

## QUESTIONING COMMUNICATION MODELS AND CONSTRUCTS: QUALITATIVE DISTINCTIONS

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**Abstract:** Central issues in linguistics and semiotics can be addressed through reflection on the underlying concepts in models and constructs. General models or constructs do not always fit particular instances of their application. General models are useful, but qualitative and ontological differences are given insufficient attention. Some key models and constructs are considered. Qualitative differences in several dimensions are introduced and linked to ontological differences between entities and to the roles, implied capacities of communicators, and to intelligence type. Such qualitative differences must be used to supplement existing classificatory methods and to differentiate the features of communication constructs. They are non-gradient.

**Keywords:** communication, classification, models, constructs, transmission

### **Résumé**

Des aspects centraux de la linguistique et de la sémiotique peuvent être abordés en reflétant sur les concepts fondamentaux dans des modèles et constructions. Les modèles ou les constructions générales ne respectent pas toujours les situations particulières de leur application. Les modèles générales sont utiles, mais les différences qualitatives et ontologiques reçoivent une attention insuffisante, donc quelques modèles et constructions clés sont considérés. Des différences qualitatives dans des plusieurs dimensions sont introduites et liées aux différences ontologiques entre les entités et le rôle et les capacités impliquées des communicateurs, et le type d'intelligence. Telles différences qualitatives doivent être utilisées pour compléter les méthodes de classifications existantes et pour différencier les caractéristiques de constructions de communication. Ils sont non-gradients.

**Mots-clés:** communication, classification, modèles, constructions, transmission

## **1. Introduction**

The fundamental issues in linguistics and studies of communication processes and systems of all sorts ('semiotics' or 'semiology') are *metaphysical*, i.e., they concern concepts and relations of concepts related to our understanding of reality, and hence involve philosophical considerations. One cannot assume that linguistic and other communicational phenomena, which we perceive as 'communication reality', can be understood simply through direct observation. Our understanding of communicational phenomena must be constructed through a process of conceptualising-creating models or constructs. Hence, it is necessary to identify and critically examine the basic concepts underlying such models or constructs. Examples of such analysis are found in Rastall, (2011, 2013a). *One way* of identifying and clarifying basic concepts is to reflect on models of communication (Rastall, 2013b). One may set up imaginary small-scale models for the purpose of reflection, or analyse the underlying concepts of specific existing proposals. Individual constructs which are the components of larger-scale models (e.g. the transfer 'model' below), such as signs, are of course themselves models. No ontological distinction is drawn between models and constructs here; the distinction is one of terminological convenience. Here we will consider some qualitative issues concerned with *existing* concepts and models of communication. A key point to emerge from reflection on models and constructs is that the more general they are, the more they leave aside qualitative differences in particular forms of communication. One reason for this is that models and constructs are established from single points of view. When multiple perspectives are introduced, models and constructs must be differentiated to get closer to communicational reality.

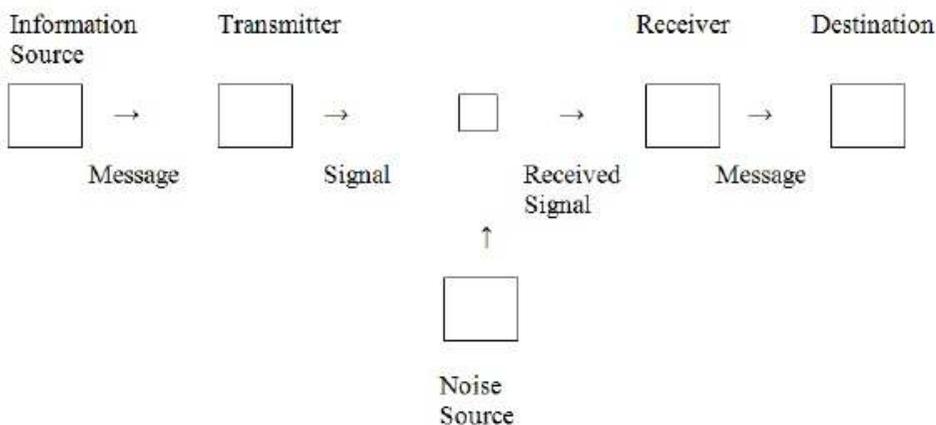
Qualitative issues are important because they concern the nature of communication concepts- how we understand communication processes, entities, and systems- and the intelligence types needed for their use. Communication models and constructs involve varying parameters which differentiate the types of communication involved.

## **2. Questioning a standard model**

One important and influential model among many is the transmission model of communication proposed by Shannon and Weaver (1975, first published 1949) which is widely presented (e.g. in the standard introduction by de Vito, 2009) and often uncritically adopted (e.g. in the standard (and otherwise admirable) work on marketing studies by Kotler and Armstrong, 2006). The Shannon and Weaver model is said to be 'widely accepted' as the basis for communication studies (Fiske, 1982:6), and is applied in certain influential approaches to linguistics (e.g. Lakoff and Johnson, 1980:10), where verbal communication is taken as the formation of meaning by the speaker which is

then converted into physical signals and transmitted to a hearer who receives the signal and converts it back into a meaning in the way outlined by Shannon and Weaver (below). (Saussure's 'circuit de la parole' (1972:27ff) is very similar in linking a sender and receiver via a channel of communication, and in linking a meaning to a physical means of expression in the sender with the reverse process in the receiver) Reflection on, and analysis of, Shannon and Weaver's model can be taken as an example of the sort of questioning of the content and presuppositions in models I have in mind. It leads to qualitative distinctions. Reflection on smaller-scale constructs follows.

As is well known, Shannon and Weaver's ideas are fundamental to mathematical and (what they call) 'engineering' issues in communication. They also have a clear resonance with notions in linguistics (particularly, functional approaches). The views that information implies choice and that the quantity of information correlates with the number of choices, and that redundancy is necessary to avoid loss of information, for example, are clearly consistent with views in linguistics and semiotics. The issues of entropy in communication and the relations of information quantity, frequency and cost are also useful reference points in linguistics (Martinet, 1989:182ff). Their model cannot, however, be simply and directly applied to human verbal interaction (or indeed any communication processes) without an analysis of its presuppositions and without introducing some modifications. It is (1975:7):



The authors explain (1975:7-8):

The *information source* selects a desired *message* out of a set of possible *messages*...The selected message may consist of written or spoken words, or of pictures, music, etc.

The *transmitter* changes this message into the *signal* which is actually sent over the *communication channel* from the transmitter to the receiver...In oral speech, the information source is the brain, the transmitter is the voice mechanism producing the varying sound

pressure (the signal) which is transmitted through the air (the channel).

The *receiver* is a sort of inverse transmitter, changing the transmitted signal back into a message and handing this message on to the *destination*. When I talk to you, my brain is the information source, yours is the destination; my vocal system is the transmitter, and your ear and the associated eighth nerve is the receiver.

In the process of being transmitted, it is unfortunately characteristic that certain things are added to the signal which were not intended by the information source. These unwanted additions may be distortions of sounds...or distortions in shape,...or errors in transmission...etc. All these changes in the transmitted signal are called *noise*.

There are several reasons for questioning this neat and plausible model as a description of any communication process. (See also the critique by Chandler (1994) largely from the perspective of human, verbal communication.)

First, the model makes no reference to a wider social or discursive context (or behavioural/environmental context in the case of animal communication), the motivation to communicate, or selection of *priorities* in communication, or the nature of the 'selection' of the message. That is, no difference is made between innate, natural responses (e.g. alarm calls) and the complex conventions of verbal communication. The concept of 'selection' may be appropriate where a fixed set of choices is linked to defined circumstances (in a simple case such as *on or off states* in a circuit), but –as many have pointed out- verbal message creation is a function of multiple considerations in the adaptation of verbal possibilities to circumstances and needs. Furthermore, the 'selection' in an electronic or mechanical program cannot be of the same nature as any biologically determined 'selection' in animal communication.

Indeed, the model presupposes a kind of brain-body dualism in which 'messages' are linked to physical signals. It is unclear whether semantic messages- as opposed to quantities of information- are to be seen as physical brain states (or electronic or mechanical states) or as disembodied 'meanings'. This question of the ontological status of 'meanings' is one of the key metaphysical questions of linguistics, and is rapidly reached through reflection on any model. If one rejects a mind-body or brain-body dualism (as most neuroscientists and philosophers now do), then communication and

linguistic accounts of communication must be revised in such a way that messages and signals are different aspects of the same thing (see below).

However that may be, as Shannon and Weaver themselves acknowledge, qualitative meanings and quantities of information, though linked, are not the same things. In whatever way one may deal with semantic information, the assumption in the model is that there is always a selection from a fixed set of possible 'messages' in any context. As we have seen, this simplifying assumption (grouping different phenomena into a general category) cannot be made for all communication processes.

Secondly, the model does not allow for feedback (either from the receiver or *from the signal itself* (which in *verbal* communication is constantly monitored for error or inappropriateness by the sender) or *from the receiver* (whose responses are also constantly monitored)). It is a one-way transmission model, which cannot be simply reversed so that the receiver becomes the transmitter. Even in animal communication the response to a signal may be in a different medium and involve a different repertoire- male and female birds do not signal in the same ways in mating behaviours, for example, and in humans a question may be responded to by a head gesture or even in a different verbal 'code'. In human verbal interaction, even more complex possibilities must be allowed for. Jakobson (1970: 31ff) considers other parameters of human verbal behaviour which go well beyond Shannon and Weaver's transmission model. One should note that noise (as the authors suggest) can occur at any point in the transmission process, while the visual model suggests that noise is an external factor (although that is partially corrected later, p. 26).

This is connected to a third point: the model assumes that the message sent and the message received are the same except for distortions by noise. Again this may be true of simple systems, but in verbal discourse there are multiple perspectives and priorities in interpreting sent messages and, hence, numerous reasons why the message sent and the message received differ. The concept of the receiver as 'inverse transmitter' and, hence, the destination as an inverse information source is unexplained, and seems implausible on simple inspection. In the case of a driver seeing a red light and receiving the information to stop, it should be clear that the biological and conventional processing by the driver in the context of road conditions and the speed of the car through training and practice is not a simple inverse of the transmission by a traffic light. In the case of verbal messages, it is unclear why one should assume that the reception and interpretation of information are the inverses of message creation and transmission. The construction of a verbal signal in relation to a communicational need requires different processes from the identification, coordination, and interpretation of that signal. As is well known, an utterance such as- *Have you put the car away?*- in context may

serve as a simple question, a reminder or suggestion, or a criticism or complaint. The addressee of the utterance must assess its purpose and respond according to the contextual interpretation and his or her priorities at the time. This act of interpretation, which occurs in any verbal interaction, is hardly the inverse of the processes which led to the initial utterance, and may or may not correspond to the intention of the speaker.

Fourthly, the model requires that there is an identifiable source. This clearly is not always the case. Apart from the interpretation of environmental changes (such as changes of wind direction or cloud formation), 'indices', the 'information source' in traffic lights, for example, is a programmed mechanism whose programmer is concerned with traffic flow, not specific messages to particular drivers, and who is not a component of the communication process on the road. In advertising, the 'sender' is a company or collective consisting of many coordinated individuals working to a common purpose with editing, decision-making, and production, and hardly a single, delimited information source. Again, as we have seen, the 'information source' may be an electronic or mechanical device, or brains of varying complexity and intelligence type.

Finally, one might suggest that not all cases of communication 'failure' are due to the factor of noise. The notion of failed communication needs deeper analysis and is not the topic of this paper, but may involve differences of communication system or differences of information processing or perspective on the parts of the sender and receiver.

This is not the place to discuss all the details of Shannon and Weaver's model. The important point is that critical reflection on the model leads to a questioning of the underlying presuppositions of the model and a clarification of concepts (rather than uncritical acceptance or application) - and eventually to better modelling with a differentiation of communication processes. Part of that clarification involves seeing the qualitative differences in acts of communication and the semiotic entities involved in them, and that arises from looking at communication from a wider range of perspectives. Another part of the issue is to clarify what we mean by communication in human, verbal contexts as opposed to what is meant in other contexts, and that- in turn- raises questions about how and whether human behaviours differ from animal or machine interactions.

A danger here is that it is frequently possible *to make a communication process fit the general or "macro-" model*. Thus, traffic light systems, territorial singing in birds, and verbal communication can all be said to have an 'information source' and 'destination' connected by transmitters and receivers affected by noise, but those information sources and destinations are quite different in type. While one is a powered electronic circuit working in a loop, the bird's behaviour is controlled by innate

processes and environmental factors, whereas human verbal activity involves multiple determining variables of many sorts. Hybrid interaction (human-animal, machine-human, etc.) obviously involve different systems and process components. Furthermore, there are cases which *do not* obviously fit. Animal badges (such as identification plumage distinguishing different species of birds) do not have an obvious source for the message and there is no ‘selection’ by the animal (which is biologically programmed). The interpretation of environmental factors for survival (such as weather conditions) has no information source at all. Communication models need modification and analysis to be useful descriptions of processes.

### **3. Questioning communication constructs**

‘Communication’, as we know, is a very broad term and so it is normal to distinguish different types of ‘semeiosis’ (to use Sebeok’s useful term – e.g. Sebeok, 1994). Various approaches to the classification of semiotic entities and systems have been used over the years. While they are useful, classifications tend to draw attention away from the very considerable qualitative (including ontological) differences between semiotic entities, and between behavioural capacities. Similarly, models of the communication process have tended to overlook the qualitative differences in the roles and behaviours of senders and receivers of information, which are implied by the classificatory parameters.

Qualitative and ontological differences between semiotic entities and behaviours are largely *discontinuous*, and are connected to differences in awareness and intelligence type. Differences of quality in semiotic entities and behaviours are matters of the directness of the relationship with immediate context or need, constructional complexity, complexity in the combinations of functions and semiotic channels in message transmission, the nature of the semiotic entity, and the capacities of communicators to operate with complex semiotic entities and roles. Qualitative issues are also matters of the range and complexity of perspectives on acts of communication and the capacities of communicators to operate with multiple communicative dimensions.

#### **3.1. Types of classification in semiotics**

Since qualitative and ontological differences are connected to classificatory issues and affect models of the transmission process, it is useful to start with a brief review of methods of classification in semiotics. ‘Communication’ can be seen in narrower or broader terms. Shannon and Weaver’s view of acts of communication is particularly broad. (It is part of the problem of their model discussed above.) They say (1975:3):

The word *communication* will be used here in a very broad sense to include all of the procedures by which one mind may affect another. This, of course, includes not only written and oral speech, but also music, the pictorial arts, the theatre, the ballet, and in fact all human behavior. In some connections it may be desirable to use a still broader definition of communication, namely one which would include the procedures by means of which one mechanism (say automatic equipment to track an airplane and to compute its probable future positions) affects another mechanism (say a guided missile chasing this airplane).

Not all approaches to communication would include all of those possibilities as ‘communication’. For instance, Ogden and Richards (1923) and Buyssens (1967) in effect restrict communication to human, voluntary, and intentional semeiosis. For example, de Vito’s definition (2009:12), although obviously influenced by Shannon and Weaver but including a notion of ‘context’, is particularly restrictive. He says:

Communication occurs when one person (or more) sends and receives messages that are distorted by noise, occur within a context, have some effect, and provide some opportunity for feedback.

This would mean, in principle (and probably unintentionally), that interaction between animals, humans and animals, machines and humans, etc. would fail to meet the definition and hence not be ‘communication’. However, in most approaches one would want to distinguish ‘communication’ in the narrower sense from acts and procedures which are very similar to human communication through the transfer of information or which are human, but non-verbal and involuntary. The latter can be distinguished as ‘signification’, ‘animal signalling’, ‘control mechanisms’, etc. ‘Semeiosis’ is thus a useful catch-all term, but it must be supplemented by a sifting of the different types of semeiosis. One can usefully classify acts of communication qualitatively by the *medium* of communication (sound, sight, touch, etc.- carefully listed with examples by Poyatos, 1979) or, from various points of view, as:

- *naturally occurring or artificial*
- *human or non-human*
- *animal or mechanical*
- *voluntary or involuntary behaviour*
- *intentional or unintentional acts*
- *learned behaviour or inherited behaviour*
- *social or non-social behaviour (or actions)*
- *conventional (or “coded”) behaviour or naturally occurring events.*

Moreover, one must distinguish communication units with purely differential function from those which also have some type of significative function. Of the latter, ‘natural indices’ can be distinguished from “wholly fixed conventional entities” (‘signs’) with various possibilities in between such as “partly fixed conventional entities” (‘proper symbols’, such as proper names), ‘*ad hoc*’ or ‘nonce’ symbols and icons (as when we say *let x = 3*). (Terminology varies. I am using Mulder and Hervey’s Axiomatic Functionalist terminology (e.g. 1972 or 2011), but that is of minor importance in this context: Rodriques, 2000, provides a useful classification of semiotic entities.)

There are different ways of classifying meaningful units, but the most important are the differences between the types of relation linking the index and the interpretation. Natural indices are cases where the index (or identifiable difference in experience) is related by natural causes to its interpretation. The symptoms used by a doctor to make a diagnosis, or changes in meteorological features, such as wind direction or types of cloud correlated with impending weather changes, are cases in point, but there are many others, including many forms of animal response behaviours, control systems, and internal bodily responses (such as increased heart rate in the presence of a stimulant such as caffeine). Many European scholars consider indices to be cases of ‘signification’ rather than communication involving sign or symbol conventions (see Buysens, 1967, p. 15 *ff* for a detailed discussion of this point).

One should note, however, that there are considerable cognitive differences between a simple stimulus-response survival mechanism (such as a flight response to an index of perceived danger in a flock of birds) and the interpretation of a symptom by a doctor in the context of a body of scientific knowledge, or the interpretation of voice features as indices of gender, ethnicity, age, or attitude in the context of wider social awareness, let alone biological, electronic, and mechanical control mechanisms, which do not involve cognition, but which do show a purposive reaction to a controlling factor. The common feature, however, is that ‘signification’ involves an act of interpretation by the receiver on the basis of the perception of some environmental difference, which may or may not have been deliberately transmitted. Once again, one can *make different types of index fit the construct*, but only at the expense of ignoring the qualitative differences.

In the case of signs (‘symbols’ in the Peircean terminology), the relation between the index and the interpretation is entirely unmotivated (in the Saussurean sense – Saussure 1972, p. 100 *ff.*), or ‘arbitrary’. There is no natural-causal link. (By ‘signifier’ and ‘signified’ I am referring to the types rather than the tokens, as Saussure clearly indicated.) Examples include some road signs (e.g. the red triangle for warning), certain bodily gestures (i.e.

those which are voluntary and interpreted differently according to culture or community, such as the ‘horn sign’), and the ‘words’ of natural languages, although one must allow for ‘relative motivation’. (The term ‘word’ is just used for convenience here.) Again, *the general model fits different cases*, but overlooks differences (see below).

When we have classified communicative acts and identified the units and relations involved in communication, we can further classify by the type of semiotic *system* those units and relations belong to. Hockett (1958, and later with his co-worker Altmann), usefully discussed by Lyons (1977) and Aitchison (1989), offered rather eclectic qualitative dimensions for such a classification (‘design features of language’), while Mulder and Hervey (1972, 2011) and Hjelmslev (1975) offered classifications of semiotic systems more systematically using the component semiotic entities and their relations. The latter involve important ontological distinctions of dimension (between purely differential ‘cenological’ entities such as phonemes and entities with both a differential and meaning-bearing dimension, ‘plerological’ entities) and of class to member relations (as in the case of allophones to phonemes and allomorphs to morphemes/monemes). Mulder (2011) is particularly clear on those points. As he points out, an allomorph, such as *is*, is ontologically different from the verb *be* as member to class, and hence one cannot speak of the phonological form of the sign *be*, but only the phonological forms of the allomorphs of *be*. (This also vitiates the idea of an articulation of *signs* (classes of allomorphs) into phonological forms.) It should be obvious that systems with duality of structure (sometimes called ‘double articulation’) are ontologically different, more complex, and cognitively more demanding than those in which there is no separate formal complexity, and that systems with both member-to-class and syntactic complexity are more advanced than those with only symmetrical or occasional combinatory possibilities (such as road signs), or where there is no contextual variation.

In view of this variety of perspectives and qualities in semiotic entities and in the semiotic behaviours associated with them, one can easily see the dangers in attempting to put all cases of semeiosis into a single transmission or exchange model, as Shannon and Weaver, for example, do, or in simple classifications into ‘indices’ and ‘signs’. It should be clear that there are significant qualitative differences between intentional and non-intentional signalling, voluntary and non-voluntary behaviours, between learned/acquired and innate behaviours, between conventional and non-conventional semiotic entities, and between complex and non-complex signals.

#### 4. Further qualitative differences

The above discussion arises from looking critically at models and concepts and some of it is relatively uncontroversial, although the implications of communicative differences are less widely discussed. The further point I would like to make is that there are significant *qualitative* leaps between the various behavioural possibilities and between the various entities. The qualitative differences may also be linked to *ontological* differences between semiotic entities and also to intelligence capacities, as we have seen. Intentional, voluntary, and conventional communication implies far more advanced capacities, social circumstances, and processes of acquisition than involuntary, indexical communication or signification. However, references to such differences in the literature are relatively rare with little or nothing in the standard works of, for example, de Vito (2009), Sebeok (1994), or Chandler (2007). There are major differences of quality between:

- A. the response to, or recognition of, a natural index and *positive* signalling behaviour
- B. the behavioural use of indices and the use of arbitrary signs
- C. the use of single signs and the use of sign combinations.
- D. The integration of multiple channels of communication and use of a single channel
- E. restricted and more wide-ranging communicative perspectives and dimensions of communicative entities and acts.

A qualitative difference between similar entities, actions, or behaviours is a non-quantifiable property. It may be gradient (in intonation or stress, for example), but most qualitative differences in semiotics are discontinuous. While purely differential entities, such as phonemes, and significative entities, such as linguistic signs, are of distinct orders and their classes cannot overlap, meaningful linguistic signs may also vary along different scales. They vary in degrees of concreteness of reference, transparency (versus opacity of formation), and generality, for example (Ullmann, 1972). Qualitative differences may, then, be differences of type, but they may also be differences of complexity, or both. It is important to see that phonological (or, more broadly, cenological) units are ontologically different from meaningful (or plerological) units. As ‘entités à deux faces’, as Saussure (1972, p. 99) puts it, plerological entities (signs) are of a different order of being from cenological ones.

There is, furthermore, a qualitative and ontological distinction between a combination of signifier and signified linked by a natural connection and one linked by unmotivated convention. Operating with natural connections is widespread in the living world and implies no conscious awareness or capacity for reflection, but operating with learned conventions implies higher associative abilities and the potential for

awareness, reflection, and intelligent control over the environment. It also implies a far more complex social context.

Furthermore, acting as an interpreter of natural indices is both typologically and qualitatively different from positive signalling. A receptive act is essentially one of interpretation, whereas positive signalling is either an involuntary behaviour with survival value (such as courtship displays or 'badges') or an intentional act with a social function.

Natural indices range from automatic responses, such as blinking in response to a sudden bright light (or *automated* responses in machines or biological control systems), to the instrumental and intelligent use of natural phenomena, as when gardeners judge the ripeness of an apple by the colour of its seeds. Fixed conventional signs may occur in only limited contexts with few, if any, connotations- such as a red triangle for warning on a road sign- through to verbal expressions with multiple connotations or indeterminacy of reference which can be resolved only contextually. For example, *starter* (unlike a red light) can be interpreted quite differently according to context:

*There were three starters in the race.*(competitors)

*The starter fired his pistol and the competitors set off.* (official)

*They ate soup as a starter.* (first course)

*The car had a faulty starter motor.* (electrical device)

*Here is your starter for ten (points).* (initial question in a well-known television general knowledge quiz, which has become a fixed phrase in the UK), etc.

Identifying an interpretation from a fixed and restricted set must be distinguished from the construction of an interpretation through the integration of conventional, contextual, and situational information. Whereas natural indices and arbitrary signs are clearly different as types, the use of combinations of signs differs from the use of single signs in (constructional) complexity. The ability to use a simple sign, such as pointing or referring to a single feature of the environment (a specific alarm signal for 'snake', for example) must be distinguished from the ability to combine and integrate signs with different functions- such as *snake* and *over there*- where short-term memory and association are required.

Herder may have seen something of this in his *Abhandlung über den Ursprung der Sprache* (first published, 1772), when he says that humans differ from animals not in degree but in type and recognises the ability of humans to identify distinctive characteristics in the environment and associate them with arbitrarily selected speech forms. As he says (1966, p. 25), <die Menschengattung über den Tieren nicht an Stufen ses Mehr oder Weniger stehe, sondern an Art> ("The human race does not stand above animals in degrees of more or less, but in quality" – my trans.).

Darwin's (1872) classification of animal signalling as 'direct physiological response', oppositeness of response corresponding to oppositeness of emotions ('antithesis'), and, further, the deliberate application of natural signals outside their normal context ('associated serviceable habits') is in fact a qualitative progression in the direction of intelligent purposive communication away from purely physiological responses (natural indices) to sign behaviour. However, we should note that Darwin's categories do not shade into one another, but are qualitative leaps. (One can speculate that the evolution of natural languages involved precisely such qualitative 'leaps'.) Hunting dogs, for example, have natural behaviours, stimulus-response mechanisms (such as 'pointing'), which are exploited for the purposes of the hunter, but dogs have been known to use those behaviours (or whining) intelligently to communicate in other contexts to draw attention to something (a lost ball, for example). The latter 'associated serviceable response' is clearly indicative of intelligent intentionality, rather than an automatic response and displays a step from biologically determined to intelligent behaviour. The qualitative distinction between stimulus-response mechanisms (with natural indices) and arbitrary signs is clearly implied by Buysens (1967:15 *ff*) and Popper (1972:235 *ff*.) also makes qualitative distinctions between the various speech functions (see below).

#### **4.1. Responding and Signalling**

The qualitative difference in A. (above) is the progression from the response to environmental changes as a survival device (e.g. when a sudden noise or movement causes birds to take flight) to the directed and purposive transmission of signals to other members of a specific group, for example in sexual displays or contact calls in birds. Such positive signalling itself varies with the degree of control exercised by the individual animal over the signalling behaviour. The stridulation of crickets is biologically determined, whereas bonding displays in gulls involve greater selectivity by the bird. This progression has the intermediate possibility (in complexity, not necessarily historical sequence) of involuntary signalling (with badges, such as the black 'bib' of the male house sparrow showing sexual maturity). Normally, the number of *positive* signals made by animals is much lower than the number of *responses* to perceived indices. Not only do positive signalling calls or displays present a danger to the animal (by drawing attention to itself), they also imply greater intelligence and cognitive processing, a higher level of social interaction, and a specialisation of behaviour linked to given contexts. Such specialised display behaviour is generally inherited and not voluntary, but some animals may select the contexts in which they display and thus exercise some intelligent control (for instance in making a (voluntary) submissive gesture).

Typically, models of the communication process allow for one-way and for two-way communication or signalling interaction, but such models rarely highlight the qualitative differences. It should be obvious that there are differences between:

1. responding to environmental changes (such as flight in the presence of a danger signal),
2. being the receiver of one-way signalling with no interchange of roles (for instance, when a female bird sees the display of a male bird),
3. responding to one-way communication with another one-way signal (as when the female bird signals readiness to mate),
4. and operating reciprocally using the same system of signals (as when chimpanzees of similar status engage in mutual grooming).

In the first case of responding to environmental change, it is difficult to speak of a communication 'system' at all. In cases 2 and 3, there are responses to specialised signals and in case 4 there is much more advanced social interaction. While 1, 2, and 3 are all 'purposive', they are directly connected to limited and immediate contexts and involve indices. The case number 4 involves wider purposes of social bonding and not just the satisfaction of immediate need. (Benveniste, 1966, contrasted bee and human verbal communication in some detail, p. 56 *ff*).

In the more advanced case of human speech interaction also, speakers may (if they share a language system equally) act either as senders or receivers, but that ability should be distinguished from the qualitatively different acts of interpretation and signalling, and different roles as sender and receiver. As noted above, because of differences in the message creation and interpretation processes, and because of social differences or personal affective variables, sending and receiving verbal messages cannot be seen as simple mirror images in the way that process models often seem to imply.

#### **4.2. Indices and signs again**

The qualitative difference in B. is the difference between the interpretation of an index through its naturally related circumstances or consequences and the unmotivated linkage of an index and an arbitrarily connected interpretation with the deliberate intention to communicate. The absence of a natural connection in signs requires a social learning process and means that there can be displacement between the act of signalling and the immediate environment. Associated with the unmotivated connection of index and interpretation is the development of a representational function. As the philosopher Popper (1972) pointed out in a different context, Bühler's (1968/1934) expressive and appellative (or 'address') functions are qualitatively less advanced than the representational function. It is the latter

which is required for rational discussion of ideas (along with what Popper calls an ‘argument function’ of language).

Although Popper overlooked certain issues (see Rastall, 2006), such as the simultaneity of speech functions, the conventionality of expressive and appellative features in speech, their importance in conversational interaction, and the possibility of the *rational discussion* of expressions and addresses (as opposed to discussion of factual states), he was right to draw attention to the qualitative difference between *representation* of states of affairs and the *reasoning function* of language in their use or discussion. The expressive and appellative functions are common to humans and animals, but the representational and argument functions are not (although there appear to be some simple representational/conventional signs in the repertoires of higher primates and very occasionally in other animals). Expressive and appellative expressions are typically constructionally simpler in natural languages and are always simple (not constructionally complex) in non-verbal communication (gesturing). It is the abilities to represent the world of experience, make verbal judgements, construct rational arguments which are vital for social order and control over the environment, as well as understanding of the social and natural worlds. The communicative means required for representation and argument are clearly qualitatively different from signals used for immediate need and relatively simple social relations. Operating with the communication systems needed for representation and argument is correlated with higher levels of intelligence. As BuysSENS (1967:16) pointed out, however, there can be degrees of conventionality. A dog whining at the door, or scratching it, is signalling a desire to be let out. Such actions have a degree of conventionality (and are not natural indices) but are linked to a situational context. Many conventional hand gestures also cannot be ‘displaced’ from a ‘context of situation’. The dog’s behaviour shows intentionality limited to a small range of messages and contexts. Not all signs are qualitatively the same. All signs involve a conventional association of form and meaning, but verbal signs enter multiple non-conventional associations as well; while many non-verbal signs are the association of a single form with a single meaning, verbal signs allow for a range of indeterminacy which is resolved contextually, as we have seen.

#### **4.3. Complex Signs, multiple media and perspectives**

As regards the third point (C.), the association of signs into complexes (especially complete utterances – see Rastall, 1994), we can see that there is a qualitative leap involving the ability to store signs and cross-classify them to arrive at complex meanings. Each linguistic act involves at least two connected signs (one of which may be conveyed by intonation or may be part of another utterance). The connection provides different ways of looking at

the same complex of communicanda. The operation of complex sign behaviour implies the recognition of the signs and their interpretation as well as their association and connectedness. For those conditions for communication to be fulfilled, there must be (at least) short-term storage of the signs as well as review of them and their relations in order to arrive at an interpretation. Without those processes of storage, review, and interpretation, no advanced form of communication, rational discussion, or verbal planning could take place. In fact, verbal sign combinations are normally reviewed from a range of perspectives (correspondence to fact, logic, reference to other utterances, social or aesthetic properties, etc.).

The integration of multiple channels (D. above) for a single overall communicative purpose is commonly found in many visual forms of communication, such as the London Underground or Hong Kong subway maps, where colours, names, orientation, and shapes are used as conventions for representational communication, and which can then be applied in arriving at solutions to travel questions through application of reasoning with logical argument; e.g. if I am at Kings Cross station in London and I wish to go to the City, I can work out the route, direction, and interchanges needed, i.e. using the map I can work out (and translate verbally) the plan: if I travel southbound (downwards orientation) on the Piccadilly line (blue) to Holborn (interchange sign) and change to the Central line (red) eastbound (left to right orientation) and get off at Bank station (with station sign), I'll be in the right area. Here we can see an example of the combination of the representation and argument functions along with the typical 'translation' of non-verbal communication into natural language. Multiple channels are, of course, also found in speech, where discrete features (words, phrases) are combined with non-discrete features of stress and intonation, and where there are also numerous voluntary and involuntary 'tone of voice' features (voluntary imitation of accentual features or involuntary secondary sexual or age features). This kind of integration implies complex, simultaneous processing for both transmission and reception.

Similarly complex are the multiple functions and perspectives which are common in verbal entities and wider discourse (E.). Saussure's view of the sign was that the signifier and signified are different aspects of the same thing- not two different things somehow joined together- this is an important alternative to dualistic views of the ontological problem of meaning (above). Thus, the sign can be seen from a formal perspective (signifier) or from a semantic-informational perspective (signified). The sign exists in a complex set of associative relations (1972:100). A signifier such as *starter* (above) is formally associated from different perspectives with *carter*, *barter*, *starting*, *startle*, *stouter*, etc. and the signified *starter* with the verb *start* and its synonyms, *commence*, *begin* and its antonyms *stop*, *cease*, *desist*, and with

other agent or instrument naming nouns in *-er*, such as *opener*, *reader*, *worker*, but also other nouns in *-er* such as *Londoner* (resident of), *baker* (occupation name), or the pseudo-composites *badger*, *carpenter*, etc. *Starter*, thus takes its place in a complex web of associations, which is of course more complex than indicated here and ultimately connects to all other signs in English to create a kind of mind map of reality. The network of combinatory possibilities (*starter + s*, *the starter*, *fast starter*, *starter motor*, *for starters*, etc.) place *starter* in a set of grammatical patterns. There is a clear *similarity* here with the model of neuronal connections in the brain.

In wider discourse, we must think not only of the transmission aspects of the signal but also of the ways in which the signal is interpreted. Since the signal and message are the same thing from different perspectives, one can think of the transmission/signal aspect as ‘language as communication’ and the interpretation and rational analysis of the verbal signal/message as ‘language as information’ (Rastall, 2006). While the sender’s signal has an argument function (in Popper’s terms) or more generally a wider discursal function, from the point of view of the receiver, each utterance (however momentarily or consciously) is rationally assessed from multiple perspectives (factual, logical, aesthetic, ethical, etc.). Any signal in discourse (written or spoken) is stored and considered from multiple perspectives by the receiver, who may prioritise any one of them and who- as a sender- may respond accordingly. This view is consistent with Dennett’s (1991) ‘multiple drafts’ theory of consciousness in which signals and their interpretations ‘compete’ for prominence. Since there are many perspectives in language as information, there are many interpretations and many possible signals which could be made, but in fact one or other will be prioritised. From the point of view of linguistic analysis, what is important is that any utterance has multiple aspects- it is *simultaneously* phonological, grammatical, semantic, pragmatic, discursal, social, aesthetic, and ethical. It is misleading to present an utterance as fundamentally a grammatical construction to which other features are attached. As an example, we might take the famous opening sentence of *Pride and Prejudice*:

It is a truth universally acknowledged that a young man in possession of a good fortune must be in want of a wife.

It will be clear to any reader that this sentence can be seen from several perspectives simultaneously, and hence can be taken further, or responded to, in several ways. (In fact, Miss Austen chose to continue by focussing on ‘this truth’ being firmly fixed in the minds of neighbours to develop another theme.) The opening sentence of the novel encapsulates several of the main themes of the book. It is expressed impersonally in the apparent style of an ethical tract beginning with what purports to be an

immediately evident axiom stated *a priori*. It contains what appears to be a logically necessary proposition (*must*) with an antecedent and a consequent. The reader will appreciate that the sentence is a spoof and contains a quite outrageous claim. At the same time the reader may well suspect that in reality there is some truth in the assertion. Thus, the wittiness of the novel and the element of social satire are immediately established. The reader senses the element of hypocrisy. The sentence links social attitudes with the themes of wealth and its relation to marriage. The verbal wit, typical of Jane Austen, can be seen in the supporting contrast between the high-style expression (*in possession of a good fortune*) with two Romance nouns and the balanced and contrasting entirely Germanic and everyday style (*in want of a wife*). Other readers may see other features of this sentence, but the point is that the rational processing of it *as information* requires multiple perspectives and their integration. Any response to this sentence might focus on its style, its humour, or the different parts of its content. While this famous sentence is indeed a complex sign, one can see that such a sign has properties in numerous dimensions which must be integrated. The need for the integration of multiple viewpoints on utterances has been emphasised by various writers (including Hagège, 1980, Harris (1982), and Weigand, 2010). That such a multiplicity of perspectives cannot be readily accommodated into communication models and constructs without significant analysis of qualitative differences and the integration of multiple functions and perspectives should be apparent.

## 5. Concluding remarks

We can see that there are important qualitative and ontological differences between active communication and receptive interpretation and that our existing macro-level models and constructs are rather distant from the properties of particular instances and too crude to allow for their qualitative differences.

All animals interpret using their perceptions, but that ability is distinct from, and less complex, than active signalling using distinctive behaviours within the group or species. That may be one reason why positive signalling in animals is less commonly found and is frequently limited to involuntary badges or behaviours. Darwin's 'associated serviceable response' is even less frequently found, even when it is based only on a simple oppositeness principle, for example where dominance and submission are signalled by opposite movements or postures. As we have seen, the use of conventional (socially determined) communication systems is again more complex behaviour involving entities (conventional associations of signifier and signified) which are ontologically different from natural indices (physically, naturally, or causally related observables linked to likely results by

experience in the immediate environment). The ability to combine conventional signs leads to further complexity. The principle of duality, according to which there is economical organisation of both significant units ('pleremes', signs) and non-significant units ('cenemes', phonemes) which can be combined with a distinction between ordered and unordered complexes, accounts for a level of complexity in natural languages and writing systems which ensures the indefinite capacity to form new utterances and hence to achieve the 'universal purport' mentioned by Hjelmslev (1968:137-8,168) as a defining feature of natural languages. Further dimensions of combinatory complexity are introduced through

- associative and metaphorical meaning
- the abilities to imply, presuppose and to cite
- the ability to combine multiple communicative systems in the creation and interpretation of complex meaning
- the ability to operate with multiple communicative functions simultaneously

(One should note that this ability to combine complex systems is different from the constructional complexity involved in sign complexes.)

The contrast between 'macro-level' general models and the properties of micro-level constructs covered by those models is apparent also in linguistic descriptions. Thus, for example, the English phoneme /ð/ fits easily into a phoneme table with the features /voiced, fricative (non-nasal), apical/ with the minimal oppositions, /ð - d /, /ð - n/, /ð - v - θ - z - ž - dž/. However, /ð/ is very rare in the phonological forms of allomorphs, and is restricted to the immediate pre-vocalic and post-vocalic positions (including intervocalic). It is not systematically exploited from a phonotactic point of view, but it serves an important contrastive function as a component of words with major grammatical functions, such as *the, this, then*, and as a feature of verbs rather than nouns (*bathe* vs. *bath*, *teethe* vs. *teeth*, *clothe* vs. *cloth*), and is indicative of a standard speaker of English (in some non-standard varieties /ð/ does not occur). When considered separately, /ð/ has properties which are not in the overall phonological description.

Similarly, a sign such as *every* falls into a category including *no, both, each, some, all* and is in mutually exclusive opposition to them. However, while all those signs are also mutually exclusive with *the, a, this, that*, and *no, both, each, some, all* are mutually exclusive with the possessives (*my, our*, etc.), *every* is not mutually exclusive with possessives (*his every word, your every move*, etc.). Furthermore, we find *none, both, each, some, all + of*, but not *\*every of*. Again, the overall classification does not allow for detailed anomalies, when we consider the individual sign separately.

The important points are that semiotic behaviours are placed on scales of complexity and ontological hierarchy as well as classified in the ways

mentioned above. The scales of complexity and hierarchy are obviously interconnected with the features of conventionality, intentionality, social, learned, and voluntary behaviour. One might say, the greater the complexity of communication, the greater the implied intelligence of the communicators, but equally one might take the qualitative properties of communication as indices of intelligence type. Because of the non-gradient nature of many qualitative differences, it is clear that the scale of communicative intelligence is not a cline, but a series of qualitative leaps. It is also clear that communication models and constructs based on single dimensions cannot be applied simply or uncritically to verbal communication, and that new models are needed to allow for the multiple parameters involved. One way would be, as suggested by the linguistic examples above, to work ‘bottom-up’ from individual communication units, rather than ‘top-down’ from ‘macro-’ models.

Human beings operate with semeiosis at different qualitative levels, but it is important to note that the rise in the quality of semiotic entities correlates with the increase in speech functions, range of communicative possibilities, and more advanced intelligence type. These qualitative and ontological differences can be blurred by views of communication which are too all-embracing or by classifications or models which are too mechanically applied.

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