Linguistic Modelling of Energetic and Informatic Situations

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Abstract
The current state of approaches to situations with natural, technical and living components leading to changes in physical and mental properties, is discussed. Energy, artefacts and information as products are instrumental in these changes of which the notion of information is developed in more detail. The method of linguistic modelling as a symbolism to represent dynamic situations, is introduced.
Keywords : notion of product, information, information system, linguistic modelling.

1 Introduction

The term 'situation' or 'scenario' refers to a perceived, imagined, suggested or projected sequence of events. Thus, we are talking about dynamic situations in which *specified* changes, and/or those due to *chance*, occur. Activities leading to changes take place constantly in everyday situations : 1. The gardener cuts the grass in the garden, 2. The nurse gives baby a bath, 3. The bank notifies a couple that their request for mortgage has been granted. We also have changes on a microscopic i.e. cell or bacteria level and on a large scale : 1. Farmers spread man-made fertiliser to increase the production of wheat, 2. Management increases the output of a hydroelectric power station supplying a town, 3. The local government announces to the inhabitants that it intends to introduce large scale rationing of petrol.

Consideration of situations shows that change involves : an *object* (grass, baby, couple etc.) which undergoes *change of state* expressed in terms of specific properties basically as defined in physics, a *product* which, through its properties, induces change and a *system* of varying degree of complexity which delivers the product to the object (Korn, 1996a, 2000a). We have three kinds of product : *artefacts* (lawnmower blade, fertiliser), *energy* (thermal energy in water, electrical energy) and *information* (request for..., large scale rationing...). A system invariably consists of a *number of interacting, bounded* objects with specific functions (Korn,1989,1995). We note that artefacts and energy as products are intended to induce *physical* change of state, on the other hand, information whatever way it is physically realised, is intended to bring about *mental* change of state.

Although the ideas are well known, to see chosen, bounded parts of the world in terms of explicitly mentioned changes of state, product and system, appears to be a recent view (Korn, 1996b, 2000a,b). Scenarios are usually described by declarative sentences of natural language in which these terms are implicit (Korn, 2000a,b). Another view, prompted possibly by the development of servomechanisms in the 2nd world war (Brown, Campbell, 1948), is to see parts of the world as interrelated objects which led to an immense variety of studies under systems science, systems engineering (Bertalanffy, 1950, Jenkins, 1969, Checkland, 1981). Any part of the world can be seen as interrelated or interacting objects depending on whether the connection between them is expressed by a stative or a dynamic verb respectively (Checkland, 1971, Quirk, Greenbaum, 1973, Korn, 1996b). The basic problem with this view is that it strives to represent a situation as a whole usually leading to a model of its topology only. Topology can be represented by diagrams of contours of various shapes joined by lines, a very popular method in current systems science.

Practitioners of systems science so far appear to have produced :
1. A vast collection of diverse, mostly speculative views concentrating on systems. The views are not well related to observables and use poorly defined concepts (Jackson, 1995).
2. A number of methods of modelling and problem solving using mostly diagrams with ill defined concepts and symbols. The methods seem to be unrelated to existing branches of knowledge (Checkland, 1981).

The concept of information, mostly in the field of signal transmission, has been known for some time (Hartly, 1928, Shannon, 1964). With the development and widespread use of personal computers in management, the notion of information systems was introduced with theoretical treatment following those in systems science (Flynn, 1998). The problems associated with the current state of information and information systems theories may be summarised as follows :
1. There is no agreed description of a concept of information which would include both, meaning and quantity within the framework of a theory,
2. There is a variety of topics of information systems without reference to a description of the concept of information itself,
3. Information and information systems are not related to consideration of energy and energetic systems,
4. Information and information systems seem to be considered in the narrow context of people, organisations and computer technology mostly by practitioners with predominantly computer background.

Conventional scientists so far do not appear to have expressed significant interest in systems science and/or in approaches to information systems. An interest of conventional science lies in devising explanatory hypotheses and in development of quantitative relations between regularly recurring properties of phenomena and their incorporation into theoretical structures of the 'observables-theoretical constructs capable of being manipulated-observables' pattern (Hempel, 1965). Conventional science tends to divide its subject matter into disciplines and is ill equipped with dealing with problems involving many objects arranged in a topological configuration. Therefore, science is poor in dynamic theories with interacting, multidisciplinary objects. Newton's and Lagrange's theories were originally developed for mechanical discipline but the latter was later adopted to handle electrical and multidisciplinary problems. Conventional science has been unable/unwilling to deal with situations involving purposive activity even at the technical level and left control theory to engineering (Franklin et al, 1994). This has created a gap in the spectrum of knowledge which perhaps can be closed (Korn, 1995). Purposive activity is *all pervasive* in creating specified changes of state in the context of product and system.

Systems science, in particular approaches to information and information systems, has to cope with a much less certain recurrence of phenomena organised into topology of scenarios. The relations between objects are tenuous and possibly speculative with high levels of uncertainty due to exhibition of will, caprices, frailties and fluctuating properties of living, especially human elements. Systems science should express its subject matter less in metaphysical, abstract terms and should strive towards using *concrete and abstract properties* as an integral part of a more comprehensive, empirical theory.

Current work is an attempt to generate such a theory consisting of a number of general statements and a symbolism. In summary :

1. A number of *observation driven generalisations* regarded as pervasive throughout the immense variety of manifestations of 'systems', is asserted. The generalisations concern precise notions of property, objects and interactions expressed as physical power or influence carrying specific form of energy or information respectively (Korn, 1996b, 2000a,b). These are seen as the constituents of situations, or scenarios, with human, living, natural and/or technical components,
2. A symbolism for an inferential structure based on natural language and aspects of predicate logic called *'linguistic modelling'*, is developed. The symbolism is capable of handling objects with qualitative as well as quantitative properties and uncertainties associated with their behaviour affecting the outcomes of a situation,

Although we may mention artefacts and energy as product, this paper is intended to concentrate on introducing a view of information and a brief outline of linguistic modelling.

2 Nature of information

We appear to perceive a part of the world *in its entirety* especially through the sense of vision, and, as a result, can effect recognition and/or take appropriate action. If we close a sense organ, we can form images of concrete objects through combinations of geometric, material, numerical and possibly energetic properties (Korn, 1995, 1996b). However, to express an opinion, to issue an instruction, to reason and to form abstract concepts like 'furniture', for example, *symbols* which can be manipulated by the mind, have had to be invented (Johnson-Laird, 1988, Korn, 2000b). We can perform the theoretical operation of separating an image called object into two parts : the image itself and whatever we choose to allege about the image. This is called the *subject-predicate* form, best known in natural language.

1.1 Aspects of Information

Based on technical literature and everyday use of the term 'information', we briefly discuss concepts (Korn, 1998, 2000a) which may be referred to later.

1. Meaning

The assignment of symbols to images and comments about them leads to the subject-predicate form. The invention and introduction of symbols poses the problem of relation between these symbols and what they are supposed to represent, the problem of *meaning* (Anon, 1998).

In a subject-predicate form the subject can be used to refer to a concrete part of the world, a figment of imagination like an 'angel' or to abstract concepts such as 'quality'. Here the predicate part is used to assign a feature or characteristic or a property to the subject or to other constituents of a sentence.

Representation of a part of the world, a view, opinion or abstract concepts in terms of symbols is arbitrary. Here the assignment of a symbol as a *particular representation* constitutes its meaning. When a subject-predicate form is implemented as a symbol in accordance with a convention agreed on by two living things and is sent by one to the other leading to a specific change in mental state of the latter then the form has a meaning as far as the particular living things are concerned. Accordingly, we note that the *concept of meaning is concerned with the relation between parts of the world, symbols and specific mental states.* Our own mental state can change as a result of perception. In this case the number of living things reduces to one.

2. Message carrier

A message carrier is a particular type of symbolism for realizing information in the mind. Natural language is by far the most widely used carrier for thinking. Mathematics is another. The latter, however, operates in terms of *properties only, the subject is lost.* These two appear to be arrangements of symbols capable of being manipulated by the mind according to rules for ordered forms of thinking as well as for daydreaming (Johnson-Laird, 1988).

The formation of thought in terms of a message carrier is usually done instinctively and quickly without conscious effort. However, this is not necessarily the case as people with imperfect knowledge of a foreign language can experience when trying to find a word suitable to implement a thought. The saying 'On the tip of my tongue' is another description of the difficulty.

There are other forms of symbols like Morse code or smoke signals, for example. These are converted forms of natural language considered more convenient for transmission of information.

3. Primary and secondary medium
A message carrier is converted into a physical medium by a sender. *A medium is the result of constructing symbols by means of physical properties referred to as 'informatic' so as to prepare the physical realization of information.* This is called *primary medium*. This construction is agreed on by convention so that the receiver can recover the message carrier with meaning attached. Convention means in accordance with some agreed specification. Thus, construction can only be done by a *purposive system*. Physical properties can be classified into material, geometric, numerical and energetic, they are also used for constructing physical objects like a brick and various forms of energy like electrical in terms of voltage, for example, i.e. products.

A message carrier as a symbol, for example, natural language, must be translated into a medium to be fed to an appropriate sense organ of the receiver for detection involving a small but finite amount of physical power (Korn, 1995) carried by light or the product of air pressure and flow, for example.

Message carriers can also be attached to an immense variety of objects by a sender called *secondary medium* and interpreted by a receiver : in biology, nerve impulses and hormones, forms of art, a dead body as in the film 'Man who never was' can all act as secondary medium.

1.2 Definition of Information and Data

The subject-predicate form as a symbol has been invented as a means to express a view or to make a comment about a chosen part of the world. A subject-predicate form can be stative or dynamic which without qualifiers is called a *context-free sentence* (Korn, 2000a). However, a context-free sentence although meaningful, can only provide a topic which we cannot imagine to reproduce or to carry out in practice. To do these the constituents of the sentence must be qualified, or modified, by adverbial and adjectival phrases. *A context-free sentence with qualified constituents attached to a special verb as a subordinate clause, is defined as information.* 'Data' are the numerical part of a qualifier which are used for achieving precision. Without qualifier data by themselves are meaningless. *The number of qualifiers equals the number of units of information.*

The number of nouns and their role, or function, in a sentence are determined by the verb. We can have one-, two-, or more place verbs attracting various cases such as accusative and dative. Linguistic analysis may be required to handle linguistic complexities (Korn, 1996b). Using its definition, information can be represented diagrammatically as in Fig.1.

The *special verbs* which *are symbols for influence interaction, carry information* as a message from sender to receiver. For example, in the sentence 'The waiter notified the guest that the chef who was distracted at the time which was 11.00 hours, irretrievably burnt the very tasty chicken soup', 'notified' is the special verb, 'waiter' is the sender and 'guest' is the receiver. The clause after the connective 'that' is information. The context-free, two-place sentence is 'chef burnt the soup'. Information as a diagram is shown in Fig.2.

We make the following remarks :

1. Notion of space of an object

In a simple, context-free sentence each noun and the verb are seen *to represent spaces of all objects, actions or states* denoted by that noun and verb. The term 'space' refers to the space of existence and imagination in case of concrete and

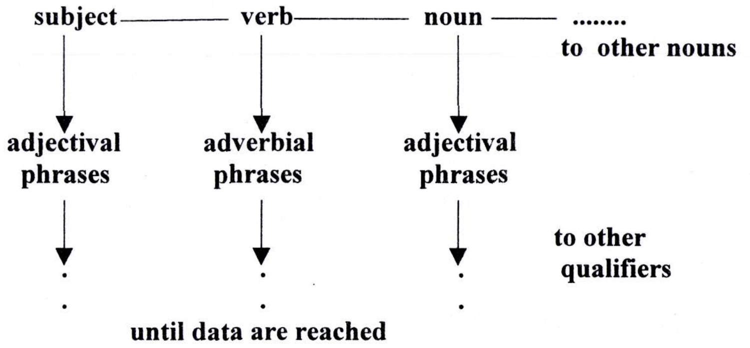

Fig. 1: Diagram of information

abstract nouns respectively. All verbs are abstract (Korn, 2000b). Thus, in 'chef burnt the soup' the space of all 'chefs' is connected to the space of all 'soups' by the verb 'burn'. Qualifiers are used to locate a noun or a verb in its space. Logically contradictory qualifiers are not admitted. Qualifiers themselves can be qualified so as to make the location of a noun more definite or precise.

Referring to Figs.1. and 2. the diagram of information can be bounded by any qualifier like 'tasty', for example, which is *vague and gradable,* we can have : 'just tasty', 'tasty', 'very tasty', 'extremely tasty' and so on. A diagram bounded by vague qualifiers can be further *qualified towards precision* by other qualifiers like 'very' which puts 'tasty' into the upper range of the concept 'tastiness'. Further qualification can go on, if required, until *precision is reached or certainty is introduced* which can only be done by non-gradable qualifiers such as 'square', for example, and/or by data like '11.00 hours' in Fig.2. Such qualifiers then bound a diagram of information absolutely, they locate a noun and a verb in their space precisely without any more uncertainty. Acceptable precision can also be reached by expressing vague qualifiers as fuzzy sets (Zadeh, 1973).

Thus, vagueness and uncertainty are associated with location of a noun and a verb in their spaces. This is a feature of natural language which makes it such a powerful means of communication since no elaborate scheme is required to convey meaning sufficient for comprehension. However, in technical situations like drilling a hole of *specified size* in a piece of wood, precision is obligatory. The drill would have to be located precisely in the space of all drills so as to accomplish the task to specification.

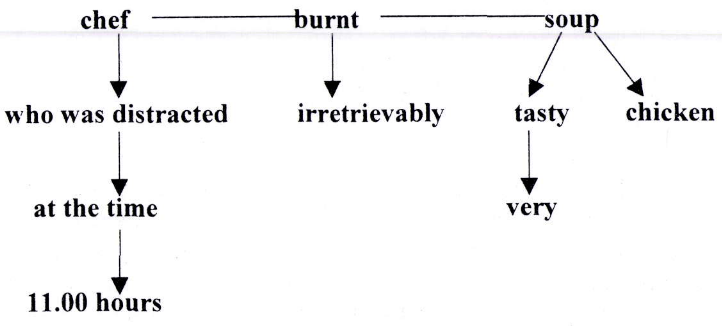

Fig. 2: Diagram of information in a sentence

2. Unit of information

By product we mean an object which is the immediate causal agent to bring about a physical or mental change of state. Energy and artefacts interact with another entity whose state is to be changed directly through physical properties. Information needs an intermediary called 'medium', a combination of concrete or informatic properties, to be perceived by any of the five external senses, instruments or internal senses through some kind of a physical effect like light reflected from a surface. We have broken down information into components of nouns, verbs and qualifiers, to each of which a symbol is assigned by the mind.

A qualifier refers to a single feature of a noun/object or a verb and is called the *unit of information.* A qualifier can be expressed as a single word as adjective or adverb referring to regularly recurring feature or as a number of words and other linguistic forms like gerunds (Quirk, Greenbaum, 1973).

Since information needs an intermediary, the question is : How many and what kind of informatic properties are to be exhibited by an object so that a qualifier can be assigned to it. Or if we observe a given conjunction of properties then the conjunction can be named by a qualifier. There is an element of necessity and sufficiency in the question.

This kind of thinking is common having the danger of 'jumping into conclusion'. With this question in mind we can classify qualifiers into :
a. Those which refer to a *single concrete property* like 'red', a concrete qualifer.
b. Those which refer to *combinations of concrete, directly observable properties* leading to a conclusion 'smooth', for example, a concrete qualifier.
c. Those which refer to *abstract properties or abstract qualifiers* which are inferred from particular combinations of concrete properties. For example, we infer that a person appears 'old' when we observe a certain configuration of geometric and material properties of the skin.
d. Precisely defined qualifiers to which a number and a unit can be assigned are called *scientific qualifiers.* For example, we can say 'the gas is pressurised at 1000 N/m^2' in which the numerical part is data.

Qualifiers under a., b., c. can be gradable like 'happy' or 'painful', non-gradable like 'circular' and expressible as a fuzzy set like 'tall'.

The number of units of information acts as a measure of the *amount of information* like the number of units of energy acts as the measure of its quantity. Information in Fig.2. carries seven units. The *effectiveness of information* is measured by subjective numbers. The first, ranging from – 100 to + 100, is related to the significance, relevance or importance of information in changing a particular instance of mental state and the second, from – 1 to + 1, which is intended as a measure of belief in the certainty of effectiveness of a sentence (Korn, 2000a,b).

Unit, meaning and precision are related to effectiveness. A context-free sentence although with zero units may be considered effective since its terms have meaning and it has *implicit information.* When the 'waiter notifies the guest that *the chef burnt the soup*' the latter becomes aware of what has happened and may well be 'disappointed'. However, when the qualifier 'irretrievably' is added the effectiveness of information will have increased. For the same number of units *effectiveness varies as we vary the qualifiers or we grade the same qualifier since by doing so the meaning of qualifiers is varied.* In the example above, if we change 'tasty' to 'tasteless' the guest is likely to feel less sorry that the soup has been lost. Precision of a qualifier is likely to increase effectiveness of information which is demonstrated by the use of scientific qualifiers.

Further to Figs.1. and 2. the number of units of information equals the number of directed lines, precision increases in direction of those lines until it terminates at data and meaning is imparted to each qualifier. Effectiveness is related to these factors.

3. Notion of bundle of information

When we have more than one dependent clause acting as information, we speak of a *bundle of information.* Qualifiers are selected and information in a bundle is *arranged or directed* so as to make influence as effective as possible in bringing about a change in mental state (Korn, 2000a).

4. Uncertainty of response

A sender constructs and delivers a particular bundle of information and expects a *response from a receiver* as a sign of mental change. In general, however, there is no logical and/or empirical necessity between receipt of an interaction carrying information and response. In case of power interaction carrying energy the expected response regularly recurs, it is a matter of nature or technology, but in case of influence interaction with information the response is by and large unpredictable due to exercise of will, designs and caprices, its connection with its cause is tenuous. Anything or nothing can happen, lack of observable response does not mean a lack of mental change. In case of the examples above, the guest's response may range from getting up and leaving to giving a chef a punch in the face. To bring about a specific response, a bundle of information needs to be designed (Korn, 2000a).

6. Notion of embedded information

We have *embedded information* when a whole subordinate clause is qualified. For example, in the sentence above when we insert '....that, *unfortunately,* the chef.....' the insertion modifies the complete clause. In such a case we would have to convert the sentence into '....that, he considers *unfortunate* that the chef.....'.

7. Manner and timing of information

The *manner and timing of delivery of information* is taken into account by qualifying the constituents of influence interaction. For example, we can rephrase the sentence above 'The waiter *who was unhappy* notified the guest *immediately and offensively* that....'. Thus, these factors are handled by the delivery part of an information system (Korn, 2000a).

8. Expressive power of language

Abstract nouns, qualifiers and verbs are deduced from properties or activities displayed by concrete objects. Their introduction has immensely increased the ease and economy of use and expressive power of natural language by avoiding the repeated recital of properties and activities every time a sufficiently similar phenomenon recurs.

3 Basic Constituents

A scenario or a story is constructed of one- and two-place qualified sentences which are arrived at by *linguistic analysis* (Korn, 1996b). To demonstrate how the symbolism is applied and diagrams constructed, we consider the sentence : 'The postman as part of his duty, with care about his job and having good eye sight, sorts properly addressed letters according to code. We follow the procedure in (Korn, 2000a,b) :

Homogeneous language of context-free sentences
Postman sorts letters. (Skilled power carrier)

Semantic diagram
Shown in Fig.3.

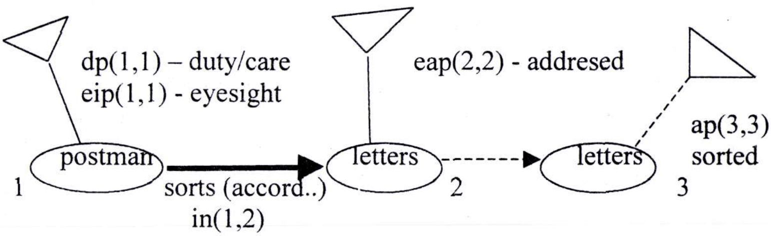

Fig. 3: Diagram of a two-place sentence, a basic constituent

In Fig.3. the object labels are enclosed in contours connected by solid, directed lines of interaction. The dotted directed line indicates change in time, not explicitly stated here. Triangles indicate qualifiers.

Adjectival modifiers (qualifiers) with grading
dp(1,1) – partofhisduty (strong,med,weak),care(high,low)
eip(1,1) – eyesight (excellent,poor)
eap(2,2) – addressed (perfect,mistake)

Logic sequences/topology of scenario
1/1. dp(1,1) $\wedge$ eip(1,1) $\rightarrow$ in(1,2)
1/2. in(1,2) $\wedge$ eap(2,2) $\rightarrow$ ap(3,3)

Interactions with adverbial modifiers
in(1,2) – sorts : sorts(according to code)

Logic sequences with graded adjectives/data for cf
1/1. dp(pman,1,1,(duty(strong,90/.8,med,70/.6.weak,40/.4)),
(care(high,80/.8,low,60/.5)))(.) $\wedge$ eip(pman,1,1,(eye(excel,90/.7,poor,30/.2)))(.) $\rightarrow$
(..)in(sorts,pman,1,letters,2,(how(acctocode)))(.)

Personality profile of 'dp'	cf of 'dp'	cf of 'eip'	minimum cf of dp/eip	cf of rule
strong/high	.8	excell .7	.7	1
(90x.8 + 80x.8)/(90 + 80) =	.8	poor .2	.2	.9
strong/low	.68	.7	.68	.85
.....		.2	.2	.8
med/high	.71	.7	.7	.75
.....		.2	.2	.65
med/low	.55	.7	.55	.6
.....		.2	.2	.55
weak/high	.66	.7	.66	.4
.....		.2	.2	.35
weak/low	.46	.7	.46	.3
		.2	.2	.25

and, hence, cf of in(1,2) = (minimum cf)x(cf of rule) = .7, .18, .58, .16, .525, .13, .33, .11, .264, .07, .138, .05.

1/2. in(sorts,pman,1,letters,2,(how(acctocode)))(.) ∧
eap(letters,2,2,(propad(perfect,90/.2,mistake,40/.8)))(.) →
(1)ap(letters,3,3,(letters(sorted)))(.)

minimum cf (certainty factor) = .2, .18, .2, .16, .525, .13, .2, .11, .2, .07, .138, .05, and
.7, .18, .58, .16, .525, .13, .33, .11, .264, .07, .138, .05.

Since cf of rule =1, cf of ap(3,3) is the same as these numbers giving 24 conditionals.

Thus, the certainty that the *'letters will be sorted according to code'* varies from *'probable'* (cf = .7) to *'unknown'* (cf = .05) (Durkin, 1994). We note that the distribution of certainty is much affected by the 'eye sight' of the postman. Although when the letters are assumed to have mistakes in their address (cf = .8), the postman with characteristics 'strong/high/excellent' will still sort them with certainty of *'probable'* (cf = .7) but with decreasing certainty as his 'quality of performance' decreases.

We regard the variation of cf of the antecedent in the first conditional as the input function shown under 'minimum of cf' in the vertical column of the table above. We can plot this variation as a function of time with unspecified units in Fig.4. We regard the consequent of the second conditional i.e. ap(3,3), as the output which is also plotted in Fig.4. We note that when the certainty of letters being addressed as 'perfect' is very low (cf = .2), their being *'sorted according to code'* is also very low. When the certainty of letters 'with mistakes' is high (cf = .8) their being *'sorted according to code'* is high towards the postman being 'strong in duty, high in care and with excellent eyesight'. Since the *appearance of any states is equally probable*, we cannot tell which of the two possible sets of outcome states is more likely to occur although the performance of the postman remains the same. The occurrence of a set is a *matter of chance with two equally probable sets in this case*.

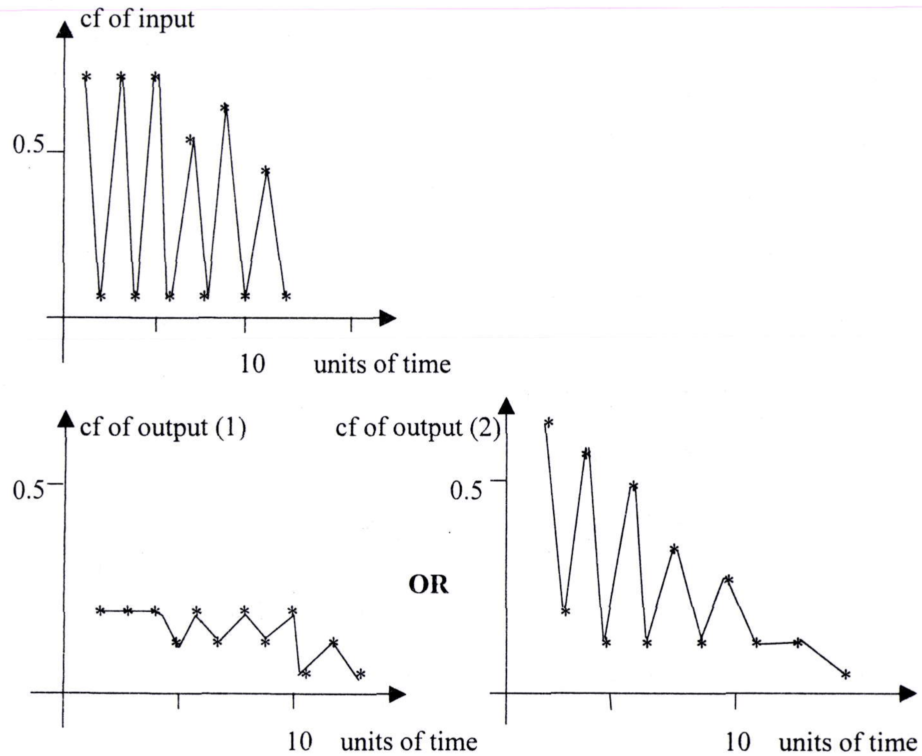

Fig. 4: Plot of input and output in the conditionals

The second type of basic constituent is the *'one-place sentence'* such as 'The alert shop assistant, also a good and well trained employee, quickly noticed that a customer was putting goods in a handbag'. The verb 'notice' *attracts one noun* and is an *information carrying verb*. The diagram is shown in Fig.5.

In general and as shown by the example above, one- and two-place sentences can be expressed as a pair of conditionals (Korn, 2000b) :

$$zp(on,rp,lp,(prop_i(mod_j)))(.) \rightarrow (..)in(vn,io,ao,(adv_k(mod_m)))(.) \qquad 1.$$

$$in(vn,io,ao,(adv_k(mod_m)))(.) \wedge wp(on,rp,lp,(prop_i mod_j)))(.) \rightarrow (..)ap(on,rp,lp,(adv_k(mod_m)))(.) \qquad 2.$$

where ap – acquired property, in – interaction,

z – *d* and/or *ei*, *a* i.e. driving and/or enabling and acquired property,

w – *ea* and/or *c*, *a* i.e. enabling, calculating, acquired property,

on,vn – object, verb names,

rp,lp,io,ao – reference (at which an object is first met in a scenario), applied (subsequent occurrences of the same object), initiating, affected object positions which specify the topology of the situation,

prop,adv – property and adverbial concept,

mod – grade and uncertainty numbers,

i = 1,2,..I and for each 'i' j = 1,2,...J, similarly for k and m.

(.) – certainty factors of antecedent and consequent, (..) – certainty factor of rule.

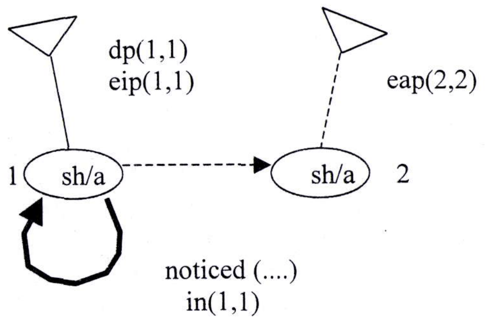

Fig.5: Diagram of a one-place sentence, a basic constituent

The consequent in eq.2. tells us that the acquired property makes explicit the property carried by interaction implicitly as adverb. To indicate the topology of a situation described by context-free sentences, eqs.1,2 are reduced to

$$zp(-,lp) \rightarrow in(io,-) \qquad 3.$$

$$in(-,ao) \wedge wp(-,lp) \rightarrow ap(-,-) \qquad 4.$$

where the dashes stand for numerals representing rp, ao, io and changed object as appropriate.

4 Treatment of a Scenario

We consider a story to show how diagrams of basic constituents are used to construct the diagram of a scenario as in Fig.6. : 'John who wanted to eliminate his debt, noted that a letter with required properties is to be constructed. He was intelligent and able to

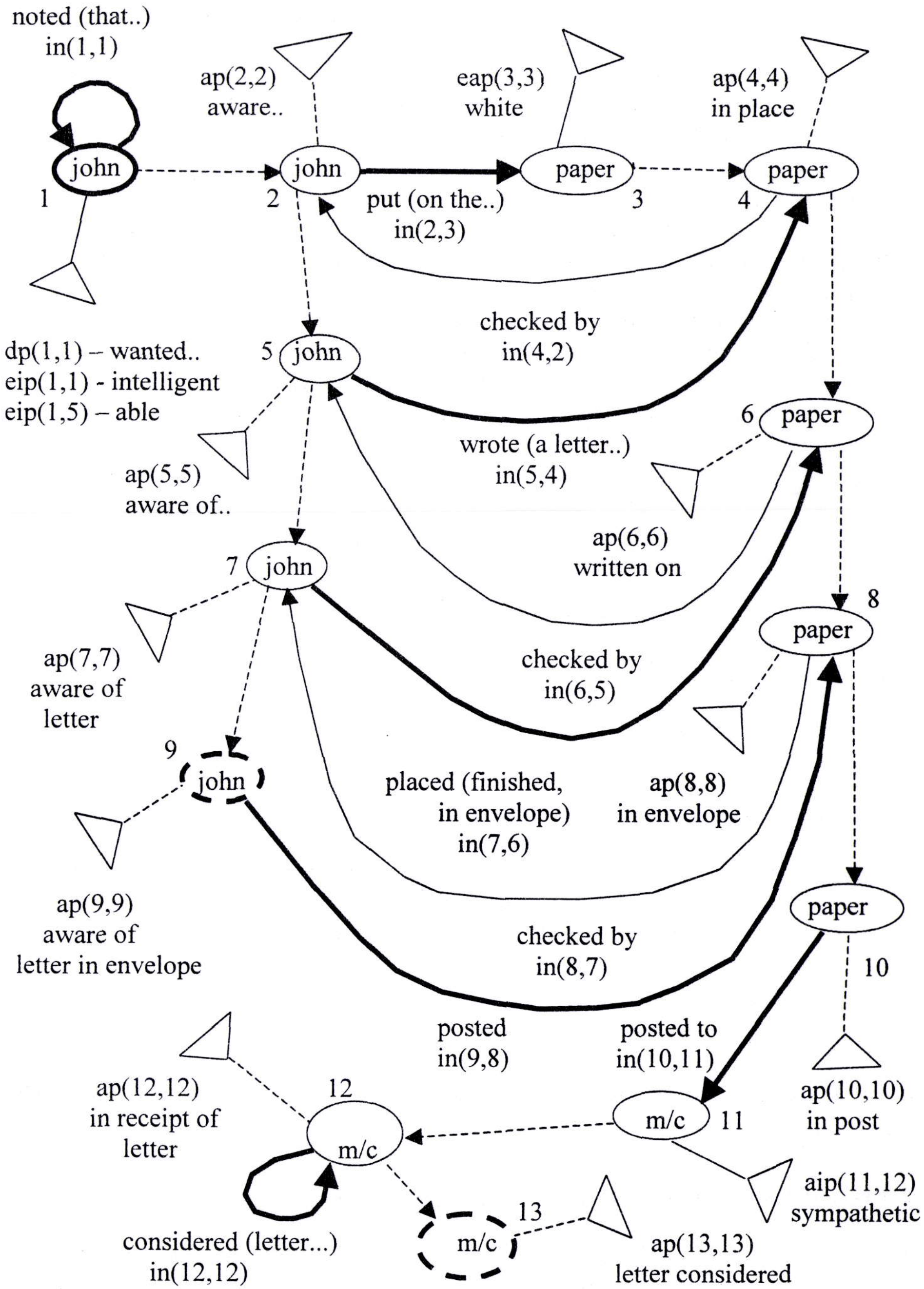

Fig.6: Semantic diagram of scenario

write letters. So, he put white paper on the table and wrote on the paper a letter containing the bundle of information. When he finished, he placed the paper in an envelope and posted it to the mortgage company hoping for sympathetic consideration'. The processes involved in deduction of the subsequent inferential structure using eqs.1,2,3,4 is not given here (Korn, 2000a,b).

5. Conclusions

We have given a brief overview of the current state of systems science and approaches to information systems. This has led to an introduction into a theory of situations in which qualitative properties and uncertainty of outcomes, or physical and mental changes of state, have predominant importance. The central part of the theory is occupied by : a set of empirical generalisations (Korn, 2000b) which are regarded as pervasive throughout the immense variety of manifestation of 'systems', the notion and propagation of state expressed in terms of properties as defined in physics and the causal factors of propagation. The method is rooted in and makes use of branches of existing knowledge.

Natural and technical inanimate objects exhibit a high degree of repeatability of their selected features which is much less the case when a situation involves animate/human objects exhibiting will. Thus, a view imposed on the former can be used for prediction of occurrence of outcomes but in case of the latter the possibility is much restricted.

We have shown how a part of an information system can be represented by means of linguistic modelling. We have introduced a number of features of information to make this concept specific and applicable to situations with living/human objects. However, we have not yet related these features. At the moment the method uses simple means of numerical measures and no computational mechanism yet exists. The projected sequence of events as shown in Fig.6. is in fact an *anticipatory sequence*.

The discussion here raises a number of questions such as to engineer situations by manipulating information, information conveyed by secondary medium, significance of truth of information, design of bundles of information and its delivery i.e. information system (Korn, 2000a), connection between bundles of information and changes in mental state, objectives, need and nature of theoretical work in view of the reduced repeatability of recurrence of features of objects and tenuous connection between influence interaction and response of an object.

References

Anon.(1998). Encyclopaedia Brtitannica Inc., Chicago.
Bertalanffy von L (1950). An outline of general systems theory. The British J. for the Philosophy of Science, v1, n2.
Brown G S, Campbell D P (1948). Principles of servomechanisms. Wiley.

Ckeckland P (1971) A systems map of the universe. J of Systems Eng., v2, n2.
Checkland P (1981). Systems thinking systems practice. Wiley.
Durkin J (1994). Expert systems. Macmillan.
Flynn D J (1998). Information system requirements. McGraw-Hill.
Franklin G F et al (1994). Feedback control of dynamic systems. Addison-Wesley.
Hartley R V L (1928). Transmission of information. Bell System Tech J, July.
Hempel C G (1965). Aspects of scientific explanation. The Free Press.
Jackson M C (1995).Beyond the fads:systems thinking for managers. Systems Research, v12, n1.
Jenkins G M (1969). The systems approach. J of Systems Engineering, v1, n1.
Johnson-Laird P N (1988). The computer and the mind. The Fontana Press.
Korn J (1989). Systems and design as the basis of engineering knowledge. IEE Proc., v136, Pt.A, n2.
Korn J (1995). Theory of spontaneous processes. Structural Eng. Review, v7, n1.
Korn J (1996a). Domain-independent design theory. J. Engineering Design, v7, n3.
Korn J (1996b). Linguistic modelling of situations. Systemist, v18, n4.
Korn J (1998). Linguistic modelling of information systems. Systemist, v20, Sp.Ed.
Korn J (2000a). Construction and delivery of information. 44th Annual Meeting ISSS, 16-22 July, Toronto, Ca.
Korn J (2000b). Possibility of general systems theory. 44th Annual Meeting ISSS, 16-22 July, Toronto, Ca.
Quirk R, Greenbaum S (1973). A university grammar in English. Longman.
Zadeh L A (1973). Outline of a new approach to the analysis of complex systems and decision processes. IEEE Trans, SMC-3, 1.