Investigating the dual function of gesture in blind and visually impaired children

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Introduction

GESTURE IN BLINDNESS

Blind and severely visually impaired children and adolescents gesture at a rate similar to that of their seeing peers (1).

We considered two hypotheses regarding the reasons behind gesture production (2):
- gestures serve a communicative purpose
- gestures support the process of inferencing and aid speech production

And two levels of hypothesised gesture origin:
- spontaneous
- learned (culturally transferred).

Question(s)

DUAL FUNCION OF GESTURE

If we assume dual function of gesture, does the division between **spontaneous and learned gesture** translate to the division between gestures for inferencing and gestures intended to facilitate the understanding of the listener?

How does one distinguish between spontaneous and acquired gestures for this purpose?

In order to weed out learned (socially conditioned) gesture our participants were blind or severely visually impaired from birth, which necessarily limited their exposure to visual gestural cues.

Hypothesis

If the division between innate and learned gesture mirrors the division between gesture for inferencing and gesturing to improve communication **we should see a decreased or unchanged gesture rate from the blind participants in the dialogue condition** (gesturing for the interlocutor) as compared to the monologue condition (gesturing for inferencing).

Method

Participants:
Interviews conducted in Polish with 12 blind and seeing impaired children and young adults:
- two age groups (19-16 and 7-11 years old)
- 7 females, 5 males
- no known other cognitive deficits

Conditions analysed:
- **monologue** (participant is asked to reflect on a concept and explain it to a computer)
- **dialogue** (computer asks the participant for additional information, for instance „show me what it's like", „show me where to find it")

Procedure:

A psyscript based programme was designed to interact with the participants on an audio-only basis. No visuals were used to avoid confounding data due to varying visual sensitivity of the subjects (light perception, full blindness, contrast perception etc.)

Participants were asked to „teach" the computer a number of concepts using words and gestures. The concepts were either abstract or concrete.

Location
the experiment was conducted in surroundings familiar to the blind participants in order to empower them to use gesture (otherwise they might fear hitting an object or hurting themselves)

Control group:
A follow up control group study is scheduled to be conducted in September 2012
- the control group will be age and gender matched students

Stimuli

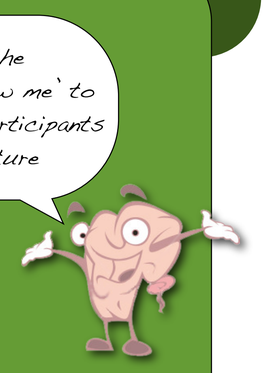
Concrete and abstract concepts tested for understandability, frequency and tangibility in the course of a previous study (3)
- 21 abstract concepts
- 21 concrete concepts

Two lists of concepts (containing both types of concepts) were created, one per each condition. For both conditions the programme randomly chose 10 words from the list for the participant to explain.

Tasks:
monologue:
Participant hears a word and is asked to describe it using words and gestures.

dialogue:
Participant hears a word and is asked a question immediately after. There are four clarification requests per concept:

- Pokaż mi co to jest [Show me what it is]
- Pokaż mi jakie to jest [Show me what it's like]
- Pokaż mi gdzie mogę to spotkać [Show me where to find it]
- Pokaż mi co o tym sądzisz [Show me what you think of it]



Analysis

PRELIMINARY STAGES

Annotative practice:
For this experiment we chose to use an adapted version of the methodology put forward in McNeill Lab „Annotative practice"(4).

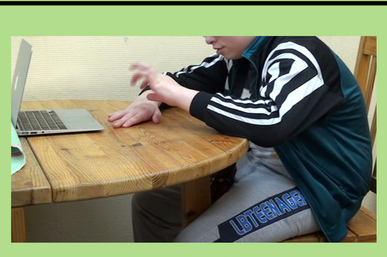
Speech transcription is followed by gesture annotation.

For the purpose of this study we assumed that gesture begins in the preparation stage and ends with the retraction phase, unless it ends at the beginning of the preparation stage for another gesture, nested or otherwise.

Camera angles:
in order to ensure data redundancy, safeguard against data loss and facilitate accuracy of the analysis we used a two-camera setup.

The camera angles were set up to ensure participants' anonymity, showing only their hands and torso.

computer's eye
participants' hand movements are recorded by the inbuilt camera of the computer used in the study



camcorder
a camcorder on a tripod records the participants' movements from a third person perspective

Analysis
The number of words used per concept was counted as well as the number of gestures performed per concept in dialogue and monologue; and per question in dialogue analysis.

As this is an ongoing analysis the explanatory power of our results is quite limited.

The results focus on the word per gesture rate for four of our participants.

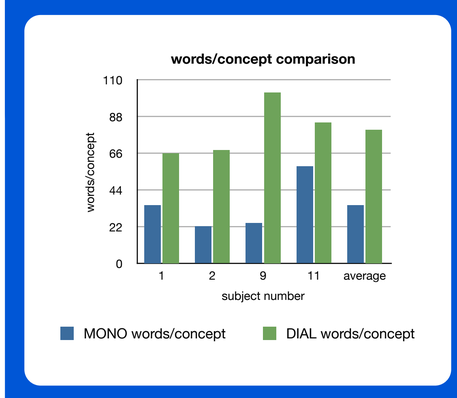
BLINDISMS

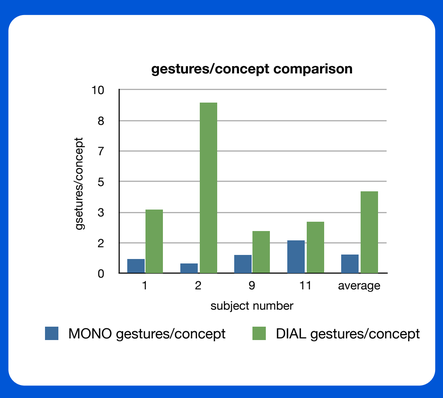
Blind children and adults may exhibit repetitive behaviours called **blindisms.** Blindisms are a type of sensorism(5), that is sensory perceptual behaviour resulting from sensory deprivation during childhood.

Blindisms are unconscious and quite difficult for the researcher to tell apart from unintentional gestures. One should bear this fact in mind as it may decrease the reliability of gesture ratio analysis.

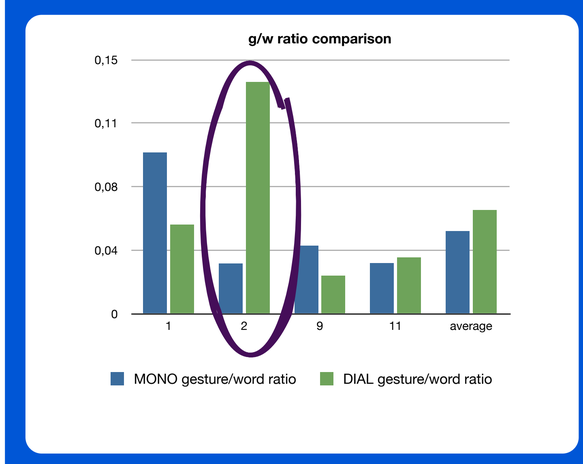
Results

OF PRELIMINARY ANALYSIS





Increase in the number of words and gestures in the dialogue condition
Perhaps unsurprisingly, participants' replies were more exhaustive in the dialogue condition, showing the facilitative role of questions/requests for clarification. Participants' replies were longer, the number of gestures per concept increased as well.



Gesture/word ratio analysis
If we consider the ratio of performed gestures per number of words spoken the situation is different.

While blind participants (in this case 1, 9 and 11) gesture more in monologues or equally in both conditions the seeing impaired participant (residual peripheral vision) included in this analysis is markedly more inclined to gesture in dialogue.

Whether this trend will be supported by further analysis remains to be seen.

Conclusions:
Although the tendency for a parallel division between innate and learned gesture and between gesture for speaking/thinking and improving communication may be postulated on the basis of the results of the participants with no residual vision the limited scope of the analysed sample forces the researcher to tread with caution.

The tendency to increase the number of gestures in dialogue as opposed to monologue as noted in the performance of the participant with residual vision should be researched further.

We hope to narrow down the possibilities as the study progresses.

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