BODILY COMMUNICATION DIMENSIONS OF EXPRESSION AND CONTENT

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1. INTRODUCTION

Bodily communication perceived visually or through the tactile senses has a central place in human communication. It is probably basic both from an ontogenetic and a phylogenetic perspective, being connected with archaic levels in our brains such as the limbic system and the autonomous neural system. It is interesting from a biological, psychological and social point of view and given recent developments in ICT (Information and Communication Technology). It is also becoming more and more interesting from a technological point of view.

However, interest in bodily communication is not new. There is preserved testimony of interest in the communicative function of bodily movements since antiquity, especially in connection with rhetoric and drama (cf. Øyslebø, 1989). However, the study of bodily communication has clearly become more important over the last 40 years, related to an increased interest in the communication conveyed through movies, television, videos, computer games and virtual reality.

In fact, it is only with easily available facilities for recording and analyzing human movements that the study of bodily communication really becomes possible. It is becoming increasingly important in studies of political rhetoric, psychodynamically charged communication and communication in virtual reality environments. Pioneers in the modern study of bodily communication go back to the 1930's when Gregory Bateson filmed Communication on Bali (cf. Lipset, 1980) or the 1950's when Carl Herman Hjortsjö (e.g. Hjortsjö, 1969) started his investigations of the anatomical muscular background of facial muscles, later to be completed by Paul Ekman and associates (Ekman & Friesen, 1969). Another breakthrough was made by Gunnar Johansson (e.g. Johansson, 1973) who, by filming moving people dressed in black with white spots on their arms and legs, was able to make a first attempt at isolating what gestures are significant in communication. Other important steps using filmed data were taken by Michael Argyle (1975), Desmond Morris (1977), Adam Kendon (1981) and David McNeill (1979). In the 1990's, another barrier was crossed when it became possible to study gestures using computer simulations in a virtual reality environment (cf. Cassell et al, 2000).

For an overview of the whole field and its development there are several introductions available. Among them are Knapp (1978 and later editions), Key (1982), øyslebø (1989) and Cassell et al (2000).

2. THE PLACE OF BODILY COMMUNICATION IN HUMAN COMMUNICATION

2.1   *Communication*

If we try to define the word communication in a way, which covers most (perhaps all) of its uses, we get a definition of the following type:

Communication = def. Transmission of content X from a sender Y to a recipient Z using an expression W and a medium Q in an environment E with a purpose/function F.

Even if it is possible to add further parameters, some of the most important are given in the above definition. The definition could be paraphrased by saying that communication in the widest sense is *transmission of anything from anything to anything with the help of anything (expression/medium) in any environment with any purpose/function.* A definition which is as wide as this is required to capture uses of the word *communication* which are exemplified in expressions like *table of communication, railroad communication* and *communication of energy from one molecule to another (cf.* Allwood, 1983).

Based on these examples, it could be claimed that the word communicant designates a "pretheoretical concept" which needs to be made more precise and specific in order to be suitable for theoretical analysis. This could, for example, be done by analyzing the connections and relations between properties *of* the arguments in the definition that provide constraints and enablements, i.e. properties and relations of the content (X), the sender (Y), the recipient (Z), the expression (W), the medium (Q), the environment (E) and the purpose/function (F).

Some of these properties and relations are the following:

1. *Sender and recipient:* A first problem here concerns the terms *sender* and *recipient.* Depending on circumstances, the following terms could be used as synonyms of *sender: speaker, communicator, producer, contributor* and the following as synonyms of *recipient: listener, hearer, communicator, receiver, contributor.* All terms have problems since they are either too restricted, too general (no difference between sending - receiving) or give the wrong metaphorical associations - s*ender* and *receiver* are too closely linked to radio signaling. A second problem concerns how the nature of senders and recipients influence their ability to communicate. Some of the most important abilities of senders and recipients have to do with whether they are living, conscious and capable of having intentions. Their abilities often relate to what types of causal and social relations they have to their environment. Different types of senders and recipients vary greatly in their ability to make use of such relations in order to convey and receive information symbolically, iconically and indexically. See section 2.2 below.

2. *Expressions and media:* Which types of expression and media are available to senders and recipients depends on the restrictions and enablements that are imposed by their nature. Through their five senses, human beings can perceive causal influences of at least four types (optical, acoustic, pressure and chemical (taste, smell). These causal influences have usually been produced by bodily movements or secretions coming from other human beings. Normal human face-to-face communication is, thus, multimodal both from the point of view of perception and production, employing several types of expression and media simultaneously.

3. *Content:* Similarly, the content is usually multidimensional. It is often simultaneously factual, emotional-attitudinal and socially regulating. There are several interesting relations between the modalities of expression and the dimensions of content, e.g. we mostly communicate emotion using vocal quality or body movements while factual information is mostly given with words.

4. *Purpose and function:* On a collective, abstract level, the purposes/functions of communication can, for example, be physical, biological, psychological or social, e.g. "survival" or "social cohesion". On a more concrete level, most individual contributions to conversation can also be connected with (individual) purposes/functions, like making a claim or trying to obtain information.

5. *Environments:* Environment on a collective, abstract level can be characterized as physical, biological, psychological or social in a way which is similar to "purpose/functions". Each type of environment can then be connected with particular types of causal influence in communication. On a concrete level, most human environments will be complex combinations of all the four mentioned dimensions and possibly others and thus exert a fairly complex combined influence on communication.

2.2   *Indices, icons and symbols*

People who communicate are normally situated in a fairly complex (physical, chemical, biological, psychological and social) environment. Through their perception (i.e. at least sight, hearing, touch, smell and taste) connected with central brain processing, they can discriminate objects, properties, relations, processes, states, events and complex combinations of all of these in their environment. All information, including that originating in communication with other persons, is processed and related to preexisting memories, thoughts, emotions or desires and in this way makes up a basis for what later can be expressed in communication.

What a person expresses can normally be described as being dependent on the attitudes the person has toward the expressed information. Clear examples of this can be found in such speech acts as statements, questions and requests, which normally express the cognitive attitudes of belief, inquisitiveness and desire for some action on the part of the hearer.

Independently of what is going to be expressed, any communicator has to use one of three basic ways of conveying and sharing information (cf. CS. Peirce, 1902). Peirce was concerned with a general basic descriptive framework for communication and sharing of all types of information (including information related to gestures), so his "semiotics" contains many concepts, which are useful in describing multimodal communication:

A. *Indexical information;* this is information which is shared by being causally related to the information which is being perceived - the index, e.g. black clouds, can be an index of rain.

B. *Iconic information;* this is information which is shared by being related through similarity or homomorphism to the information which is being perceived – the icon, e.g. a picture, iconically represents whatever is depicted.

C. *Symbolic information;* this is information which is shared by being related by social convention to the information which is being perceived - the symbol, e.g. words, symbolically represent their referents.

In normal human communication, we simultaneously use a combination of these types of information. For example, as we speak to each other, we frequently let our words "symbolically express" factual information while our hands "iconically illustrate" the same thing and our voice quality and our facial gestures "indexically" convey our attitude to the topic we are speaking about or the person we are speaking to.

The simultaneous and parallel use of symbolic, iconic and indexical information is commonly connected with variation in the extent to which we are aware of what we are doing and variation regarding how intentional our actions are. Generally we are most aware of what we are attempting to convey and share through symbols, somewhat less aware of what we convey and share iconically and least aware of what we convey and share indexically. This means that most people are more aware of what they are trying to say than they are of what their hands illustrate or of what their voice quality and facial gestures express.

This variation in intentionality and awareness also leads to a variation in controllability which affects our impression of how "authentic" or "genuine" the feelings and attitudes of a person are. Usually this impression is more influenced by voice quality and gestures which are not easily controllable than by those that are more readily controllable.

If a conflict arises between what is expressed by words or by facial gestures which are relatively easy to control and what is expressed by voice quality or by the rest of the body, which is not so easy to control, we mostly seem to trust information which is not so easy to consciously control. More or less subconsciously, we seem to assume that such information puts us in touch with more spontaneous, unreflected reactions.

However, this tendency has sometimes been misunderstood in previous research on nonverbal communication (cf. e.g. Fast, 1973). The significance of what has been said above is not that 80-90% of the information that is shared in conversation is conveyed by bodily movements. The significance is not even that information which is conveyed by bodily movements is more important than other types of information. Rather the significance is that bodily movements and voice quality are convenient, spontaneous and automatic means of expression for emotions and attitudes. Probably, they are our most important means of expression for this type of information. As a consequence they often also become our most genuine and spontaneous means of emotional expression. However, this does not imply that information about emotions and attitudes is always the most important information. Sometimes it is, sometimes it is not - sometimes factual information is more important. Nor does it imply that genuine or spontaneous expression of emotion is always the most appropriate or the most interesting.

An emotional expression based on some effort and reflection can in certain situations be more interesting and appropriate. After all, this is what the person wants to express and leave as a lasting impression, using effort, self-control and reflection.

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2.3 Indicate, display and signal

Above I have briefly illustrated that one of the interesting questions connected with the study of how body movements are used for communication is the question of how intentional and conscious or aware such communication is. Since this problem is of both theoretical and practical interest, I will now introduce three concepts which can be used to capture some of the variation in degrees of intentionality and awareness (cf. also Allwood, 1976 and 2000, as well as Nivre, 1992).

A. *Indicate:* A sender indicates information to a recipient if and only if he/she conveys the information without consciously intending to do so. If A blushes in trying to answer a sensitive question this could indicate to the recipient that A is feeling shy or embarrassed. Information that is indicated is thus causally connected with A without being the product of conscious intention. It is totally dependent on the recipient's ability to interpret and explain what A is doing.

B. *Display:* A sender displays information to a recipient if and only if he/she consciously shows the information to the recipient. For example, a person A can consciously use more of his/her regional accent in speaking in order to show (display) where he/she is from.

C. *Signal:* A sender signals information to a recipient if and only if he/she consciously shows the recipient that the information is displayed. To display is to show that you are showing. Ordinary verbal communication usually involves signaling. For example, if a person A says I *am from Austin* this information is signaled, i.e. it is clear that the sender wants the recipient to notice that he/she is communicating (showing) this information.

The three concepts *indicate, display* and *signal* are really three approximate positions on a complex scale combining degrees of consciousness and intentionality. "Indicate" is connected with a lack of conscious intentionality while "display" and "signal" are associated with greater degrees of awareness and intentionality. However, consciousness and intentionality are in themselves very complex phenomena so that the three concepts only capture some of their properties. Other concepts might be needed to capture other types of intentional and conscious states than the ones described here, e.g. the higher levels of iterated (reflexive) consciousness and intentionality described in Schiffer (1972). The only claim made here is that the three concepts can be a useful point of departure for a description of consciousness and intentionality in communication.

It is possible to combine the three types of communicative intentionality and awareness with the three basic semiotic relations described earlier (indexical, iconic and symbolic). If we do this, we obtain a table with the following nine combinations:

Table 1. Indices, icons, symbols and degrees of communicative awareness and intentionality

	Index	*Icon*	*Symbol*
Indicate	X		
Display		X	
Signal			X

All combinations are possible in principle, but in practice certain combinations are more common than others. In the table, an X has marked this. For example, indexical information is mostly indicated (this was in fact the motivation for the choice of the term "indicate"), even if with conscious, intentional effort it can be displayed and/or signalled. For example, we might with the help of bio-feedback learn how to blush. Similarly, symbolic information is mostly signalled even if it can also be communicated with a lower degree of consciousness and awareness. Iconic information is mostly displayed but can exceptionally be indicated. The reason for these preferential relations is thus far not fully clarified. It involves, for example, looking at whether iconic (isomorphic) relations are more easily usable in the visual than the auditive mode and whether visual icons are more suitable for display than for signalling.

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As we have seen, normal human face-to-face communication is multidimensional. Among other things this means that the source of shared information can be indexical, iconic and symbolic, and that the sharing simultaneously can occur on several levels of intentionality and awareness by being indicated, displayed or signalled. Normal (multimodal and multidimensional) communication thus carries with it the complex task of integrating diverse modalities and levels of awareness into the complex resulting shared content.

In this way, normal human communication just like the communication of other species contains much sharing of information on an indicated and displayed level. This kind of information forms a common basis for communication across species. What differentiates humans from other species, as far as we know, is the large-scale introduction of signalled symbolic communication and the high degree of complex use of several levels of communicative intentionality simultaneously.

This view should be contrasted with a traditional linguistic perspective which usually assumes that linguistic communication is only signalled and symbolic (mostly in written form). The insufficiency of this perspective becomes apparent as soon as we start to seriously describe spoken language communication and include intonation and bodily movements in the description. We then notice that normal spoken interaction, besides being symbolic (digital), also is iconic and indexical (analog), and that this information can be shared not only through signalling but also by being displayed or indicated.

We will also notice that reception and sharing of information is neither passive, nor always conscious. Reception, i.e. perception and understanding (if we want one word we can use J.L. Austin's word "uptake", (cf. Austin, 1962) is dynamic just like production (sending) of information, being controlled by perspectives and purposes which are often unaware, so that a person reacts and stores information in an automatic way without being fully conscious of what is happening.

Body movements and prosody are thus very important means of displaying & indicating indexical and iconic information simultaneously with signalled symbolic verbal information. It should, however, be noted that the major focus of intentional effort can be changed so that symbolic information can be used with a low degree of intentionality and awareness and indexical information with a higher degree of awareness. It should also be stressed that bodily movement often can be used to convey symbolic information. Deaf sign language very clearly shows this. Let us now, in more detail, consider the different means of expression employed in communication.

3. MEANS OF EXPRESSION IN COMMUNICATION

The means by which humans communicate can be subdivided in many ways. One possibility is the following:

A. *Primary:* Primary means of expression are means of communication that can be controlled directly without extra aids, e.g. bodily movements, voice, speech, gestures, touch, song, etc. Possibly production of molecules related to smell and taste could also be included. An argument against including smell and taste is that even though they are directly causally related to man, they are usually not controllable. Concerning the other primary means of expression, they include both spontaneous indexical and iconic means as well as symbolic means dependent on social conventions (speech, gestural language and certain types of song).

B. *Secondary:* Secondary means of expression simply consist of the instruments which are used to augment and support the primary means of expression. Secondary means are used, for example, to overcome spatial distance and to preserve information over time, e.g. using pen, chisel, typewriter, computer, megaphone, microphone with a loudspeaker, semaphore, radio, TV, audio and videotapes, telephone, telegraph, fax or e-mail. As we can see some secondary means directly reproduce primary means, e.g. radio, megaphones, audio tapes while others require more advanced recoding of primary means, e.g. writing. In some cases, this recoding requires several steps, e.g. telegraph or e-mail.

C. Tertiary: When we come to tertiary means it might be objected that the label "means of expression" is not entirely adequate. Tertiary means are simply all human artifacts (no negative evaluation intended) that are not secondary means of expression, e.g. tables, chairs, houses, roads, household appliances, cars, etc. All such artifacts express technical, functional and aesthetic ideas and intuitions. Perhaps the

artifacts which are easiest to regard as means of expression are those which mainly have an aesthetic purpose like paintings and sculptures, etc. Second to these, there are artifacts, the construction and shaping of which has been under relatively direct causal control by the person who has made them. In most traditional cultures involving "handicraft", such control was usually individually exercised by both masters and apprentices. The artifacts in industrial societies, however, have less and less of such individual control and are instead often products of teamwork and industrial mass production. If they are to be seen as means of expression they must perhaps be seen as an expression of a collective rather than an individual mentality. In fact, this was perhaps also true of older traditions and artifacts where the creation of a single individual often was constrained by tradition and for this reason difficult to discover.

Thus, tertiary means of expression can often be regarded as collective while primary and secondary means, even if they are also often bound by convention, give greater room for the expression of single individuals.

What we have here been calling tertiary means of expression could also be extended to include the unintended and undesired remains that different human cultures have left behind, e.g. bits of pottery, charcoaled remains of houses, leftovers from eating and more generally a changed and somewhat destroyed environment. All of them are in extended sense expressions of human activities and tell us something about the collective forms of life that produced them. Since some of them might be intended while others probably are unintended, we see that also with regard to expressions of collective forms of life there are varying levels of awareness and intentionality. Both collective and individual expressions can be indicated, displayed or signalled, and both types can make use of indexical, iconic or symbolic information.


4. BODILY MOVEMENTS

Let us now turn to movements of the body as primary means of expression and study some of their functions in human communication.

We may first note that body movements can be used both together with speech and independently of speech. They are thus a major source of the multimodal and multidimensional nature of face-to-face communication. Below, we will first discuss some of the major types of body movements and their functions and content, and then return to the question of how they are related to speech.

Some of the body movements that are relevant for communication are the following: cf. also Argyle, 1975; Knapp 1978, and later editions; Allwood, 1979; and Øyslebø, 1989). Each type of body movement will be followed by a short description of one or more functions that the movement may have.

(i)   Facial gestures. Functions: e.g. emotions and attitudes.

| neutral | happy | sad | angry | diabolical | sheepish |
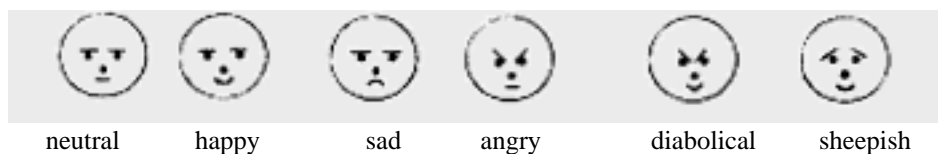
(ii) Head movements. Functions: e.g. information about feedback (acknowledging, agreeing and rejecting) and turntaking, i.e. basic functions for managing interactive dialog and communication.

(iii) Direction of eye gaze and mutual gaze. Functions: e.g. information about attitudes like interest and interactive communication management functions like speaker change (cf. Duncan & Fiske, 1977)

(iv) Pupil size. Functions: e.g. increased pupil size can indicate increased interest.

(v)   Lip movements. Functions: e.g. speech or attitudes like surprise.

(vi) Movements of arms and hands. Functions: arm and hand gestures are often used for symbols, e.g. "money" (rubbing thumb against index finger) or "come here" (waving fingers towards palm of hand upwards or downwards depending on culture). They are also used for nonconventional iconic illustrations.

(vii) Movements of legs and feet. Functions: e.g. to indicate nervousness or to display or signal emphasis.

(viii) Posture. Functions: Information about attitudes like shyness or aggression.

(ix) Distance. Functions: information about attitudes. A small distance between communicators could for example indicate friendliness and "closeness".

(x) Spatial orientation. Functions: e.g. information about attitudes like avoidance or contact.

(xi) Clothes and adornments: Functions: e.g. to indicate or display social status or role in a particular social activity.

(xii) Touch: Functions: Touch can be a way of communicating friendliness or aggression.

(xiii) Smell. Functions: Smell can indicate emotional states like fear, what kind of work you do or what food you have been eating. It can also be used to arouse pleasure, displaying a wish to be attractive.

(xiv) Taste. Functions: e.g. information guiding a hungry person in choice of food. Probably taste, if at all used as a means of communication, is used in connection with preparation and consumption of food.

(xv) Nonlinguistic sounds. Functions: e.g. warnings, summons or information about specific types of activity or about specific tasks within an activity.

All examples above are given from the perspective of a producer of the information. From the perspective of the responding recipient, we may note that the majority of the body movements are connected with visual reception (i - xi): (xii) is connected with touch and (xv) with hearing. Smell (xiii) and taste (xiv) are in ordinary language more or less neutral with regard to production and perception. *He smells* can mean both "he is experiencing a smell" and "he is giving off a smell". However, since we are often concerned with human experiencers of smell and taste, phrases like *it smells,* and *it tastes* are often used for production while the recipient side can be described by phrases like *experiencing a smell of X* or *experiencing a taste of X.*

 Furthermore, it should be stressed that the functions given above are only meant as examples. There is much more to say. It should also be stressed that the cultural variation both with regard to means of expression and type of function is considerable for almost all of the mentioned types of body movements. Cultural variation is especially well studied with regard to facial gestures, head movements, gaze, arm and hand movements, distance, spatial orientation, clothes and adornments as well as touch.

5. DIMENSIONS OF CONTENT

The use of body movements in communication is typically connected with simultaneous multidimensionality, both with regard to means of expression and functional content. This multidimensionality of body and speech is further connected with differences in levels of awareness and intentionality and with differences in the use of semiotic relations (indexical, iconic and symbolic). Below I will now give a brief account of the dimensions of content (functionality) which are primarily associated with body movements.

1. *Identity:* Movements of the body and the body itself indicate, display and signal who a communicating person is biologically (e.g. sex and age), psychologically (e.g. character traits such as introvert or extrovert) or socioculturally (e.g. ethnic/cultural background, social class, education, region or role in an activity).

2. *Physiological states:* Physiological states of a more or less long-term character, like hunger, fatigue, illness, degree of athletic fitness etc. are often clearly expressed by body movements, e.g. by properties like intensity and agility.

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3. *Emotions and attitudes:* When we communicate with other people we continuously express our emotions and attitudes to the topic about which we are communicating as well as to the person with whom we are communicating. We do this primarily with body movements but also with intonation and prosody.

4. *Own communication management:* A fourth function for which we use our body movements is that of managing our own communication. When we need time to reflect, plan or concentrate, we can, for example, turn our gaze away. If we have difficulties finding a word, we often move our body, especially the hands to gain time and to contribute to activating the word (cf. Ahlsén, *1985;* Ahlsén, *1991; and Fex & Månsson, 1998).* If we need to change what we have said, we may show this by movements of the hands and/or head (cf. also Allwood, Nivre & Ahlsén, *1990).*

5. *Interactive communication management:* We also use body movements to manage our interaction with fellow communicators, e.g. Hirsch *(1989),* based on observation of TV-debates, claims that changes in bodily position can function to show that there is no more to say about a particular topic. Body movements (primarily hands, head and gaze) are also important to regulate turntaking (cf. Duncan & Fiske, *1977;* and Sacks, Schegloff & Jefferson, *1975).* They are used for feedback, i.e. using facial gestures and head movements in order to show whether we want to continue, whether we have perceived and understood and how we react to the message which is being expressed (cf. Allwood, *1987;* and Allwood, Nivre & Ahlsén, *1992).* A further important function which perhaps also is primarily managed through body movement is the rhythm of the interaction (cf. Davis, 1982).

6. *Factual information:* Also factual information can be conveyed through body movements. In its most salient form it can be done through the use of symbolic gestures, e.g. in deaf sign language. But symbolic gestures are used also in relation to speech. Probably around fifty symbolic gestures are used together with most of the spoken languages of the world. Some examples are different kinds of head movements for "yes" and "no" (several different cultural variants exist), shoulder shrugs for "I don't know" and rubbing the index finger against the thumb for "money", a great variety of insulting gestures etc.

In addition, factual information is often conveyed by iconic gestures, so-called "illustrators" (cf. Ahlsén, 1985; and Ekman & Friesen, 1969). It is also conveyed through indexical gestures like pointing or by movements which serve to mark structure or emphasis in the message which is being communicated.
To sum up, we have noted that body movements which are used for communication are multidimensional, both from an expression-oriented behavioral perspective and from a content-oriented functional perspective. Perhaps the most important content-related contributions given by body movements in spoken interaction (between hearing, non-deaf communicators) are related to information about emotions, attitudes and management of interaction.

6. MULTIDIMENSIONAL RELATIONS AND INTERACTION

6.1 The relation between expression and content

Both when they are used on their own and in connection with speech, body movements provide a multidimensional medium of expression which can be used to convey a multidimensional content. The relation between expression and content can thus be described as a simultaneous multidimensional coupling. Consider the following example of how a simple verbal *yes* can be used together with head movements and facial gestures.

	Expression	*Content*
verbal:	yes	affirm
head movement:	nod	affirm
facial gestures:	raised eyebrows	surprise
	wrinkled forehead	doubt

The example shows how affirmation, surprise and doubt can be simultaneously conveyed by a combination of words, head movements and facial gestures.

Secondly, the relation between expression and content is generally a many-tomany relation. Several expressive means are often related to one content - e.g. intensive nodding and an emphatically pronounced *yes* both simultaneously express strong affirmation. Correspondingly, one means of expression can be a codedeterminant for many types of content. To return to the example above, nodding can simultaneously signal affirmation and enthusiasm. Thus, there are in general no simple relations between expression and content but many-to-many relations.

Thirdly, the multidimensional and many-to-many coupling between expression and content can take place on several levels of awareness and representation simultaneously. A person can signal something by using conventional symbols, while simultaneously displaying something using similarity or indicating something causally. Natural biological expressions and conventional expressions can be combined and be used together in order to convey different types of content on different levels of awareness and intentionality simultaneously.

Fourthly and finally it is important to note that the perception and understanding of (i) means of expression, (ii) dimensions of content and (iii) the relation between expression and content is dependent on context. Exposed teeth and retracted lips will be seen and understood as a smile or as something else, depending on the look of other facial gestures and the eyes. In order to be interpreted, a single expressive feature must be seen in relation to a surrounding context, e.g. the function of a smile may vary with context in expressing neutrality, ingratiation or shyness.

The socio-cultural context is often decisive in choosing between interpretations of the type mentioned above. In a conversation between two young people freshly in love, one might be more tempted to interpret a smile as shyness than if one is observing a conversation between two older people of different social status, where one might instead be tempted to use the socially stereotyped interpretation -ingratiation.

6.2 The role of body movements compared to prosody

I will now somewhat speculatively compare the contribution given by body movements to human direct "face-to-face" communication with the contribution given by prosody (i.e. variations in the pitch, intonation and intensity of speech), words and grammar. The discussion will use the table below as a point of departure. The types of content that occur in the table are the same as those that have been discussed above, except that focusing has been distinguished as a category of its own and that contextual dependency (which is not really a type of content) has been added.

Table 2. Content/Ji4nctions which can be expressed by body movements, prosody, words and grammar

Content	Body movement	Prosody	Words & grammar
Identity			
Physiological state			
Emotions, attitudes			
Own communication management			
Interactive communication management			
Factual content			
Focusing			
Contextual dependency			

Let us now consider the types of content one by one. There is probably no great difference between the three means of expression with regard to the possibilities of expressing social identity. This can be done implicitly and indexically using body movements and prosody, or more explicitly and symbolically using words and grammar. Compare the difference between indicating or displaying membership in the upper class implicitly by gestures and prosody and explicitly saying "I am a member of the upper class".

The next category - "physiological states" - is primarily indexically expressed through body appearance and body movements. The third category - emotions and attitudes - is probably mostly communicated through body movements and prosody even if it is clear that words and grammar can also be used to convey emotions and attitudes, especially in poetry.

Turning to "own communication management", (e.g. the ways in which we communicate needs for planning, choice of words and hesitation or the ways in which we show that we want to change what we have said), we probably use all three types of expressive means equally much. This is also true of the ways in which we convey "interactive communication management", i.e. turn management, feedback, sequencing, etc. All three means of expression are used simultaneously, providing information related to more than one type of content.

As for factual content, it seems clear that words and grammar are the most important means. In deaf sign language, bodily gestures replace spoken words and grammar but in ordinary spoken language communication, only a relatively limited number of gestures with a factual content occur. Prosody can play a role for factual information, for example, by being used to make conventionalized distinction between meaningful units like morphemes or words, e.g. by word tones or word accents in many of the languages of the world.

If we consider the structuring of information through focusing, all three types of expressive means may be used. Compare *It was not Bill that Mary kissed,* where *Bill* has been focused grammatically/syntactically with *Mary kissed Bill* (giving Bill extra stress), where *Bill* has been focused prosodically. Even though body movements can also be used to emphasize and focus, they probably are less important than spoken words, grammar and prosody.

Finally, the table reminds us that all types of expressive means are dependent on context both in order to be identified as specific types of expression and in order to help us identify what content they are expressing.

6.3 The semiotic status of the production modalities of communication

Maintaining the somewhat simplified 3-part division of the production modalities of communication into "body movement", "prosody" and "words and grammar", we may ask how it relates to the three basic sign types (index, icon and symbol) and to the three types of communicative intentionality (indicate, display and signal) introduced above. Using the preferential relations between indicate and index, display and icon and signal and symbol as shown in Table 1, we may create the following table.

Table 3. Modality of production and semiotic status

	indicate (index)	display (icon)	signal (symbol)
Body movements	X	X	
Prosody			
Words and grammar			X

As in the discussion of Table 1, we may observe that although all combinations are possible, certain relations are preferred among hearing people in "face-to-face" communication.

Words and grammar normally have the status of signalled symbols while body movements mostly indicate (as indices) or display (as icons) information. This is of course very different in deaf sign language where gestures are the main mode of signalled symbolic communication. The status or prosody is more unclear. It clearly very often functions to indicate (as an index) information but it also has important displayed iconic and signalled symbolic functions.

6.4 The relation between speech and gestures

Besides considering the general relation between content and means of expression and the more particular relation of prosody to body movements, it is also of interest to consider the relation between information conveyed by speech and information conveyed by gestures more generally.

Since the two means of expression are separately controllable, the messages they convey can either be independent or dependent. If they are independent, each means of expression carries its own message, e.g. when speaking on the phone and gesturing something to a person in the room simultaneously. If they are dependent, the two means of expression multimodally combine to form a more complex message drawing on both.

If they are dependent, very often, but not always, the spoken message is the main message which the gestural message modifies, e.g. to reinforce some part of what has been said. Sometimes, however, the gestural message might be more important, as when a person exhibits a particular emotion through posture and facial expression and words only serve to fine-tune the emotion. There are also cases when the two are more or less of equal importance, e.g. (in giving directions on how to find something) saying *over there* and accompanying this utterance with a pointing gesture showing the exact location.

More generally, when speech and gesture are not used for messages which are independent of each other, the relation between them can be of three kinds:

(1) Addition of information: -   identity expression (anchoring)
                                   -       attitudinal embedding
                                   -       illustration
                                   -       specification
                                   -       communication management
(2) Change of information: -   Attitudinal modification
                                   -       Communication management
(3) Reinforcement/support
    of information: -   Support, repeat

Let us now consider the three kinds of relations a little more carefully one by one:

1. *Addition of information:* The first type of relation involves one means of expression adding information to the information given by the other means - for example, when a speaker, while speaking, expresses and thereby anchors his/her biological, psychological or social (e.g. class, region, ethnic group) identity through his/her prosody and gestures. Secondly, it can occur when the body and prosody of the speaker embed what is said in a particular attitude. Thirdly, it can occur when a speaker illustrates what he/she is saying by gesturing something which is similar to what is being talked about. Fourthly, it can occur when a gesture specifies a phrase, e.g. when a pointing gesture specifies what is being referred to by a deictic phrase like *that* or *this.* Fifthly, it can occur as part of communication management, e.g. as part of a speaker change or in giving feedback.

2. *Change of information:* Since addition of information already is a kind of change, what we have in mind here is a kind of modification of information which is not merely addition. An example here might be the use of prosody or facial gestures in a way which suggest an attitude of non-seriousness, irony or satire. Imagine the phrase *he is a nice guy* said with irony. The effect will be almost the same as negation, i.e., "he is not a nice guy". The irony can, however, be more or less integrated in the total message. If it is poorly integrated, we get a kind of double message which might result in what has sometimes been called a "double bind". This can, for example, occur if a parent who wants a teenager to stay home says to the teenager: "Well, you go out and have a good time and I'll stay home and wait for you", while simultaneously with voice quality and facial gestures indicating or displaying disappointment (and resentment).
   A second very different kind of example is provided by gestures used to show that one has made the wrong choice of words (communication management), e.g. I *would like vanilla* (head shake), *chocolate ice cream.*

3. *Reinforcement and support of information:* A very common function of gestures in relation to speech is that of reinforcing and supporting that which is said. This can be done prosodically using stress, or gesturally by head nods or decisive hand movements.

All three relations discussed above can hold internally between the gestures and the speech of a particular communicator. However, they can also hold interactively, i.e. between different communicators so that the gestures of one communicator add to, change or reinforce the information expressed by another communicator. With the exception of identity-anchoring and own communication management all the functions discussed above in relation to a single communicator would also be applicable to the ways in which the gestures of one communicator can relate to another communicator's contributions in dialog.

6.5 interaction

In face-to-face communication, each new contribution is usually multimodal, combining vocal verbal with bodily gestural information. In a few cases, however, contributions are unimodal consisting only of vocal verbal or gestural information. Let us now consider the case where a multimodal contribution from one communicator is reacted to by a single- or multimodal contribution from another communicator. The occurrence of the two contributions may from a temporal point of view be either - simultaneous and overlapping or - sequential and non-overlapping.

If we consider the relations from a functional point of view, the following relations seem to be possible:

1. Simultaneous and overlapping contributions

Some of the information which is indicated or displayed by different communicators is overlapping because it is more or less static through an interaction. Examples of this include information concerning identity or physiological state, which can be expressed through clothes or non-changing features of the body. Other information, like emotions and attitudes (e.g. expressed through a sullen or smiling face) can change but often changes slowly, so that one communicator has a good idea of the reactions of the other party as he/she is making his/her contribution. This is also true of some of the ways in which feedback concerning contact, perception, understanding and attention are given through eye gaze and head movements from recipients to the floor-holding communicator while a contribution is being made.

Slightly more active unimodal or multimodal contributions (expressed through vocal words and/or hand or head movements) are often made by recipients to the floor-holding communicator, as he/she is speaking. The function of such overlaps can be of many kinds, but most of them are probably related to "interactive communication management", especially information concerning turn management and feedback. Overlaps can thus be used for turn management, e.g. in attempts to take over the floor (to interrupt). The main use of overlap, however, is probably to provide feedback to the floor-holding communicator about what and how his/her message is being perceived, understood and reacted to. Mostly, this feedback is supportive and involves showing by head-nods and words like *yes* and *mhm* that the message has at least been perceived and understood and that the speaker may therefore continue. In addition to acknowledgement, it often shows acceptance or other attitudes like enthusiasm, disappointment or surprise at what is being said. An interesting special case here is "interactive nodding", i.e. when communicators nod in synchrony throughout several contributions. The speaker nods to reinforce his/her own message and the recipients nod to acknowledge and possibly accept the message.

Overlapping contributions can also be used to give negative feedback showing lack of perception, understanding or acceptance. Looks of puzzlement (using eyebrow raises and/or backwards head-tilts), in combination with question words like *what* can show that the message is not being perceived or understood. Non acceptance and even rejection can be shown by recipients through satirical smiles, headshakes, sceptical facial gestures and/or negative vocal words.

Even though positive feedback related information is probably the main use of overlapping contributions, occasionally other kinds of information can also be given, often perhaps as extensions of feedback. In this way, a non-floor-holder can add to the floor-holder's message with an illustration or a pointing gesture.

2. Sequential - non-overlapping contributions

If the reaction of one communicator to another is non-overlapping in time, it might still take place in many different positions in relation to the previous contribution, e.g.
- in a pause between the words or constituent phrases of the preceding contribution,
- after the contribution is finished and the communicator is letting go of the floor (turn).

If the contribution takes place in a pause between the words or constituent phrases of a preceding contribution, its functions will, to a large extent, be similar to those that we have discussed above for active simultaneous contributions, i.e., mainly feedback and to some extent turn management. As an example of feedback given sequentially, consider the case of establishing reference in the following example.

A: Jill's boyfriend		Jack		was here
B:	m		yeah	
	nod		nod	

We see how A and B jointly, step by step establish consensus about who is being referred to. A does this by leaving room for B to signal shared perception and understanding through head nods and feedback words.

The example shows how bodily contributions occurring after a finished contribution function as feedback expressing perception and understanding. However, this position also gives an opportunity to express an attitude toward the point or evocative function of the previous contribution. Thus, a nod can signal agreement after a statement, acceptance of a task after a request and affirmation of a proposition after a yes/no question, in this way providing a kind of contextdetermined polysemy of the head nod. As already discussed above, such feedback reactions need not be positive, but can also be negative. They can also be extended by providing information in the form of emotional reactions, illustrations or pointing gestures that add to or even change the information provided by the previous contribution.

7. CONCLUSION

The main purpose of this paper has been to show that (and how) body movements are an essential part of interactive "face-to-face" communication, where gestures normally are integrated with speech to form a complex whole which hardly can be understood without considering both gestures and speech and the relation between them.

However, the integration of communicative body movements into a perspective which includes also speech and written communication requires a new understanding of the complex relations which exist between the dimensions of content and the dimensions of expression. -This new-understanding will include the interplay between, and the integration of, indexical, iconic and symbolic aspects, or to use other similar, commonly used concepts, it will include continuous and discrete, analog and digital aspects of human communication on different levels of awareness and intentionality.

This kind of integration is needed as a counterbalance to the traditional view which has emphasized monologue over dialog, writing over speech, speech over body, symbol over icon, icon over index, discrete over continuous, digital over analog, signal over display and display over indication.
Signalled, digital, discrete, written symbols make up the type of communication where we humans perhaps, in some sense, have made the greatest "artificial" (cultural) contribution. Because of this historical background, writing is the type of communication that has been easiest to study and, if necessary, bring order to by prescriptive means. Since writing is both one of our most important technological social instruments and is fairly open to normative social regulation, writing is also the type of communication which has been most studied.

However, a more complete and correct picture of human communication requires the inclusion of indexical, displayed, analog, continuous, bodily and spoken icons and indices. Expanding scientific description and explanation in this way will most likely not be without problems but will require new ways of thinking of units, relations and operations, both with regard to expression and content. Hopefully, the compensation for this increased degree of difficulty will consist in an increased understanding of human communication not merely as a cultural phenomenon but rather as a phenomenon that has developed as a result of a complex interaction between nature and culture.

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