Osmo Kuusi & Elina Hiltunen

THE SIGNIFICATION PROCESS OF THE FUTURE SIGN

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ABSTRACT

Weak signals have aroused increasing interest among futurists in recent years. The dilemma caused by their varying definitions led Hiltunen (E. Hiltunen, The Future Sign and Three Dimensions of It, accepted for publication in Futures) to introduce the concept *future sign*, which is based on Peirce's semiotic model of the sign. Hiltunen's conceptual framework is developed further in this paper. The focus of the analysis shifts from single future signs to the *signification processes* in which the future signs are perceived, interpreted and produced. The idea is that every future-oriented signification process is based on some *issue* on the agenda. It is a process of learning and acting, focused on the solving of problems related to the issue in question.

1. INTRODUCTION

Weak signals have aroused increasing interest among futurists in recent years (see e.g., Ansoff [1, 2, 3, 4, 5], Webb [6], Coffman [7, 8, 9, 10, 11], Blanco and Lesca [12], Harris and Zeisler [13], Day and Schoemaker [14], Mendonça et al. [15], van der Heijden [16], Brabandere [17], Lücken [18], Salmon [19], Saul [20], Metsämuuronen [21], Mannermaa [22, 23, 24, 25], Hiltunen [26, 27, 28, 29, 30], Kuusi et al. [31] , Nikander [32], Moijanen [33], Ilmola & Kuusi [34], Uskali [35], Brummer [36], Kuosa [37]). They are considered essential in terms of anticipating future changes, but there is no common understanding about their definition. Authors have used the following synonyms, for example: *seeds of change, emerging issues, strategy signals, early-warning signals and wild cards* (see, for example: Molitor [38], Dator [39, 40], Nikander [32], Mannermaa [22] and Petersen [41]).

The dilemma caused by these varying definitions led Hiltunen [42] to introduce the concept *future sign*, which is based on Peirce's semiotic model of the sign [43]. This triadic model consists of the *representant (also called representamen)*, the *interpretant* and the *object*. The representant stands for the form the sign takes (not necessarily material, but perceivable); the interpretant is equivalent not to the interpreter but rather to the sense made by the sign; and the object is that to which the sign refers [44]. According to Hiltunen, the future sign includes three dimensions: issue, signal and interpretation. These dimensions and their correspondences to Peirce's sign are illustrated in Figure 1. [42]

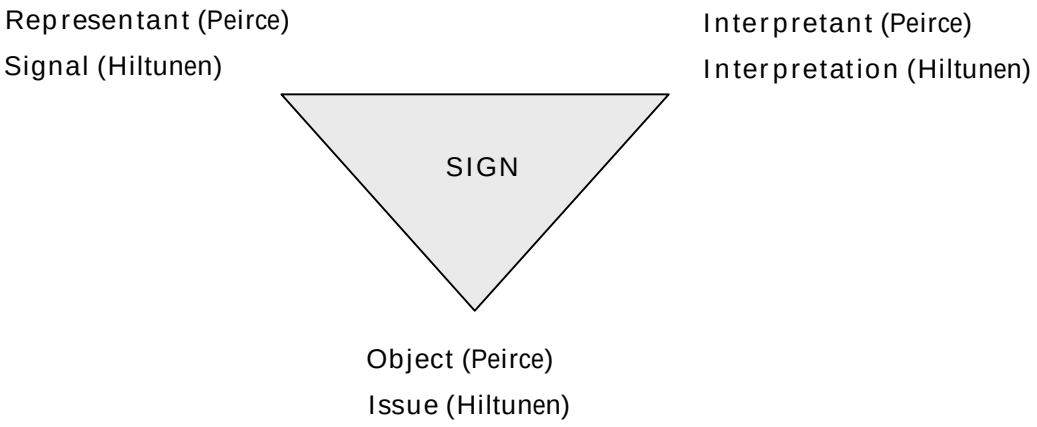

Figure 1. Peirce's triadic model of a sign and Hiltunen's future sign [42]

Peirce focused his attention on single signs. For example, when we see a traffic sign on the street we perceive what Peirce calls the representant. This perceived aspect of a traffic sign would be its physical form, in other words a colorful piece of metal with three angles. We make sense of the sign's meaning (interpretant according to Peirce). Our interpretation connects the traffic sign (representant) with its object (e.g., a dangerous bend in the road).

While Hiltunen uses the analogy of Peirce's triadic sign in the future sign, she goes a little further in her thinking. She has presented a three-dimensional sign (see Figure 2.) to help in describing its development from weak to strong, for example.

The three-dimensional sign also incorporates many signals (representants according to Peirce) and issues (objects according to Peirce).

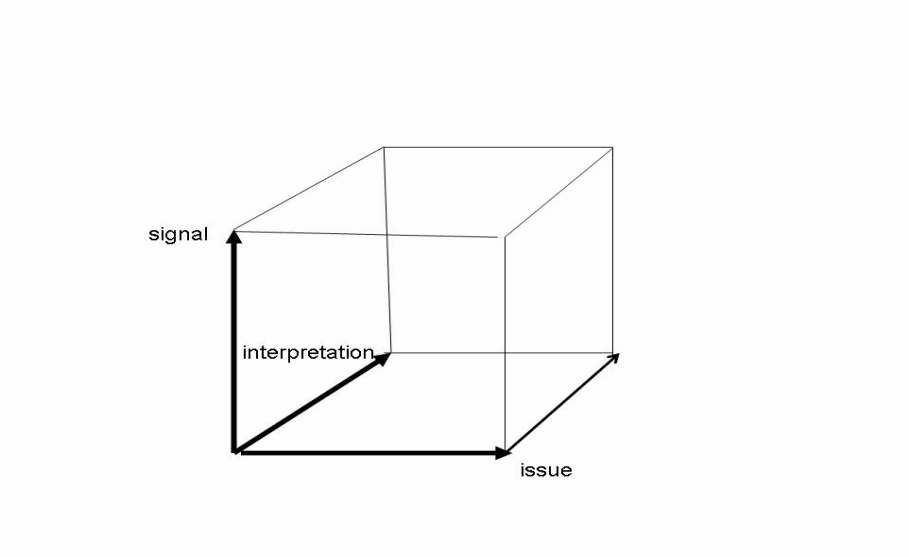

Figure 2. Hiltunen's three-dimensional future sign [42]

The authors examine the dynamics of the future sign i.e. the signification process in this article. The aim in this article is to go more deeply into the future-oriented signification process by drawing on Tarasti's [45] theory of endosigns and exosigns.

2. THE FUTURE-ORIENTED SIGNIFICATION PROCESS

The signification process in this article means the emergence and development of issues and signals/exosigns connected to them, interpreting them (transferring exosigns to endosigns), recreating (secondary) exosigns for communication, and acting based the signs and on the issues. It is a complex process with many interconnections. Figure 3 shows a signification process and the interconnections/interactions in it.

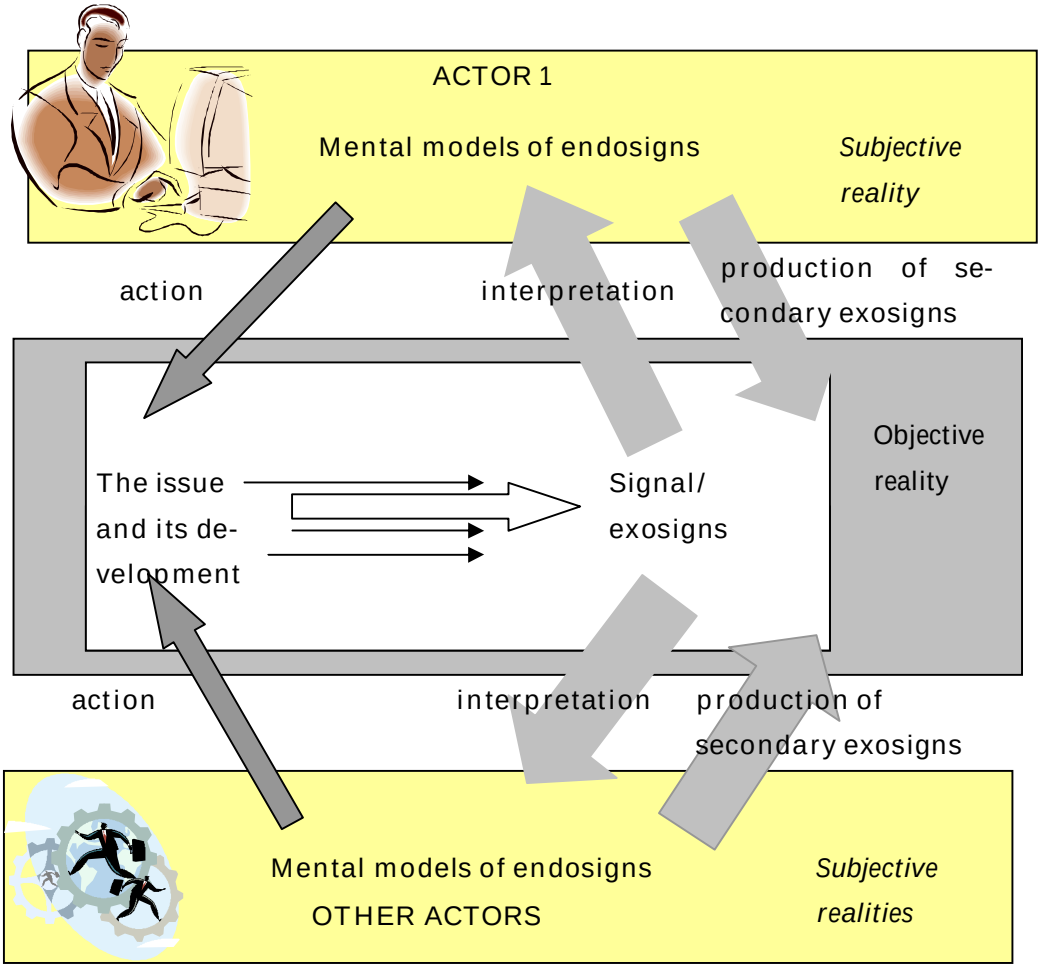

Figure 3. The signification process with its interconnections and interactions

We will discuss the concepts used in the signification model in more detail later. This section gives a short overview of the whole process and presents two illustrative examples.

The signification process starts with the emergence of an issue, which is represented by signals, i.e. (primary) exosigns (from now on in this article we will call signals exosigns). It is also important to no-

tice that the issue itself usually develops temporally and creates further primary exosigns. Exosigns are received by an actor who then interprets them. The actor can notice early exosigns or just late ones. In the interpretation phase exosigns turn into endosigns of the actor ś mental model. Depending on the interpretation, an actor makes his/her decision to act on the issue, i.e. tries directly to affect it.

The actor can also send new exosigns (called secondary exosigns) to other actors and thereby try to make them act on the issue. The action is related to the positive or negative value given to the secondary exosign by the sender of it. The interpretation of the receiver depends on his or her skills to decode the message. The receiver may act on the issue and/or send new exosigns and so forth.

Two practical examples of signification processes are presented below.

A METEOR APPROACHING THE EARTH

When a meteor is approaching the earth there is only an exosign, a small spot of light, visible in the sky at first. As it gets nearer it appears as a clearer and bigger light in the sky. Primary exosigns of the meteor do not depend on the mental model of anybody. In this case the amount of informative primary exosigns increases when the meteor comes closer to the earth. How the exosigns are interpreted depends very much on mental models, however. If the mental model of the interpreter ignores the exosigns of the approaching meteor, the perceived relevance of the issue is near zero. The ignoration might, however, be a big mistake if the meteor is on target to hit the earth.

Apart from the primary exosigns emitted from the issue, there are relevant secondary exosigns based on some receivers 'mental models. The small spot of light in the sky is perceived by observers. They write articles in newspapers, thereby transforming their endosigns to secondary exosigns that are visible to many. Thus the number of secondary exosigns that are based on endosigns (interpretations of other people) also increases step by step.

The exosigns and endosigns of the issue (the meteor approaching the earth) might result in action that has an impact on its relevance. Some action, e.g., a hydrogen-bomb explosion on the meteor, might resolve the issue and make it irrelevant.

A DANGEROUS BEND IN THE ROAD

A bend in the road is potentially a place where traffic accidents occur or dangerous situations arise. People construct a mental model connecting the accident with the issue, i.e. the dangerous bend. This process results in a secondary exosign: the traffic sign that warns about the bend. Drivers are able to anticipate the issue based on that secondary exosign, and it becomes less relevant (less dangerous) because of it.

3. KEY CONCEPTS OF THE FUTURE-ORIENTED SIGNIFICATION PROCESS

The following sections cover the key concepts related to the signification process. The concepts and sections related to them are presented in Table 1.

Table 1. The key concepts of the future-oriented signification process and concepts related to it.

KEY CONCEPTS	TYPES OF CONCEPT	RELATED CONCEPTS
Actor (section 3.1)	Person Community Humankind Other learning beings	Interpreter Influencer Stakeholder Senses Learning capacity Memory Mental model
Issue (section 3.3)	Natural/ Social Masterable/Dominating/Strongly dominating Urgent/ Not urgent	Relevance (perceived and true) Life cycle Agenda Achievement level Interest variable Adaptation
Exosign (i.e. signal) (section 3.2)	Primary Secondary	Production Hype Censorship Manipulation Dissemination Theory formation
Interpretation (section 3.4)		Interpreter Senses Learning capacity Mental model Code (decoding)
Endosign (section 3.2, section 3.4)		Memory Storage capacity of the memory Mental model

3.1 Actors in the signification process

We will use the definition of an actor given by Kuusi [46]. In order to be an actor a being has to be able at least at some stage of his/her/its life

- to learn based on his/her/its senses
- to store the results of his/her/its learning in the memory and
- to influence the development of issues based on his/her/its interests.

Actors (e.g., a single human being, a small community, humankind) are in key positions in the signification process. [1] They may be involved in such a process in three ways, which are not mutually exclusive: as an interpreter, an influencer and/or a stakeholder. The interpreter constructs endosigns concerning the issue in his/her mind. The endosigns in the memory function as a system that we call the actor's mental model. The influencer tries and is able to have an effect on the development of the issue, and the issue can have a positive or negative impact on the stakeholder.

Primary exosigns do not depend on the perception and interpretation of any actor, and without an interpretation of them there is no signification process. However, an actor might have an impact on an issue or on its primary exosign without an interpretation. For example, someone might step on an exceptionally rare plant without perceiving it.

As an influencer, an actor might act directly on an issue or she/he might transmit related secondary exosigns to other actors. An influencer might also destroy exosigns if he/she does not like the fact that other actors will perceive the issue.

An actor may also be a passive stakeholder of an issue without giving any personal interpretation of it. Being a stakeholder means that the developing issue is going to affect him or her.

[1] An actor is not necessarily a human being or a community of human beings: it could also be an intelligent machine or an intelligent animal. In order to simplify the discussion, however, the examples given are either single human beings or communities of human beings.

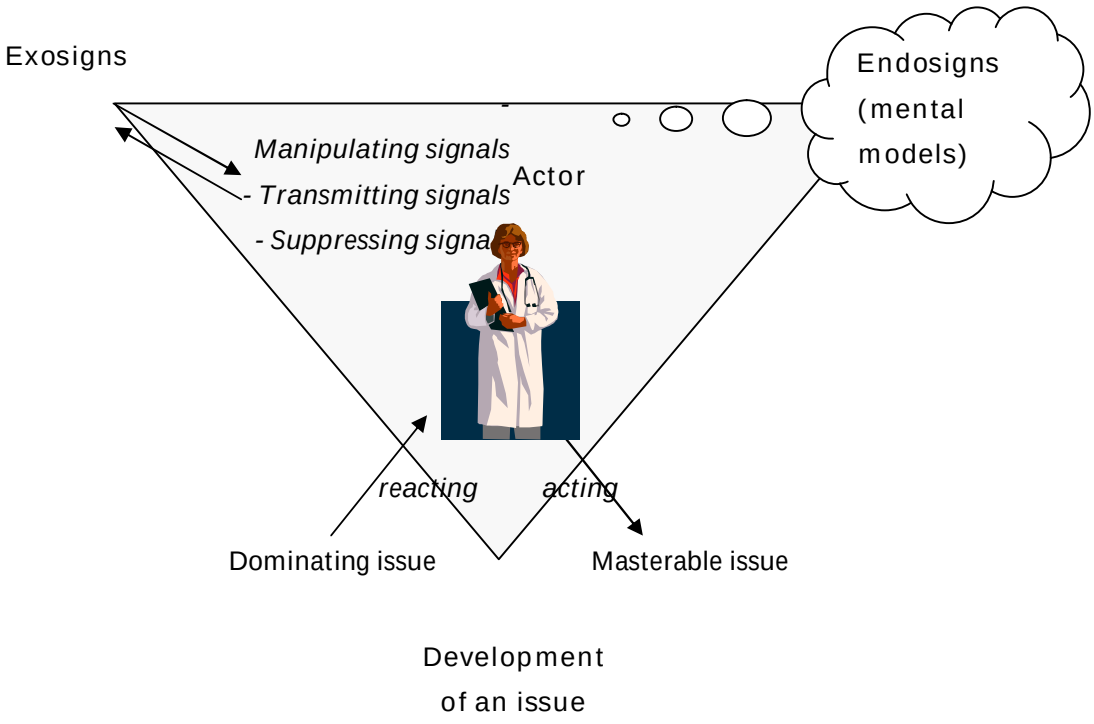

Figure 4. An actor in the signification process.

3.2. Exosigns and endosigns

Tarasti's [45] distinction between endogenic and exogenic, between the inner and outer aspects of sign processes, reorganizes the knowledge offered by classical semiotics.

A hundred years ago Jacob von Uexküll, an Estonian biologist and physician, made a distinction between "Umwelt" and "Umgebung". Umwelt refers to the subjective phenomenal world of an organism, the world of the "self", while Umgebung refers to the organism's actual physical environment. According to Uexküll: "Exosemiotic sign processes transform the objective environment into subjective universes or individual realities. They require endosemiotic processes which build up the... 'counter worlds' or 'inner worlds' in the animal or human body".

Exogenic signs belong to empirical reality, and are observable by anyone. The following question is paramount here: By what rules of inference can we make correct reasoning, on the basis of external facts, about what is internal? The extreme behaviorists hold that everything is in outer behavior and should be read therein. According to the Stimulus-Response (S-R) model of behavior an external stimulus (S) is followed by an external response (R). The problem is that the same external stimulus would produce very different kinds of external responses based on different internal processes.

Modern cognitive psychology has rejected the research program of the behaviorists. The most reasonable explanatory model now is the connectionism model. Connectionism means the statistics-based adjustment of 'weights' and the excitation or inhibition of neurons. When a group of linked neurons fires it triggers a memory (e.g., Edelman and Tonini [47]). It is reasonable to think – as Edelman and Tonini do – that a person needs about 0.1 – 0.2 seconds to reach a conscious conclusion, which is based on a highly integrated network of billions of nerve cells ("the dynamic core hypothesis"). The dynamic core is the physical counterpart of the mental model. What should be the capacity and the level of integration of the dynamic core of an actor is an open question. Seth et al. [48] have suggested some promising measures for their evaluation.

Tarasti [45 p. 43-45] gives many examples of behavior that does not make sense without a complex dynamic core. Without belief, prayer is an empty gesture; without real content, artistic virtuosity fails to move us; a statesman's acts are legitimate only when supported by the right ideas.

In addition to primary exosigns there are secondary exosigns, which have already gone through a signification process once or more often (i.e. turned into endosigns). In practice, secondary exosigns include newspaper articles or a newsflash about the issue. In some cases their number may too high in the light of the true relevance of the issue. A case in point would be when the media take up some emerging issue as its favorite and write about it excessively compared to its relevance. This could be called *hype*. In the opposite case the emerging issue might be very relevant but most of the exosigns are suppressed. This is called *censorship*.

3.3 The issue and related concepts in the signification process

The third main aspect of the signification process is the issue. Tarasti [45] does not discuss this, and focuses only on the interaction between exosigns and endosigns on the general level.

The on-line dictionary MSN Encarta [49] gives several definitions of the word issue. In the context of this article there are two that are the most suitable: an issue is a "*subject of concern: something for discussion or of general concern*", or the "*main subject: the central or most important topic in a discussion or debate*". Its most important feature is its *potential relevance to the receiver*. If the event/object does not have potential relevance to an actor (receiver) then it does not qualify as an issue. A meteor in space is not an issue for an average person, but "a meteor approaching the earth (and it might destroy my town)" is an issue that has potential relevance to an average interpreter. Here it is important to separate two possible ways of seeing the relevance of the issue. Perceived relevance is how relevant the interpreter thinks the issue is, while true relevance is its absolute and objective relevance to the stakeholders.

It is important to understand the lifecycle of an issue, i.e. how an event/series of events rises to the agenda and drops off it. An event/ series of events turns into an issue when it becomes relevant to someone. On the other hand, when it is "resolved" or loses its significance it drops off the agenda.

In this context it is necessary to introduce the concept of the *achievement level* related to an issue: An issue drops off the agenda or is no longer urgent when the achievement level has been reached. It could be seen as the necessary element of any action and futures-related learning process, as Kuusi [49,50] suggested in his General Theory of Consistency. The achievement level can be measured in terms of *interest variable(s),* which are related to the measuring of the issue. For example, the interest variables for "the rise of the water level "are centimeters, while for the issue of global warming they are degrees Celsius or Fahrenheit.

Furthermore, an issue might drop off the agenda following unsuccessful attempts to reach the achievement level: such attempts result in a lower achievement level. One often has to accept the present situation, or even something worse later. This means that the actor *adapts to* the new level. The adaptation may also go in the other direction: one has achieved something and wants more.

There are some human activities in which the role of the achievement level and adaptation are especially evident and important. Success in sport depends very much on reaching the proper achievement level: not too low or too high. The ranking among all relevant players is the clear interest variable. High levels of cognitive engagement and task persistence in the face of difficulty depend on the proper achievement level and adaptation to it.

Below is an example of the achievement level and of the interest variable of a community issue:

> *The water level of the river starts to rise and there is a threat that water will flood the houses in the town (an issue comes onto the agenda). The achievement level here is that the water will not flood the houses. The interest variable is the level of the water (e.g., in centimeters). When the proper value in the interest variable is achieved, the issue drops off the agenda. The adaptation can happen in the building of a dam to protect the town, for example*

3.3.1. Different types of issues

The key aspect of an issue *concerns to whom it is relevant, i.e. who are its stakeholders*. An issue may be relevant only to one actor (a non-infectious disease) or to the population at large (an epidemic). Related to this is the role of the *influencer* who is able to have an impact on the issue. For some issues only one person can make a difference, while for others it needs a wider population in order for it to be dropped off the agenda.

The nature of issues leads to three further classifications. The first of these is related *to the social aspect of the issue*, which Molitor [38] discusses in terms of the division of reality or of being. Other issues could be classified as *natural issues*. These include events in nature such as a rise in the water level, the warming of the climate, and meteor activity. The laws of nature, or the manipulation of natural objects based on these laws, are the driving forces here. Other issues happen in the social environment and thus

could be called *social issues*. They are based on the interpretations of people. For example, capital punishment as an issue in the USA is based mostly on what people think (their values), although its execution is based on the laws of nature. People determine how social issues develop.

The second categorization is discussed in the classical work of Bernard de Jouvenel [51]. For a given actor the future is divided into *dominating* and *masterable* parts. The actor can manipulate a masterable future or issue but not a dominating future or issue. De Jouvenel stresses an important point: 'In human affairs the future is often dominating as far as I am concerned, but is masterable by a more powerful actor, an actor from a different level ". the example he gave was environmental pollution in Paris. An issue may also be *strongly dominating* (he did not mention this) if no human being or group of human beings is able to have a relevant impact on its realization or development. It follows from this definition that no social issue is strongly dominating.

The urgency of the issue indicates how much reaction time there is (see Ansoff [4, p. 367] and Nikander [32]). All of the previously mentioned qualities - to whom the issue is relevant, the actor and the urgency - are related to time. For example, as time passes a masterable issue can turn into a dominating or strongly dominating one if nothing is done within a certain time. Similarly, an issue that concerns only one or a few persons may start to affect many if nothing is done with it. Table 2 gives examples of issues and various ways of categorizing them. It can thus be seen that the possibility of affecting any one issue (such as capital punishment) varies depending on the actor.

Table 2. Ways of categorizing an issue.

	The nature of the issue		**Actor impact**			**Actor**			**Stakeholder**			**Urgency**		
Issue	natural	social	masterable	dominating	strongly dominating	person	community	humankind	person	community	humankind	no	medium	urgent
the rise of the water level in a river	x		x				x		x	x			x	x
climate change brought about by the greenhouse effect	x			x		x	x		x	x	x		x	
climate change brought about by the greenhouse effect	x		x					x	x	x	x		x	
capital punishment		x	x				x		x	x			x	
capital punishment		x		x		x			x					x

3.4 The interpretation process and the related dissemination of exosigns

Interpretation is an activity in which endosigns are formulated in the mind of the actor based on the exosigns of the issue. A possible next step is to produce further (secondary) exosigns for other actors in order to obtain their feedback or try to make them act on the issue. This *dissemination* of exosigns is highly important for the managing of the issue, especially if it is dominating.

Figure 5 illustrates the dissemination of exosigns and their turning into endosigns in the signification process.

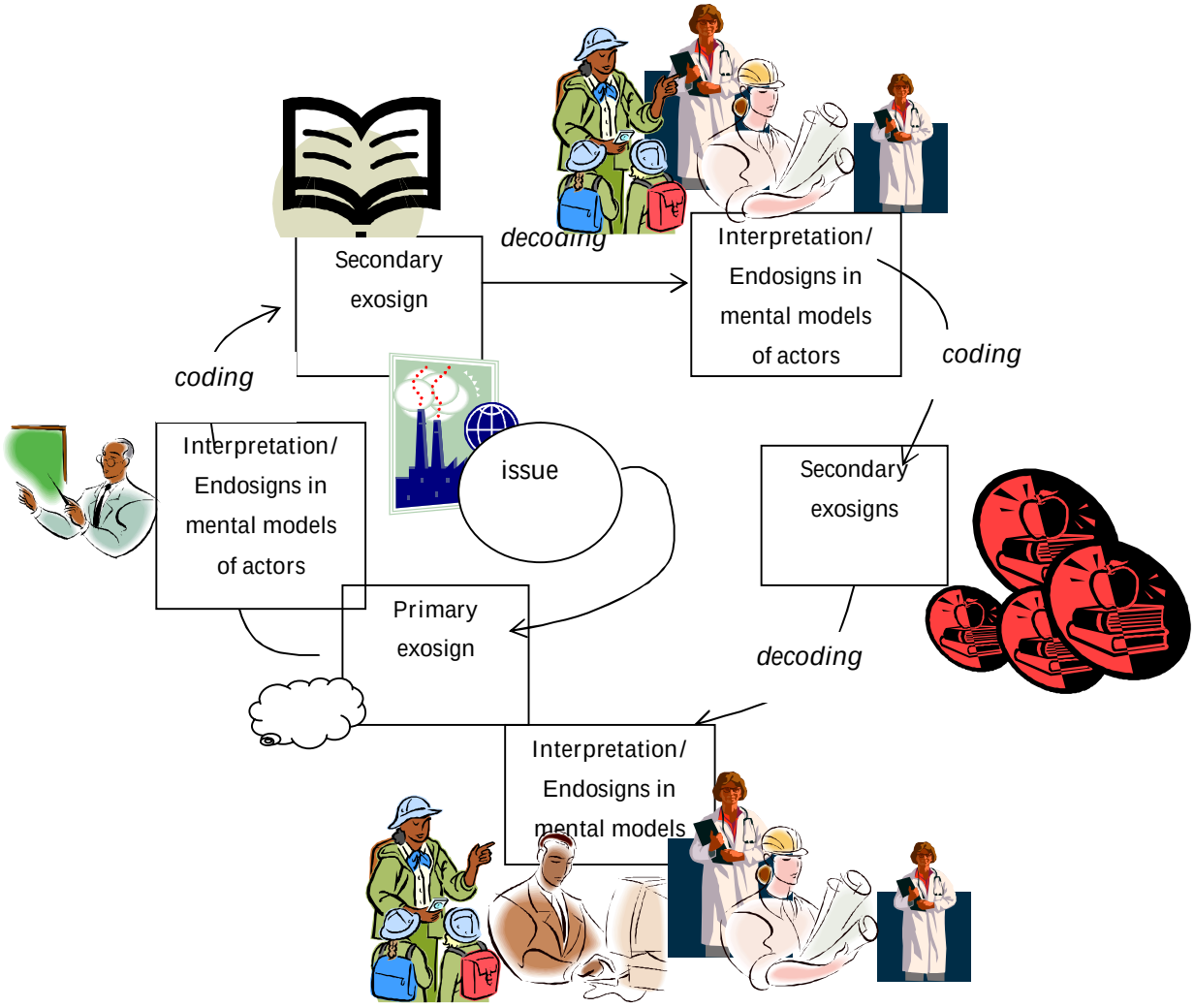

Figure 5. An example of the dissemination of exosigns in the signification process.

The future-oriented signification process is mainly started by the issue, of which the primary exosign is a visible form. The activating exosign typically starts this process. Even if exosigns are visible to us, the underlying issue might be totally new. *Theory formulation* is needed if we are to understand the issue correctly: the theory facilitates understanding of the cause –consequence relationships between the issue

and the related exosigns. When we understand the theory we may understand other exosigns appearing because of the issue, and anticipate the appearance of more exosigns. A practical example of theory formulation is the interpretation of the greenhouse effect. Exosigns such as the rise in temperatures and the rising sea levels are the visible signals. Further examination has revealed the same issue, the greenhouse effect, behind both of them [52]. Now that we know the theory we can expect new exosigns to appear because of the greenhouse effect.

There are three alternatives for observing and connecting the issue and its related exosigns. In the first case both are invisible to observers. It is thus impossible to make any realistic assumptions about the issue because there are no exosigns. However, wild guesses are, of course, available: we might assume that there is alien life in the universe though we are not able to prove it.

In the second case, exosigns of the issue are visible but the issue itself is invisible. From the exosigns it is possible to start to formulate a theory about the relationship between the issue and the signals, which in this case may be symptoms of the issue. For example, if you hear a knocking noise when you are driving a car it is an exosign of something out of the ordinary. The driver may start to think about what is causing the noise. Later it might come out that his wife had left another set of car keys in the other door lock and they are rattling against the surface of the door. (This is not impossible: it really happened to the second author of this article.)

In the third case it is possible to test the connection between the issue and its exosigns: it is possible, for example, to show that greenhouse gases in the atmosphere result in higher temperatures. Figure 6. illustrates the different ways of observing the issue and exosigns in the light of the theory formulation.

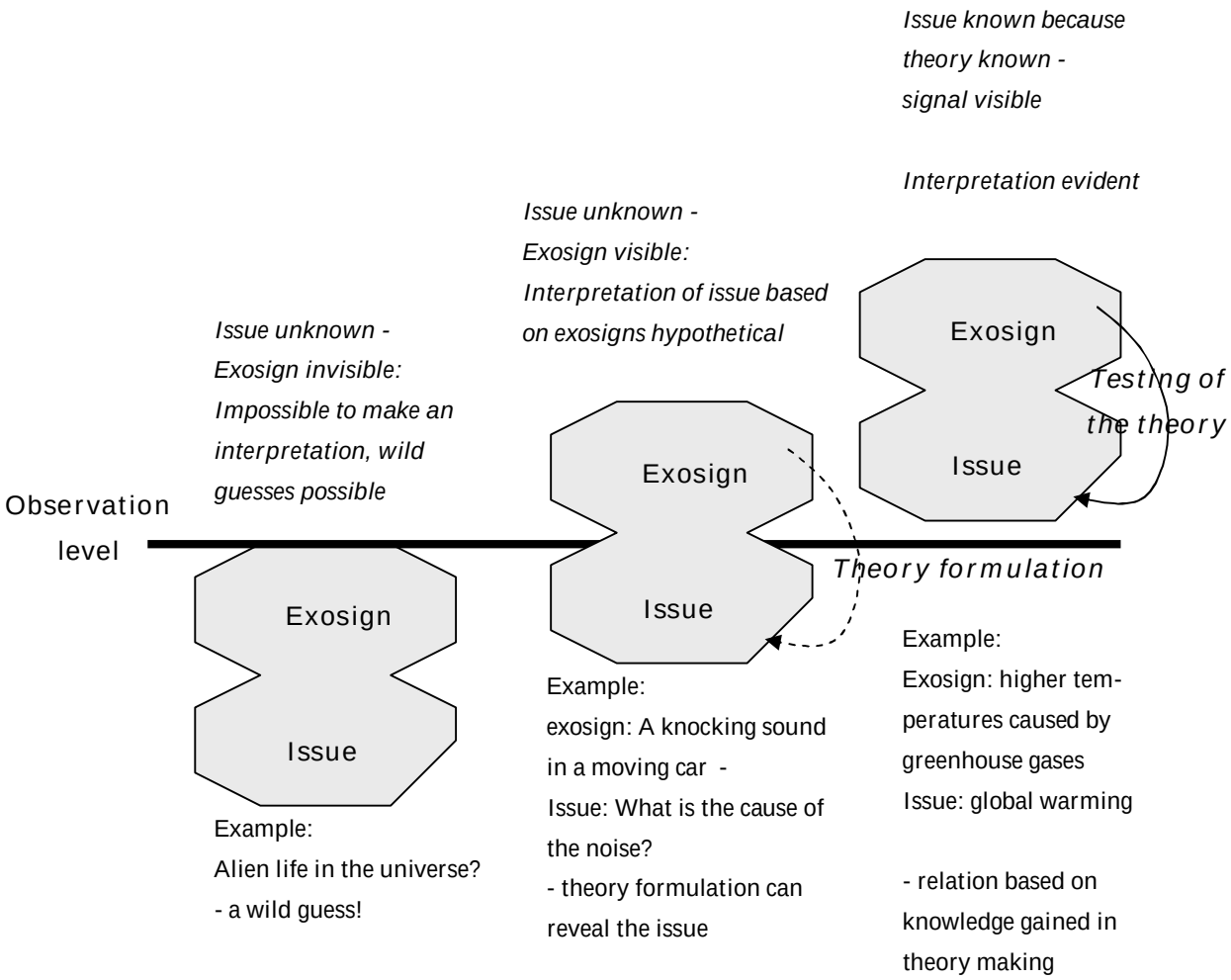

Figure 6. Signals/Exosigns and issues (the objective dimension), and ways of observing them

Sometimes the actor purposefully misunderstands the signal (primary exosign or secondary exosigns) and deliberately transmits a misleading secondary exosign. In practice, a wrong signal (exosign) could be a piece of news in a magazine that is deliberately misinterpreting the truth about the issue. In the case of natural phenomena this might lead to delayed response, and in case of social issues wrong signals may even change them.

4. THE SIGNIFICATION PROCESS AND THE THEORY OF SEMIOTICS

It seems that the above interpretation of the signification process gives an answer to one of the most debated questions in the field of semiotics: the integration of the two main lines of semiotic theory. The first line is based on the Peircian signal-interpretant-object triangle, and the second is the dual interpretation of the sign suggested by the famous semiotician Bernhard de Saussure: the signified and the signifier.

Our suggestion is that the de Saussurian interpretation works better on the level of *single and static* signs and the Peircian interpretation (in an applied form) is better on the level of the *dynamic signification process*, explaining the development of an issue, for example.

It is reasonable to assume that the *exosign has two main aspects* suggested by de Saussure: *the signified* or the perceived "real "aspect, and *the signifier* or the content aspect linking it to the endosigns used in its interpretation. The "real "aspect implies that anyone with suitable means of perception is able to perceive it (with proper senses and instruments, such as telescopes). For example, the real aspect of a traffic sign is a colorful metal plate with three angles or light waves reflected from its surface. The content aspect is related to the shared or not-shared endosigns of people.

The common and shared interpretation of an exosign requires not only that people share single endosigns but also that they have common mental models. The spoken or written language is the most important common mental model shared by people belonging to the same language community. In fact, this mental model is only partly shared. De Saussure called the shared part "Lang "(i.e. the Language) and the not-shared part "Parole "(i.e. the Speaking). For the shared interpretation of a traffic sign people need a further common mental model: a common code for the interpretation of traffic signs. The development of mental models is no longer a black box. They are based on cerebral processes and are better and better understood in the light of recent advances in the biosciences.

5. DISCUSSION

The purpose of this article was to provide a consistent conceptual framework for the analysis of future-oriented signs. With this in mind we suggest an important modification to Charles Peirce's classic interpretation of the sign: the object of the future-oriented sign is an issue (see Hiltunen [42]). The relevant issue is the starting point of the signification process, which ends when the issue drops off the agenda.

Our conceptual framework is suitable both for the anticipation of future developments based on recent signals and for the explanation of past developments. As in our model, the first stage in a political process is the agenda setting. Kingdom [53] defines a governmental agenda as a list of subjects or problems to which government officials and those close to them are paying serious attention. Thus, an agenda-setting process narrows the list of conceivable subjects within any given domain (e.g., health policy). Agendas often change dramatically. Issues "hit "suddenly if the signals are strong enough.

Kingdom's examples taken from the history of the USA are the New Deal, the Great Society and the Reagan revolution. There are exosigns that anticipate that "the policy window "of an issue will open. For example, the first unsuccessful attack by Al Gaida against the World Trade Center in 1993 was a clear early warning, which was not a strong enough signal to get the terrorism issue on the political agenda of the USA, however. A second very strong exosign was needed to push it onto the agenda and to start the future-oriented signification process.

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THE SIGNIFICATION PROCESS OF THE FUTURE SIGN

Weak signals have aroused increasing interest among futurists in recent years. The dilemma caused by their varying definitions led Hiltunen (E. Hiltunen, The Future Sign and Three Dimensions of It, accepted for publication in Futures) to introduce the concept *future sign*, which is based on Peirce's semiotic model of the sign. Hiltunen's conceptual framework is developed further in this paper. The focus of the analysis shifts from single future signs to the *signification processes* in which the future signs are perceived, interpreted and produced. The idea is that every future-oriented signification process is based on some *issue* on the agenda. It is a process of learning and acting, focused on the solving of problems related to the issue in question.

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