITA** (University of Birmingham, UK)
17.00 – 17.30	**General Discussion**
19.00	*Dinner – Carluccio's, 1 The Brunswick, Bloomsbury, London, WC1N 1AF*

Saturday 7 November 2009

09.30 – 13.00	**Morning Session: The Brain, Sensory Input and Feedback**
09.30-10.00	**Presentation 1 The use of visual feedback during signing: Evidence from signers with impaired vision** **Karen EMMOREY** (San Diego State University, USA)
10.0-10.30	**Presentation 2 What is the relationship between visual field and signing space?** **Valentina ARENA** (City University London, UK) & **Bencie WOLL** (UCL, London, UK)
10.30-10.50	*Tea / Coffee Break*
10.50-11.20	**Presentation 3 The neural organisation of visual and manual language processing in adults with Usher Syndrome: FMRI evidence of cortical plasticity** **Cheryl CAPEK** (University of Manchester, UK)

11.20-11.50	**Presentation 4 What's going on with/in the deaf "auditory" cortex?** **Sari LEVANEN** (The Finnish Federation of Hard of Hearing, Helsinki, Finland)
11.50 – 12.00	*Break*
12.00 – 12.30	**Comment** **Marty SERENO** (Birkbeck School of Psychology, London, UK)
12.30 – 13.00	**General Discussion**
13.00 – 15.00	*Lunch*
15.00 - 17.30	**Final session: discussion on networking and collaboration** **END OF WORKSHOP**
19.00	*Dinner- The Perseverance, 63 Lamb's Conduit St London, WC1N 3NB*

5. Confirmed List of Participants

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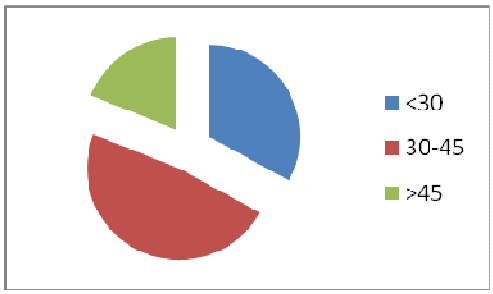
6. STATISTICAL INFORMATION ON PARTICIPANTS

The age structure of the Workshop was well-balanced. The pie chart below shows the distribution across 3 age groups: under 30; 30 – 45; and over 45. There were 16 women participants, and 5 men.



The participants came from 8 countries: Britain, Finland, France, Italy, the Netherlands, Norway, Sweden and the USA, representing 11 countries of origin: Britain, Canada, Finland, France, Italy, Japan, Lithuania, Mexico, Norway, Sweden, and the USA. Three presentations were by PhD students; one each from Britain, France and Finland.