Relevance Theory through Pragmatic Theories of Meaning

Ahti-Veikko Pietarinen (ahti-veikko.pietarinen@helsinki.fi)
Department of Philosophy; P. O. Box 9
FIN-00014 University of Helsinki, Finland

Abstract

A century ago, Peirce developed a pragmatic theory of meaning. The theory appeals to the Pragmatic Maxim. It says that the meaning of a concept is the sum total of its implications for possible observations and actions. The Relevance Theory of Sperber & Wilson is classified according to that criteria to the category of pragmatic theories of meaning. It is argued that relevance is an instance of the application of the Pragmatic Maxim.

Keywords: Relevance theory, pragmatic theory of meaning, Peirce, pragmatic maxim, pragmatics, compositionality.

Introduction

Peirce's Pragmatic Theory of Meaning

Charles Sanders Peirce (1839–1914), the noted American philosopher and scientist, took pragmatic meaning as a rule of logic embodied in the Pragmatic Maxim (**PM**): *Consider what effects, that might conceivably have practical bearings, we conceive the object of our conception to have. Then our conception of these effects is the whole of our conception of the object* (5.402, 1878, *How to Make our Ideas Clear*).[1] When considering whether a thought is logical, one has to take the practical consequences of that thought into account. These consequences do not have to be actually acted out, but one has to consider them and take them to be conceivable if any thought was to be complete at all.

Such pragmatic forms of meaning are of utmost importance not only in linguistic pragmatics and communication, but also in current theories of knowledge representation, conceptual graphs in computer and cognitive sciences, as well as in the upcoming vision of a 'semantic web' (Pietarinen, 2003a). All of the applications have enormous potential for the future societies and methods of communication. Among others, the prominent role of such thinking is recognised in recent logical and topological approaches to space and time (Pietarinen, 2005a).

Sperber & Wilson's Relevance Theory

Peirce developed a pragmatic theory of meaning, which appeals to the **PM**. It says that the meaning of a concept is the sum total of its implications for possible observations and actions. I argue that we may classify the Relevance Theory (**RT**) of (Sperber & Wilson, 1995) within the framework of such pragmatic theory of meaning.

The **RT** claims to provide a logical and cognitive account of relevance. It attempts to capture the notion of relevance in communicative situations through *contextual effects*. Since it is impossible to know in advance which descriptions of circumstances or parts of the common ground will actually be relevant to the dynamic, on-going processes of linguistic communication, Sperber & Wilson define the notion in terms of a *context-change potential*.

In other words, relevant factors or properties of an expression are those which intrude into the context of discourse. This is an argument from *cognitive economy*: the goal of communication is to maximise the relevance of the phenomena available to language users while minimising the amount of mental or cognitive processing effort. The grounds for believing in cognitive economy are, in turn, evolutionary.

Relevance Theory and the Pragmatic Maxim

Preamble

The Inferential Model of Communication According to **RT**, the *inferential* model of communication involves attempts to share, distribute and recognise acts of intention, emotion and other modalities delivered in communication. These attempts are what contribute to the relevance of utterances intended to communicate particular pieces of information. What agents recognise as relevant is largely related to common traces in their experience.

Context The notion of *context* is therefore central to this theory, since what is relevant is that which produces a tangible contextual effect, or which penetrates the context of discourse.[2] The goal of **RT** is to provide a theory of communication that would function as a reference for a host of pragmatic phenomena running wild in linguistic populations.

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[1] The reference is to Peirce (1931–1958) by volume and paragraph number.

[2] Apart from cognitive economy, the idea hints at an element of *utilitarianism* in the definition of communicative goals in terms of the maximisation of something (in this context, relevance).

Moderate Psychologism The basic idea of **RT** is thus neither entirely *psychological* nor *epistemic*, though admitting a modicum of both. It aims at providing a theory which is psychologically and psycholinguistically realistic, but not overly so. It is an attempt to make sense of linguistic pragmatics at the cognitive level which, according to (Carston, 1988, p. 713), is "the first account of pragmatics which is grounded in psychology".

Note that this may not be a major compliment. Most have regarded H. Paul Grice's program of analysing literal meaning in public language through conversational maxims as psychological, since it involves speakers' and hearers' intentions and beliefs (Grice, 1989). I consider this assimilation to be a gross oversimplification even on Grice's own account (Pietarinen, 2004b).

That the aim of relevance would be in psychological explanation backfires. Even though announced as one of the main aims of **RT**, the idea of relevance has not been tame enough to suit the needs of a rigorous logical modelling of discourse, since such an enterprise would hinge on effective ways of representing contextual information and its change.

The Pragmatic Maxim

Formulation My key concern, given Peirce's pragmatic outlook on the meaning of concepts, is the placing of Sperber & Wilson's proposal in a wider perspective. I wish to suggest that relevance may be thought of as an instance of Peirce's **PM**, which says that the meaning of a concept is the sum total of its implications for possible observations and actions.

The formulation of **PM** first appeared in the January 1878 issue of *Popular Science Monthly*. Several versions of it exist in Peirce's large corpus. A very succinct and unambiguous one says that "the maxim of logic [is] that the meaning of a word lies in the use that is to be made of it" (CN 2.184, 2 February 1899, *Matter, Energy, Force and Work*).[3]

Unfolding the PM For initial purposes, **PM** may be read such that, in assessing the scores and the overall scale according to which items of information are weighted depends to a large extent on (i) *practical consequences* of accommodating the chosen piece of information introduced in communication, and (ii) what will ensue as a consequence of *actually using* that piece in further cycles of discourse.[4] According to **PM**, the most relevant information is that which provides the best toehold for agents to continue the dialogue or action.

We may thus think of practical bearings as contextual bearings which an item of information, or a belief, has on the context within which it is located. The implications that the infiltration of such items into that context have may thus be read as Sperber & Wilson's preferred properties of relevance in linguistic utterances, which balance the *inferences* made in choosing between possible rival interpretations against the notion of the *cost* of making such inferences. In the light of **PM**, and mutatis mutandis, **RT** turns out to be a markedly pragmatic theory of pragmatics.[5]

The Subjunctive Formulation The **PM** also states that practical consequences need not be actualised, even though they need to be actualisable. They illustrate a 'would-be', a modality presented to the consciousness of future deliberation. According to Peirce's scholastic realism, possibilities are just as real as actual objects and events. Meaning as a list of practical consequences of a concept is characterised in terms of *subjunctive* rather than *indicative* conditionals.

This subjunctive nature of meaning is central to **RT**, in which it is exceedingly difficult to say which among the wide variety of relevant semantic attributes would finally materialise. Such hypotheticals manifest themselves in the relevance of the proposition "Diamonds are hard but not very firm" as expressed by a conditional such as "If diamonds are rubbed then they are unlikely to be scratched" as well as in "If diamonds are struck against something rock hard they are likely to break into pieces".

Note that this later subjunctive formulation has caused some to consider the **PM** to be both too liberal and too broad in its characterisation of concept meaning in terms of possible, potential or expected practical effects that may never be manifested.

Subjunctive Contextual Change This criticism is nevertheless not effective in formulations of **PM** that take relevance into account. What is expected to be relevant is often not only sufficient for a contextual change to happen. A mere potentiality may also intrude into the context and change the constitution in a hypothetical way, as a form of possible or *subjunctively accounted contextual change*, rather than actually realising and bringing any observable effect into existence.

One example of a potential effect is the asymmetric case of the hearer's determination of what would count as relevant in contradistinction to what the speaker intended to be relevant. In other words, relevance to the hearer may remain a potential change, given the shared environment of the utterance.

Relevance as a Constraint According to Sperber & Wilson's original formulation of **RT**, relevance is something that is not *determined* by context but *constrained* by context. On the contrary, thus, a particular context is determined by the search for relevance, the interpreter acting according to the version of the Principle of Charity that concerns relevance maximisation.

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[3]The reference is to Peirce (1975–1987) by volume and paragraph number. The quotation is a striking foreshadowing of Wittgenstein's mantra that "the word has meaning by the particular use we make of it" (Wittgenstein, 2000, item 147: 39v, *Grosses Notizbuch*, cf. Pietarinen, 2003b). Notable differences obtain between the two, however.

[4]Witness the infamous Frame Problem in AI: it is only the most idiotic robots who would not distinguish between relevant and non-relevant input from their environment, and those are unlikely to survive for long.

[5]Not all theories of pragmatics are pragmatic in the same sense. For instance, Montague's theory of grammar claims to explain the resolution of contextual matters using a hybrid of higher-order and possible-worlds concepts.

The Least Effort   But this has the unfortunate effect that the power of **RT** ceases precisely at the point in which an utterance makes the earliest contribution to context, since the theory does not presuppose computing the effects in all contexts — doing so would be cognitively too complex and thus costly. The evolutionarily-hardwired principle of *least effort* will kick in and select the first and most-accessible contextually-effective interpretation (see below).

Suboptimality   I believe that acquiring a comprehensive account of the strategic nature of communication compels us to also bring *suboptimal relevancies* within the scope of the theory. This makes **RT** bi-directional in terms of accommodating also what the hearer takes to be relevant into the formal framework of computing relevance in terms of possible contextual change instead of actual change.

Compositionality, Context and Relevance

Meaning   Referring to his logic circa 1905, Peirce made the following note in unpublished papers:

> The *meaning* of any [assertion] is the meaning of the composite of all the propositions which that [assertion] would under all circumstances [= in all contexts, A.-V.P] empower the interpreter to scribe. (MS 280).[6]

What the interpreter is empowered to scribe are thus, on the one hand, *experimental and evidenced facts* derived from experiments upon these assertions, and on the other, *inferential propositions* that follow from assertions by the same rules of valid inference. Meaning therefore involves both inductive and deductive elements of reasoning.

Pragmatic Principle of Compositionality   The above passages also suggest that, given **PM** according to which the meaning of an assertion is the sum totality of all its actual and possible practical consequences under a given interpretation, Peirce had in mind an approach to *compositionality* quite close to **PM**. A pragmatic principle of compositionality would be thus:

> *The Pragmatic Principle of Compositionality* (**PP-Comp**): *The **meaning** of a sentence is the meaning of all sentences that follow from that sentence either by inductive or deductive principles and permissions under all authorised circumstances.* [7]

Here we have an outward-looking, indefinitely-progressing principle for meaning. Noteworthy is the employment of both inductive and deductive reasoning.[8]

Experimental Verification   *Experimental verification* is one aspect of the *logic of induction*, and Peirce indeed claimed that further clarification of the meaning of assertions is attained by rationally experimenting upon them to form beliefs about the relations involved in their logical representations.

Suc representations should not be equated with "protocol sentences", which were once meant to provide the robust, independent logical bedrocks of scientific theories. For, protocol sentences that can be "confirmed" or "disconfirmed" relate to the practical consequences of assertions that are being experimented upon for the purpose of hypothesis generation. In this wider sense, the consequences may be directly and inductively tested and be prone to the kind of logical atomism that at one time was claimed to be the proper way of constructing protocol sentences from simple sense data.

Hence, some protocol representations may well be subject to compositionality. But there is no logical atomism in the kind of representations that generate these sentences, since they admit of multiple interpretations depending on the purpose of the theory at hand.

Pragmatic Context Principle   As regards the formulation of meaning in terms of its consequences, one may claim that it no longer deals with compositionality of an expression E, as the term is intended to refer to the inner constituents of E. If so, we may then think of **PPComp** as a pragmatised version the *Context Principle* (**CP**) of meaning. According to **CP**, a word meaning cannot exist unless there is sentence in which words are embedded. Such views are found in Frege's (1884) *Grundlagen der Arithmetik*: "The meaning [*Bedeutung*] of a word must be asked for in the context of a proposition [*Satzzusammenhang*], not in separation" (Beaney, 1997, p. 90).[9]

Translated into pragmatistic nomenclature, **CP** may be stated thus:

> *The Pragmatic Principle of Context* (**PPCont**): *A proposition has no meaning in isolation from its consequences.*

If a proposition has no consequences, it is meaningless. **PPCont** is how Peirce would have restated **CP**, had he been informed of its existence in Frege's writings.

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[6]The reference is to Peirce (1967) by manuscript and, if applicable, page number. A similar statement exists among the assorted draft pages of the same manuscript: "The *meaning* of any [assertion] is the meaning of the sum total or aggregate of all the propositions which that [assertion] enables the interpreter to scribe, over and above what he would have been able to scribe" (MS 280: assorted pages 35).

[7]The authorisation refers to the semiotic interpretation between the Utterer and the Interpreter of an assertion.

[8]What exactly is meant by them falls outside the scope of the present treatise. In general, they are intended to account for what all those practical, conceivable, observable or sensible effects referred to in **PM** would ideally amount to in logical terms.

[9]Wilhelm Wundt made similar but slightly earlier remarks on contextual meaning in his first volume of *Logik* (1880–1883). Unlike Frege's overly anti-psychologistic stance, Wundt's approach was prone to psychological undertones, and characteristically so in relation to context-dependent expressions that deal with the 'psychic' associations of lexical meaning. Peirce was well versed in Wundt's writings, the psychologism of which he disapproved.

Relevance and Strategic Communication

Returning to our blanket topic, several further congenialities obtain between Peirce's pragmatism and **RT** than until now has met the eye. I list here five of perhaps the most vital such connections, and supplement these with some wider issues pointing out the existence of a couple of crucial differences between the two, mostly pertaining to strategic aspects of relevance in communication.

Cognitive Economy

Evolutionary Roots First, as noted in the introduction, the relevance-theoretic principle of least effort used in choosing the first and the most accessible interpretation or interpretive hypothesis as the relevant one turns on an argument from *cognitive economy*. This argument is closely related to Peirce's *evolutionary principles*, including his quality of *incomplexity* in the economics of research, which suggests that the hypotheses requiring the least effort should be tested before any others. Incomplete hypotheses, which in rational inquiry are bound to be so, should in Peirce's own words "give a good leave" (Peirce, 1998, p. 110), because they are in any case likely to be eventually overridden by new hypotheses. They should point towards future investigation rather than past. Hypotheses per se are closer to the good and fruitful conducts to be followed than any static set of scientifically-tested propositions.

Cognition vs. Biology In communicative situations, this method may be understood to refer to things such as the acceptance of both micro- and macro-level data in recreating contexts, in other words, the taking into account of evidence from both the *cognitive* and *biological* sides of a given set of theoretical assumptions.

The method of economy is also closely related to the Principle of Charity, of taking others' utterances, in large respect and under normal circumstances, as communicating optimal relevance.

Habits and Interpretants

Habit-change Second, supplementing the effect of belief-strengthening in relevance-theoretic comprehension tasks has its correlate in Peirce's notion of a *habit-change*, which means an updating of the belief set held by the communicators, and which gives rise to logical interpretants.

Whenever a habit-change occurs, what has been communicated must be taken as relevant. What is also notable in **RT** is the appeal to interaction between relevant information and the already-existing assumptions of speaker and hearer concerning the world. This innocent-looking notion implicit in the theory may be unravelled by reflecting it against Peirce's *interactional interpretation* between the producer of the information (the utterer) and the receiver who has assumptions about the world which are contested by the information produced by the utterer.

Interpretants in Communication To make the close connections between Peirce's philosophy and later notions in pragmatics absolutely clear, the notion of ut-

terance meaning, or in relevance-theoretical terms the "assumption ostended by an utterance" can be assimilated with Peirce's notion of the *intentional interpretant* that he introduced in his correspondence with Lady Victoria Welby (Peirce, 1977). Peirce terms the meaning that the interpreter has to work out the *effectual interpretant*. Their mutual merger produces the *communicational interpretant*, which ultimately accounts for how any form of communication is possible in the first place. The relevance-theoretic outlook on communication has now come strikingly close to this time-honoured Peircean perspective.

Game-Theoretic Principles

Strategies Third, since the degree of effort required in changing the background assumptions measures the degree of relevance, the induced minimax reasoning may be fitted into the *strategic framework of game theory*, making it explicit that context update in discourse is a rational matter of (optimal) strategy selection. However, as soon as we do this, we are close to what Peirce's 'Endoporeutic Method' is intended to achieve, as it may be re-instantiated as a form of strategic evaluation method in the sense of *game-theoretic semantics* (Hintikka, 1973; Pietarinen, 2005a).

Payoffs Whether the effort of bringing forth relevant information is, or is not, to be recommendable, depends largely on the *outcomes* (payoffs) of the relevant strategies in the associated game of discourse interpretation. Likewise, it is necessary to deduct the costs incurred by inferences to the best (in the sense of the most-relevant) interpretation from the payoff values assigned to such strategies.

Rationality While the strategies are chosen according to the general principle of *rationality* of actions, since they encode information about the context in which discourse is performed and are not confined to isolated utterances, they make the relevance-theoretic notion of the context-change potential of information introduced in communication amenable to rationalistic (but not hyper-rationalistic) game-theoretic analysis.

Maxims of Conversation and Relevance

Fourth, as far as the history and the emergence of the idea of relevance is concerned, it would be make-believe to claim that the core component of relevance (or maxim of relation) would have been something novel with Grice, let alone Sperber & Wilson's **RT**. From a purely textual viewpoint, Peirce offered the following passage:

> If the utterer says "Fine day!" he does not dream of any possibility of the interpreter's thinking of any mere desire for a fine day that a Finn at the North Cape might have entertained on April 19, 1776. He means, of course, to refer to the actual weather, then and there, where he and the interpreter have it near the surface of their common consciousness. (MS 318: 32–33, c.1907, *Pragmatism*).

The answer to what relevance theorists have been searching for is implicit in this example: it is the *collateral-*

ity of what is given in observation for both the utterer and the interpreter of the utterance that determines relevance. In the light of Peirce's *phenomenology*, the notion of "what is given" naturally refers not only to real, dynamic, or physical objects, but also to the ideas that signs produce in consciousness. They thus consist of both factual and conceptual elements. There is no analytic/synthetic division in such collaterality.

The ideas evoked by conscious minds thus depend on the situations or environments in which collateral observations can be made, even though the assertions that the signs make in such situations are independent of them. They can be made just as well in other situations, in which case the interpretants produced are, of course, likely to be different.

Since Peirce's logic and his theory of communication (Pietarinen, 2003c) is purpose-driven and full of accounts of meaningful intention, and especially since every utterance is made with some goal in sight that an agent tries to reach, the notion of what is relevant must also be assessed with that purpose in mind. What is relevant is relative to the circumstances prevailing in the communicative situation, but what is truly relevant is also, and most likely first and foremost, calculated to be so.

Dewey's Pragmatic Account of Contextual Effect

Fifth, it was not only Peirce's pragmaticism (and pragmatics) that foreshadowed the ideas of relevance theorists. Also the other renowned American pragmatist John Dewey argued for relevance as a context-effective, context-changing potential: "The existence of the problematic situation to be resolved exercises control over the selective discrimination of *relevant and effective* evidential qualities as means" (Dewey, 1925, my emphasis).

I suppose it will be tedious to find any textual evidence from the early pragmatists' writings that would come closer than Dewey's remarks to the essentials of the later relevance-theoretic idea of relevance as an effective, inferential, context-sensitive and context-affecting notion. From the pragmatist perspective, such effects are natural consequences of the open-systemic nature of language and the organisms that utilise it, embedded as they are in the background from which mutual collaterality is gained, and which is both affected by and constituted via the selective bias of actions by these organisms.

Critique and Outlook

Revisiting the Roots: Peirce vs. Grice

Considerable differences also obtain between Peirce and the kind of pragmatics set up by Grice and his followers and pseudo-followers. The communicative dimensions of Peirce's sign theory are by no means exhausted by what **RT** attempts to achieve. What is avoided in Peirce's theory of communication is the untoward tendency in current theories to reduce variability in linguistic meaning into the one-sided problem of the speaker's meaning and recognition of his or her intentions. In **RT**, for instance, the hearer's role has not been incorporated in full.

No one-shot interpretation would have been approved of by Peirce, for whom the reciprocal, open-ended and triadic nature of sign meaning is irreducible. I suppose that the reason for the mild reductionism advocated by Sperber & Wilson lies in the unpremeditated domination of Grice's original proposal, in which he laid considerable emphasis on the role of speaker-meaning in linguistic comprehension. Grice's followers took his suggestions too literally: he never claimed that by focussing on what is different and what is similar in speaker-meaning vs. literal meaning one would reach an exhaustive account of what linguistic and logical meaning amounts to in general.

Grice's Anti-psychologism

Moreover, the *soi-disant* followers of Grice were misled by what they took to be his key suggestion: that the proper exposition of speaker-meaning ought to be conducted, first and foremost, by psychological means. In sober reality, this suggestion was an afterthought for Grice. He de-emphasised the use of psychological notions in explaining speaker-meaning. This comes out very distinctly in his writings once it is realised that (i) Grice's main occupation was the *meaning of logical particles* (most notably of conditionals and other logical connectives) rather than linguistic utterances, and that (ii) his remark that psychological concepts, required for the formulation of an adequate theory of language, refers to *intensional concepts of believing and intending* which may be tackled in a logical manner.

After all, in Grice's writings, references to psychological terminology are few and far between. His theory of meaning is no more psychological than, say, game theory or epistemic logic are matters concerning psychic activity (Pietarinen, 2003d; 2004c).

Rationality and Relevance Theory

RT may have emerged in the wake of Grice, but it subsequently redefined its goals to the extent that it is now somewhat of a rival. The emphasis on the search for principles of cognitive processing, from which it is hoped that implicatures and other pragmatic notions ensue, has had the effect of diminishing the force and depth of the all-powerful *rationality postulate* upon which Grice's programme was built.

In so doing, relevance theorists have rubbed shoulders with the computational sciences, sciences for the efficient accounting of information transmission and manipulation, but at the same time turned a blind eye to the conceptual analysis of information. Accordingly, **RT** has gained in status compared to theories of less-than-hyperrational reasoning and action. They all share the methodological concern that effort spent on any act of uttering and interpreting, or believing and decision-making, should be weighed against the practical consequences of such acts, and they thus continue the venerable economy of research methodology and pragmatism that was originated by Peirce. This methodological attitude was also Grice's main preoccupation.

Conclusions

Lessons from the Pragmatic Maxim

Relevant items of information are those that are context-effective. This means that they are context-dependent. In communicative situations, context-dependence is inferred by the interpreter who is given evidence concerning the intended meaning by the utterer. This account of relevance is nothing like a coding-encoding method of expressing thought and then comprehending the meaning or content of the expressed thought, let alone an endorsement of the view that the actual meaning or content resides in such expressions. The hearer has to infer the intended meaning, and the speaker has to effectuate the intended meaning. Varieties of meaning cannot be lumped together under any single method.

Outlook

What will happen to **RT** in the light of pragmatic theories of meaning and the **PM**? **RT** is now being built upon cognitive theories of the *competence of intelligent agents* while simultaneously one should support its inferential and logical dimensions.

In contrast, Peirce's goal was not to spell out the theory of cognition of intelligent agents, let alone their psychology, but to dispense with these as much as possible. This may not have been an undertaking that was invariably realistic. In the very least, however, he set out the priorities he thought were required in the brands of rational inquiry that concern language and thought.

Aside from **RT**, Fauconnier & Turner (2002)'s mental spaces and conceptual blending may be improved upon via pragmatic meaning theories (Pietarinen, 2004a). Also, the original statement of the *speech-act theory*[10] is to be counted along. Accordingly, Grice and his followers may be aligned with with the historical line-up that began with pragmatic theories of meaning (Pietarinen, 2004b).

Acknowledgments

References

Beaney, M. (Ed.) (1997). *The Frege Reader*. Oxford: Blackwell.

Carston, R. (1988). *Implicature, explicature, and truth-theoretic semantics*. In R. Kempson (Ed.), *Mental Representations: The Interface between Language and Reality*. Cambridge: Cambridge University Press.

Dewey, J. (1931). Context and thought. *University of California Publications in Philosophy*, *12*, 203–224. (Reprinted in Bernstein, R.J. (Ed.), *On Experience, Nature, and Freedom: Representative Selections by John Dewey*. New York: Bobbs Merrill Company.)

Fauconnier, G. & Turner, M. (2002). *The Way We Think: Conceptual Blending and the Mind's Hidden Complexities*. New York: Basic Books.

Grice, H. P. (1989). *Studies in the Way of Words*. Cambridge, Mass.: Harvard University Press.

Hintikka, J. (1973). *Logic, Language-Games and Information*. Oxford: Oxford University Press.

Peirce, C. S. (1967). Manuscripts in the Houghton Library of Harvard University, as identified by Richard Robin, *Annotated Catalogue of the Papers of Charles S. Peirce* (Amherst: University of Massachusettes Press, 1967), and in The Peirce Papers: A supplementary catalogue, *Transactions of the C. S. Peirce Society*, *7*, (1971), 37–57.

Peirce, C. S. (1975–1987). *Contributions to The Nation*. Four volumes, ed. by Kenneth Ketner and James Cook. Lubbock: Texas Tech University Press.

Peirce, C. S. (1977). *Semiotic and Significs: The Correspondence Between Charles S. Peirce and Victoria Lady Welby*. Ed. by C. S. Hardwick and J. Cook. Bloomington: Indiana University Press.

Peirce, C. S. (1998). *The Essential Peirce* 2. Peirce Edition Project, Bloomington: Indiana University Press.

Pietarinen, A.-V. (2003a). The semantic + pragmatic web = the semiotic web. *Proceedings of the International IADIS/WWW Conference*, (pp. 981–984), IADIS Press.

Pietarinen, A.-V. (2003b). Logic, language games and ludics. *Acta Analytica*, *18*, 89–123.

Pietarinen, A.-V. (2003c). Peirce's theory of communication and its contemporary relevance. In K. Nyíri (Ed.), *Mobile Learning: Essays on Philosophy, Psychology and Education*. Vienna: Passagen Verlag.

Pietarinen, A.-V. (2003d). What do epistemic logic and cognitive science have to do with each other? *Cognitive Systems Research*, *4*, 169–190.

Pietarinen, A.-V. (2004a). Agenda cognitive linguistics: C. S. Peirce and the emergence of the common ground. In *Text Processing and Cognitive Technologies*, *9*, (pp. 208–214). Moscow: MISA.

Pietarinen, A.-V. (2004b). Grice in the wake of Peirce. *Pragmatics & Cognition*, *12*, 295–315.

Pietarinen, A.-V. (2004c). Towards cognitive informatics: Awareness in the brain, logic and cognitive neuroscience. In Y. Wang (Ed.) *Cognitive Informatics: Exploring the Natural Intelligence*. Singapore: World Scientific.

Pietarinen, A.-V. (2005a). *Signs of Logic: Peircean Themes on the Philosophy of Logic, Language and Communication* (Synthese Library Series). Dordrecht: Springer.

Sperber, D. & Wilson, D. (1995). *Relevance Theory: Communication and Cognition*. Oxford: Blackwell.

Wittgenstein, L. (2000–). *Wittgenstein's Nachlass, The Bergen Electronic Edition*. The Wittgenstein Trustees, The University of Bergen, Oxford University Press.

[10]That is to say, not the one suggested by John Searle and J.L. Austin, but by Peirce and his followers, especially those affiliated with the Significs Movement in 1920s and 1930s, e.g. Gerrit Mannoury and L.E.J. Brouwer.