

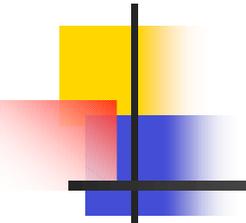
# Communicative Contributions and Multimodality

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Body communication, language disorders,  
communication aids and dialogue  
systems

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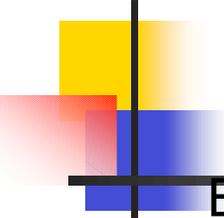
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# Multimodal communication & Aphasia

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- Many persons with aphasia, who have severely restricted speech output and sometimes also apraxia affecting intentional movement of arms and hands, are nevertheless intuitively judged as good communicators because of their spontaneous compensatory use of multimodal communication (Ahlsén 1985, 1991, 2002, Feiereysen 1987, 1991 Lott 1999).



# Examples

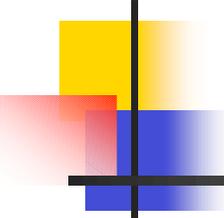
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Ex 1)

A person with aphasia is asked what her previous job was. Because of word finding problems (severe anomia) she is unable to produce nouns, proper names and most verbs. In this situation, **she points in the direction of her previous workplace, she smiles and utters phrases such as *oh it was fun*, she looks around the room for a newspaper, when she finds one she points to it, she gets it and opens it to find an advertisement for the shop where she used to be employed.**

Ex 2)

Another person with aphasia is asked by her interlocutor where she was going the other day when they met at the corner. She has fairly severe dysarthria, making her speech hard to understand. In this situation, **she “draws” a corner on the table and points into the corner, thereby providing gestural support to her speech,** indicating that she went into the house again at the corner



# Examples

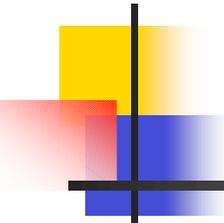
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Ex 3)

A third person with aphasia is asked about the occupation of his son. He tries to pronounce the word *theater*, but is unable to say it clearly, because of literal paraphasia, i.e. substitution of speech sounds. The interlocutor looks slightly puzzled, which makes him go on to **say now I him and then get up and move around, making very expressive facial expressions and gestures, impersonating an actor.**

Ex 4)

A six-year-old girl with severe cerebral palsy is spoon-fed by her caregiver and the interaction is focused on eating. Still, **she manages to initiate another topic (a film) by directing her caregivers attention to a videotape on a table nearby. She does this by making sounds in combination with directing her eye gaze.**



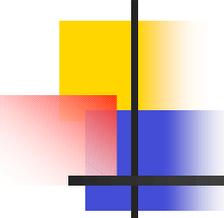
# Content

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Three main types of communication have to take place

- **factual information has to be conveyed or co-constructed**
- **interaction has to be regulated**
- **feelings and attitudes have to be communicated**

(Allwood 2002).

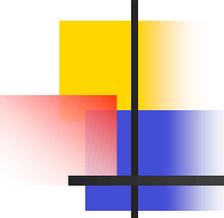


# Expression

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The *successful combination of different means of communication*, i.e. optimizing the interactive flow of information and co-construction of meaning by the use of *multimodality in a given situation*, makes a good communicator.

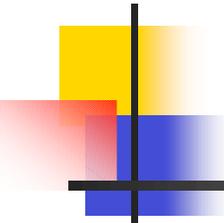
The situation involves *the social activity being pursued, the goals, the participants and their roles, the physical circumstances and use of artifacts, such as different media* (phone, speech synthesis etc.). All these factors interact in determining the optimal way of communicating (Allwood 1976, 1995, 2000, 2001, Ahlsén 1995).



# Factual content

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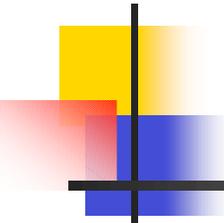
- The examples above show that other channels than speech are used as compensatory support when speech is not enough for clearly making the conversation partner share a certain content.
- **For specific factual content, like names and other reference to entities and places, assertions, questions and topics of discussion, *iconic gestures, pantomime, pointing, eye gaze and the use of drawing and pointing to pictures* are especially important.**



# Feelings, attitudes, communication regulation

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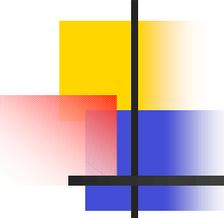
- But other aspects of face-to-face interaction are probably just as important. Apart from conveying specific factual information, it involves the **communication of feelings and attitudes and communication regulating the interaction**. There is good reason to believe that these aspects are crucial for spoken interaction.
- They also involve multimodality to a high degree, usually being to a greater part conveyed by other means than just words. ***Facial expression, gestures and other body communication and prosody, e.g. the intonation of words and phrases***, play an important part here.



# Multimodality in communication involving language and speech disorders

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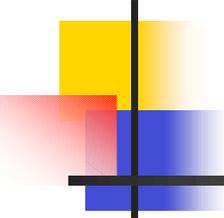
- a) frequent use of smiling, facial expressions, head movements, movements of arms-hands and legs, such as clenching one's fist or stamping one's foot, changes of body posture and gaze, prosodic markers and sounds such as sighing, laughing and smacking, all of these conveying emotions and attitude
- b) enhanced use of body posture, leaning forward to indicate interested participation and leaning backward to indicate that a topic (or interaction as a whole) should be finished or that communication is left to the interlocutor
- c) increased use of head nods and head shakes, as well as hand gestures and gaze regulating communication, i.e. giving feedback concerning contact, perception, comprehension and attitudes and regulating who has the right to contribute, as well as indicating own production problems.



# Modalities

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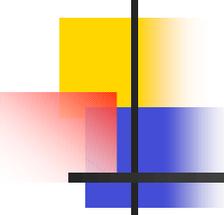
While most of our words are produced with a fairly high degree of conscious control, gestures, facial expressions and body movements are probably usually produced more automatically.



# Types of information

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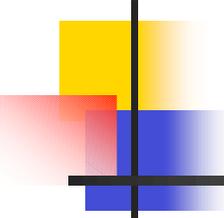
Factual information is also usually to a greater extent communicated with more control and intentionality than communication regulation (of own communication and interaction) and emotions or attitudes.



# Indicate, display and signal

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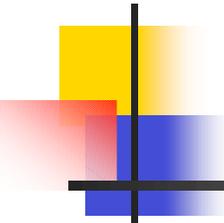
A useful way of describing degrees of intentionality in communication is to distinguish between indicating, which is done without intentionality (e.g. indicating that one is embarrassed by blushing), displaying, where you show something intentionally (e.g. by pointing) and signaling), when you show that you show something (e.g. most language use) (cf. Allwood 2002).



# Icon, index and symbol

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Another useful trichotomy is Peirce's semiotic distinction between three types of signs. An icon refers to something by a similarity relation, e.g. a picture is similar to what it represents. An index refers for something by a contiguity relation, e.g. in space or time, such as an arrow pointing to a place. A symbol, finally, refers to something in an arbitrary way, i.e. most words have no natural relation to what they stand for (which is why different languages can have completely different words for the same category of objects etc.) (Peirce 1931). In this trichotomy, symbolic communication is considered to require a high degree of conscious control.



# What is multimodal in ordinary face-to-face interaction?

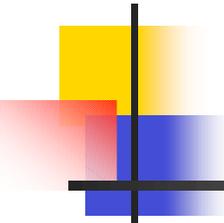
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- If we look at ordinary face-to-face interaction, much of what goes on is not expressed in words but handled by other modalities. This especially applies to *interaction regulating* information, which depends on body communication, such as body posture, gesture and gaze, as well as on intonation and voice quality, as well as to communication of *emotions and attitudes*, where facial expression, sounds, tone of voice and body communication in general are important.
- *Indicated* and *displayed* information is also more often dependent on multimodality, where body communication and prosody play an important part.

# Types of information and degrees of intentionality and control in ordinary face-to-face interaction

	Factual	Communication regulating	Emotional/Attitudinal
Indicate	x	X	X
Display	x	X	X
Signal	X	x	x

(X = is mostly used  
x = can be used)

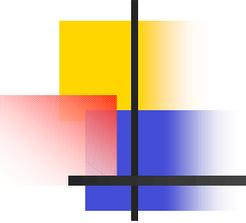


# Restrictions and possibilities concerning multimodality

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- Full-fledged multimodality in face-to-face interaction, thus, involves many dimensions and possibilities.
- Different activity factors can restrict or increase the use of multimodality in different ways.
- We will here consider two types of restrictions and possibilities:
  - 1) restrictions and possibilities imposed by communication disorders and by communication aid devices,
  - 2) restrictions and possibilities in dialogue systems.

# Communication aids



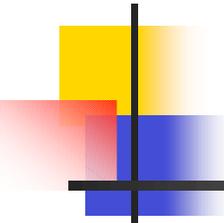
- Although there have been great hopes for ICT aids for persons with communication disorders, there have also been some lingering drawbacks (cf Ahlsén 1994). Communication aids have not been as easy to use, as useful for communication and as widely distributed as one might have expected. This is due to many different reasons. One of the main reasons was, up to quite recently, **the availability of really small, attractive and portable computers comprising AAC systems including, for example, pictures and synthetic speech**. Another reason was that most people were earlier **not used to handle computers easily** in their everyday life. We can see that these obstacles have gradually been removed, although they still have to be considered in many cases. ***It is not until now that we have the technical and social possibility to try out small and flexible communication aids in everyday life.***

# Naturalness

## - How multimodality works

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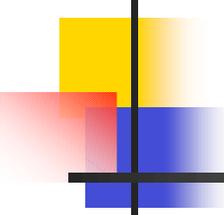
The more serious challenge, however, to the use of ICT aids is **understanding more of *how* multimodality works in a natural and spontaneous way** in face-to-face interaction and how more of this way can be used in relation to communication aids for everyday communicative interactions. There is good reason to believe that some of the slowness and failure in making ICT aids attractive to use is directly related to a **gap in naturalness and immediacy of communication between face-to-face communication with and without the aid**. The *focus on factual information* in AAC systems is long-standing. There are, however, some attempts to include more types of information and to work on total communication (e.g. Todman & Alm 1998). There is also a much increased interest in studying pragmatics and communication in relation to communication disorders, and although this is most often not combined with a direct interest in ICT aids, it is possible to combine the efforts.



# Complexity and timing of multimodal communication

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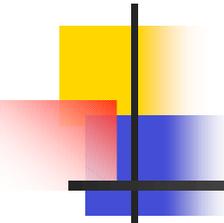
- But we still have a long way to go in this effort. Consideration of the totality of the dimensions of communication mentioned above is important for this purpose. A certain ingenuity in inventing ways of communicating multimodally which are **complex** but at the same time **natural**, is also needed. The two related main problems of **timing**, i.e. not being too slow for the flow of conversation, and **search strategies**, i.e. efficient ways to find what you want to express in the system, still largely remain unsolved.



# Dialogue systems

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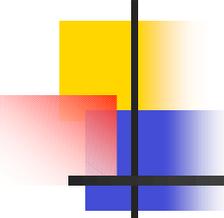
- Dialogue systems are mainly intended for communicating factual information.
- Communication regulation has turned out to be a problem that is now attended to.
- Emotional/attitudinal information is not usually considered much, except in research labs.
- We could also see that we are becoming more and more dependent on using dialogue systems.
- Persons with communication disorders, who often also have motor disorders, are a group that could be especially dependent on using dialogue systems for handling different devices, such as cars and robots.
- What is then important to consider in the development of dialogue systems?



# Questions - Dialogue systems

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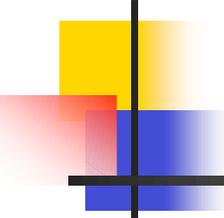
- What modality/modalities can be used? Are there alternatives?
- What are the time restrictions?
- How hard to understand are the contributions of the system? How long are they?
- What types of contributions are accepted from the user? How set or flexible are the requirements?
- Is the system robust to phenomena such as hesitation, self-interruption and self-repetition, articulation problems? What are the repair possibilities?
- Is there an option involving a human instead of the system?
- Is it possible to add more multimodality in order to simplify and provide more options?
- Is it possible to prepare and pre-store one's contributions (e.g. by using one's own computer and then just output the right contribution at the right moment, when talking to the dialogue system)?



# Accessibility

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- One of the purposes of introducing dialogue systems using speech is to make the interaction with the system simpler and more natural to ordinary users. It is important to consider **whether we are also making the interaction simpler and more natural for users with communication disorders** and, if we suspect that we are not, **whether and how we can enhance the accessibility** of the systems to these users.



# Research to be done

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Two ways in which we can find out more about how to design and adapt dialogue systems for persons with communication disorders are:

- a) to make studies involving users of these groups in contact with dialogue systems and have user reference groups for trying out designs,
- b) to work on the design of dialogue interfaces to specific aids, e.g. robots, for persons with communication and motor disorders, thereby learning more about specific cases, that can be generalized in further design.