Hyperintension, intension, extension

Marie Duží
marie.duzi@gmail.com
VSB-Technical University Ostrava, Czech Republic

Bjørn Jespersen
bjorn.jespersen@gmail.com
Department of Computer Science, VSB-Technical University Ostrava and
Institute of Philosophy, Department of Logic, Czech Academy of Sciences, Prague,
Czech Republic

Pavel Materna
maternapavel@seznam.cz
Institute of Philosophy, Department of Logic, Czech Academy of Sciences, Prague,
Czech Republic

Symposium proposal

Short annotation

The aim of this symposium is to explore the notion of *hyperintensionality*.

This notion is anchored to foundational research in philosophical logic. One example is formal semantics and its research into linguistic meaning, synonymy, reference, and expressive power. Another example is attitude logic and its research into closure principles, illogical attitudes, omniscience, and the flow of information.

The intention behind the symposium is to highlight the different reasons for opting for a hyperintensional framework in one's semantic, logical or philosophical pursuits and not least the different forms hyperintensional frameworks may assume.

Description of the symposium

The aim of this symposium is to explore the notion of hyperintensionality. This notion is anchored to foundational research in philosophical logic. One example is formal semantics and its research into topics like linguistic meaning, synonymy, reference, and expressive power. Another example is attitude logic and its research into topics like epistemic and doxastic closure, illogical attitudes, omniscience, and the flow of information within one agent or among several agents. The intention behind the symposium is to highlight the different reasons for opting for a hyperintensional framework in one's semantic, logical or philosophical pursuits and not least the different forms hyperintensional frameworks may assume.

In particular, we wish to investigate how, relative to a given framework, hyperintensions relate logically to intensions and extensions. This investigation presupposes in turn an investigation into what to make of the notions of intension and extension. The most straightforward approach to going hyperintensional would consist in adding a superstructure of hyperintensions onto an existing edifice of intensions and/or extensions. But it is not a matter of course that either intensions or extensions are to be preserved.

The overall purpose informing the symposium is to lend further impetus to the accelerated research into hyperintensions characteristic of various quarters of analytic philosophy. While the need for hyperintensionality is widely appreciated in logically oriented quarters, this is less so with the more informal portions of analytic philosophy, including philosophy of language and epistemology. It is our ambition that a strengthened focus on the need for a generally hyperintension-friendly approach will install the capacity to accommodate hyperintensions as a touchstone for philosophical theories of meaning and knowledge/attitudes/information. We see this symposium as an important move in that direction.

In the following we provide philosophical motivation for exploring the notion of hyperintensionality and some conceptual background.

The enterprise of philosophical logic has been through an extensional and an intensional phase. The former was marked by the efforts of Quine, Davidson and others to interpret all scientific, mathematical and logical language, as well as those fragments of natural language that were deemed reducible to such regimented languages, within a framework of extensional logic, which was the first-order predicate calculus. This logic is well-defined and has well-known properties, but is much too restrictive for the purposes of most fragments of natural language and arguably also for various fragments of logical and other artificial languages. The intensional phase was ushered in by the arrival of possible-world semantics, which established itself as a respectable paradigm of formal semantics in the early 1960s. Much technical and philosophical mileage has since been had out of this intensional logic. Among its virtues were that it was continuous with the prevalent model-theoretic semantics, was able to account for contingency, the *de dicto/re* distinction, sets versus properties, truth-values versus propositions, etc., and provided a rigorous answer to Quine's challenge of how exactly to individuate intensions – namely up to necessary equivalence, equating necessary co-extensionality with co-intensionality. Needless to say, though, the possible-world conception of intensions left Quine and other advocates of a frugal logical ontology unimpressed, since possible worlds were invoked as functional arguments. Possible worlds were deemed too abstract and obscure.

However, since Carnap introduced his notion of intensional isomorphism, in 1947, it had been widely acknowledged that some logical objects needed to be finer individuated than up to

logical equivalence. Cresswell, in 1975, defined negatively as 'hyperintensional' any individuation finer than logical equivalence: if *A*, *B* are hyperintensions, it is possible that *A*, *B* are necessarily co-extensional and yet distinct. Whereas possible-world intensions arguably fit most or all modal contexts, they are demonstrably too crude for explicit attitudes (i.e. those attitudes that are not deductively closed) and synonymy. The problem, in essence, is that what makes possible-world semantics into an extensional logic of intensions is its individuation of intensions (rather than the validation of the principles of extensional logic). Hence, formal theories of meaning and attitudes/information have seen the light of day. For instance, some hyperintensional theories are algebraic, like Bealer's and Zalta's, while others are procedural, like Tichý's, and others again remain within the world idiom, such as Hintikka's or Priest's, in order to model (para-) inconsistent beliefs, or turn to *n*-tuples for some notion of structure, like Cresswell's or Kaplan's. Explorations into hyperintensional logic have often run in tandem with the research paradigm of so-called structured meanings. However, the exact nature of the relationship between hyperintensions and structured meanings remains an open research question, and is one we would be happy to see addressed in our symposium.

Whereas possible-world semantics maintains an extensional principle of individuation of intensions, a possible-world-intensional approach such as Montague's is notorious for failing to validate various principles of extensional logic. Therefore, perhaps *the* fundamental question to raise when it comes to hyperintensions is whether it is feasible, or desirable, to aim for an extensional logic of hyperintensions, or whether the ambition to validate the principles of extensional logic also for hyperintensions is either unattainable or misguided. Thus, what are the prospects of preserving properties like the compositionality of meaning, the transparency of reference and sense relations, existential quantification into hyperintensional contexts, and extensionality as a criterion of individuation and substitution? And what is a *hyperintensional context*, anyway? Must the adoption of such contexts perhaps come with a semantics that alters the semantic properties of terms and expressions? Are there cardinality issues to look out for when adding hyperintensions to one's logical ontology?

Furthermore, we find ourselves confronted yet again with Quine's old challenge to intensional logic: What is the precise individuation of intensions? Should we perhaps adopt a range of hyperintensional criteria of individuation, tailored to particular contexts, rather than privileging one particular individuation? Research in this direction may revive an interest in, inter alia, Church's so-called Alternatives, which he defined relative to the logic of functions he invented (the lambda calculi). A function-based approach is potentially a fruitful paradigm of hyperintensional individuation, but ultimately just one among several options.

Finally, a deeper perspective with potentially far-reaching consequences is that the quest for hyperintensions may exceed the bounds of model-theoretic semantics and set theory. Of course, it is always a technically feasible option to introduce hyperintensions, of various sorts (like hyperpropositions, hyperproperties, etc.), as (intra-theoretical) primitives, in which case a range of such primitives can be simply added to a model-theoretic structure. But as soon as one wishes to define and describe hyperintensions intra-theoretically, it is no longer obvious just how to go hyperintensional merely by means of structure-less entities like mappings or sets. The era of hyperintensionality may conceivably see a revival of structured, or complex or compound, logical entities (whereas the received view has tended to be that structure is syntactic structure only). Thus, the relationship between hyperintensions and structured logical objects adverted to above may turn out to run deep. But the hyperintensional quarters are as yet far from having arrived at anything like a consensus or a dominant view on this topic.

Participants

Luciano Floridi
Laurea, Rome University "La Sapienza", M.Phil. and Ph.D. Warwick, M.A. Oxford
http://www.philosophyofinformation.net
l.floridi@herts.ox.ac.uk

Luciano Floridi is Professor of Philosophy at the University of Hertfordshire, where he holds the Research Chair in Philosophy of Information and the UNESCO Chair of Information and Computer Ethics, and Fellow of St Cross College, University of Oxford, where he is the founder and director of the IEG, Oxford University Information Ethics research Group.

In 2006, he was elected President of IACAP (*International Association for Computing And Philosophy*). In 2009, he became the first philosopher to be elected *Gauss Professor* by the Göttingen Academy of Sciences. Still in 2009, he was awarded the *Barwise Prize* by the American Philosophical Association in recognition of his research on the philosophy of information, and was elected Fellow of the Society for the Study of Artificial Intelligence and the Simulation of Behaviour. In 2010, he was appointed Editor-in-Chief of Springer's new journal *Philosophy & Technology*. He is currently the PI of the AHRC-funded project "The Construction of Personal Identities Online" and of the Marie Curie Fellowship Grant on "The Ethics of Information Warfare: Risks, Rights and Responsibilities" (FP7-PEOPLE-2009-IEF).

Floridi is best known for his foundational research on *Information Ethics* and the *Philosophy of Information*. Other research interests include Epistemology, Philosophy of Logic and the History and Philosophy of Scepticism.

He has published over a hundred articles in these areas, in many anthologies and in such peer-reviewed journals as *Archiv für Geschichte der Philosophie, British Journal for the History of Philosophy*, *Erkenntnis*, *Ethics and Information Technology, International Journal of Human-Computer Studies*, *Journal of the History of Ideas*, *Metaphilosophy*, *Minds and Machines, Philosophy and Phenomenological Research*, *Social Epistemology*, *Synthese, The Information Society,* and *Zeitschrift für Allgemeine Wissenschaftstheorie*. His works have been translated into Chinese, French, Greek, Japanese, Hungarian, Persian, Polish, Portuguese and Spanish.

His most recent books are: *Information – A Very Short Introduction* (Oxford University Press, 2010); *The Philosophy of Information* (Oxford University Press, 2011) and the *Handbook of Information and Computer Ethics* (edited for Cambridge University Press, 2010). His next book is *The Fourth Revolution - The Impact of Information and Communication Technologies on Our Lives* (Oxford: Oxford University Press, scheduled for publication in 2012).

His previous books include *Scepticism and the Foundation of Epistemology – A Study in the Metalogical Fallacies* (Leiden: Brill, 1996); *Internet – An Epistemological Essay* (Milan: Il Saggiatore, 1997); *Philosophy and Computing: An Introduction* (London – New York: Routledge, 1999); *Sextus Empiricus*, *The Recovery and Transmission of Pyrrhonism* (Oxford: Oxford University Press, 2002). He is the editor of the *Blackwell Guide to the Philosophy of Computing* and *Information* (Oxford - New York: Blackwell, 2004).

Marie Duží
Webpage: http://www.cs.vsb.cz/duzi/
Marie.duzi@vsb.cz

Degrees:

1982   RNDr. – Doctor of Natural Sciences (Masaryk university Brno), specialisation: Theoretical cybernetics, mathematical informatics and theory of systems

1992   CSc. – Candidate of Philosophical Sciences (Institute of Philosophy, Czech Academy of Sciences), specialisation Logic, thesis: "*Logic and Data Semantics*"

2002   Docent – VSB-Technical University of Ostrava. Habilitation thesis: "*Logical Foundations of Conceptual modelling*".

Positions:

1971-1985   Institute of Computer Science, Ostrava, programmer - analyst
Analysis, design and implementation of the Production Control System of Moravian building enterprises

1985-1990   CKD Tatra Praha, database administrator

1990-1992   Charles University of Prague, Institute of Computer Science, teaching logic

1992-1994   Czech Technical University of Prague, assistant professor, teaching logic and theory of databases
Analysis and design of the Faculty Information System (implemented in Oracle, 1994)

1994-1996   Exact Holding B.V., s.r.o., Delft, Holland, analyst

1996-2001   Silesian University of Opava, Faculty of Informatics, assistant professor, teaching logic and theory of databases

2003-   Charles University of Prague, Faculty of Philosophy, Department of Logic.

Present position (since 2001)**:**

VSB-Technical University of Ostrava, Faculty of Electrical Engineering and Informatics, associate professor

Books

DUŽÍ Marie, JESPERSEN Bjørn and MATERNA Pavel. *Procedural Semantics for Hyperintensional Logic. Foundations and Applications of Trasnsparent Intensional Logic*. Berlin: Springer, Logic, Epistemology, and the Unity of Science, vol. 17, 2010.

Co-editor:

DUŽÍ Marie, KIYOKI Yasushi, JAAKKOLA Hannu, KANGASSALO Hannu (eds.). *Information Modelling and Knowledge Bases XVII*. Amsterdam: IOS Press, 2007.

DUŽÍ Marie, KIYOKI Yasushi, KANGASSALO Hannu (eds.). *16th European-Japanese Conference on Information Modelling and Knowledge Bases (EJC 2006)*. Ostrava: VSB-Technical University, 2006.

Selected papers

DUŽÍ Marie. The paradox of inference and the non-triviality of analytic information. *Journal of Philosophical Logic*, 2010, vol. 39, pp. 473-510.

DUŽÍ Marie and MATERNA Pavel. Can concepts be defined in terms of sets? *Logic and Logical Philosophy*, 2010, vol. 19, pp. 195-242.

DUŽÍ Marie. St. Anselm's ontological arguments. *Polish Journal of Philosophy*, 2010, to appear.

DUŽÍ Marie. Topic-focus articulation from the semantic point of view. *Computational Linguistics and Intelligent Text Processing*, 2009, Springer, LNCS vol. 5449, pp. 220-232.

DUŽÍ Marie. Strawsonian vs. Russellian definite descriptions. *Organon F*, 2009, vol. XVI, No. 4, pp. 587-614.

DUŽÍ Marie. TIL as the logic of communication in a multi-agent system. *Research in Computing Science*, 2008, vol. 33, pp. 27-40.

DUŽÍ Marie, JESPERSEN Bjørn and MATERNA Pavel. Points of view from a logical perspective II. *Organon F,* 2007, XIV, No. 1, pp. 5-31.

DUŽÍ Marie, JESPERSEN Bjørn and MATERNA Pavel. Points of view from a logical perspective I. *Organon F,* 2006, vol. XIII, No. 3, pp. 277-305.

MATERNA Pavel and DUŽÍ Marie. The Parmenides principle. *Philosophia*, 2005, vol. 32, pp. 155-180.

DUŽÍ Marie. Kurt Gödel. Meta-mathematical results on formally undecidable propositions: Completeness vs. incompleteness. *Organon F*, 2005, vol. XII, No. 4, pp. 447-474.

DUŽÍ Marie. Intensional logic and the irreducible contrast between *de dicto* and *de re*. *ProFil*, 2004, vol. 5, No. 1, pp. 1-34. http://profil.muni.cz/01_2004/duzi_de_dicto_de_re.pdf

DUŽÍ Marie and MATERNA Pavel. A procedural theory of concepts and the problem of the synthetic *a priori. Korean Journal of Logic*, 2004, vol. 7, No. 1, pp. 1-22.

DUŽÍ Marie. Notional attitudes (on wishing, seeking and finding). *Organon F*, 2003, vol. X, No. 3, pp. 237-260.

Jens Christian Bjerring
Department of Media, Cognition and Communication, University of Copenhagen
E-mail: jcbjerring@gmail.com

Scientific focus: Epistemology (including formal epistemology).
Scientific competences: Philosophy of language (especially meaning, two-dimensional semantics), philosophical logic (especially modal, epistemic and doxastic logics), metaphysics (especially modality, possible and impossible worlds), and metaethics (especially naturalism/non-naturalism, cognitivism/non-cognitivism).

Education
2006 – 2010 Australian National Unversity (Research School of Social Sciences), Ph.D. candidate in Philosophy. Dissertation: Non-Ideal Epistemic Spaces.
2003 – 2005 University of Kopenhagen, M.A. in Philosophy (awarded August 2005). Dissertation: Two-Dimensional Moral Semantics.

Employments
2010   University of Kopenhagen, Visiting Research Fellow at The Social Epistemology Research Group, Department of Media, Cognition and Communication.
2008   Australian National University, tutor.
2004 – 2005 University of Kopenhagen, tutor.

Publications
Various articles in epistemology, metaphysics, philosophy of mind, and logic that are forthcoming in Politikens filosofileksikon (Politiken's Dictionary of Philosophy), Poul Lubcke (ed.), Copenhagen, Politikens Forlag.

Invited contributions
"Spaces of Impossible Worlds: a Trilemma", in special issue of *Synthese* on epistemic transmission and interaction, edited by Luca Moretti og Nikolaj J. L. L. Pedersen, forthcoming.

Work in progress
"Spaces of Impossible Worlds: a Trilemma."
"Ways to Construct Spaces of Impossible Worlds."
"Constructions of Impossible Worlds."
"A Problem for the Equal Weight View."
"Stalnaker, Logical Omniscience, and Fragmented Minds" (with Weng Hong Tang.)
"Disagreement and Conceptions of Evidence" (with Nikolaj J. L. L. Pedersen.)

Selected honors and awards
Endeavour International Postgraduate Research Scholarship, ANU PhD Scholarship, Krista og Viggo Petersens Fond, Augustinus Fonden, Knud Hojgaards Fond, Nordea Danmark Fonden,

Bjørn Thoring Flagstad JESPERSEN, PhD
Email: bjorn.jespersen@gmail.com
Webpage: http://tudelft.academia.edu/BjørnJespersen/Papers

2000	PhD, Dept. Philosophy, Masaryk University, Brno, Czech Republic. Supervisor: Prof. Pavel Materna. Thesis: *Attitudes and Singular Reference in Transparent Intensional Logic*.
2001-2009	Postdoctoral Research Fellowships and seven courses taught at Dept. Philosophy, Leiden University, and Section of Philosophy, Delft University of Technology, The Netherlands.
1/2010—present	Visiting Researcher, Department of Philosophy, Institute of Logic, Czech Academy of Sciences, Prague; Department of Computer Science FEI, VŠB-Technical University of Ostrava, Grant Agency of the Czech Republic Project 401/10/0792 *Temporal Aspects of Knowledge and Information*.

BOOKS

- *Procedural Semantics for Hyperintensional Logic. Foundations and Applications of Transparent Intensional Logic* (w/M. Duží and P. Materna), xiii + 552 pp, *Logic, Epistemology, and the Unity of Science*, vol. 17, Springer (2010).
- Co-editor of *Pavel Tichý's Collected Papers in Logic and Philosophy* (w/V. Svoboda and C. Cheyne), University of Otago Press and Filosofia, Czech Academy of Sciences (2004), 901 pp.

SELECTED PAPERS

- '*Contra* Bealer's *reductio* of direct reference theory' (w/M. Zouhar), *Logique et Analyse*, forthcoming.
- 'Two conceptions of technical malfunction' (w/M. Carrara), *Theoria*, forthcoming.
- 'An intensional solution to the bike puzzle of intentional identity', *Philosophia*, forthcoming.
- 'Two kinds of procedural semantics for privative modification' (w/G. Primiero), *Lecture Notes in Artificial Intelligence*, vol. 6284 (2010), pp. 252-71.
- 'The *logos* of semantic structure' (w/M. Duží, P. Materna), in: *Philosophy of Language and Linguistics. Volume I: The Formal Turn*, P. Stalmaszczyk (ed.), Ontos-Verlag, Frankfurt am Main (2010), pp. 85-101.
- 'How hyper are hyperpropositions?', *Language and Linguistics Compass* 4 (2010), 96-106.

- 'Hyperintensions and procedural isomorphism: Alternative (½)', in: *The Analytical Way. Proceedings of the 6th European Congress of Analytic Philosophy*. T. Czarnecki, K. Kijania-Placek, O. Poller, J. Wolenski (eds.), College Publications, London (2010), pp. 299-320.
- 'Substitution in simple sentences: validity *versus* soundness', *Epistemologia* 31 (2009), 241-62.
- ''π' in the sky' (w/M. Duží, P. Materna), in: *Acts of Knowledge.* G. Primiero and S. Rahman (eds.), College Publications, London (2009), 337-51.
- 'Predication and extensionalization', *Journal of Philosophical Logic* 37 (2008), 479-99.
- 'Tractarian *Sätze*, Egyptian hieroglyphs, and the very idea of script as picture' (w/C. Reintges), *The Philosophical Forum* 39 (2008), 1-19.
- 'Knowing that *p* rather than *q*', *Sorites* 20 (2008), 125-34.
- 'Explicit intensionalization, anti-actualism, and how Smith's murderer might not have murdered Smith', *Dialectica* 59 (2005), 285-314.
- 'Why the tuple theory of structured propositions isn't a theory of structured propositions', *Philosophia* 31 (2003), 171-83.
- 'Are wooden tables necessarily wooden?' (w/P. Materna), *Acta Analytica* 17 (2002), 115-50.

40 papers published since 1998

33 invited talks, including 3 tutorials on intensional and hyperintensional logic

27 solicited conference papers accepted

SEBASTIAN SEQUOIAH-GRAYSON
Department of Theoretical Philosophy, Faculty of Philosophy, Oude Boteringestraat 52, University of Groningen, 9712 GL Groningen, The Netherlands.
s.sequoiah-grayson@rug.nl
Projectpage: formalphilosophy.org
Homepage: logic.tsd.net.au

CURRENT POSITIONS
- Postdoctoral Research Fellow, *Formal Epistemology Project*, *Department of Theoretical, Philosophy - Faculty of Philosophy*, *University of Groningen*, The Netherlands.
- Senior Research Associate, IEG, *Computing Laboratory*, *University of Oxford*
PREVIOUS POSITIONS
2008-10: Postdoctoral Research Fellow, *Formal Epistemology Project*, *Centre for Logic*, University
of Leuven, Belgium.
2007-08: Fixed-Term Lecturer in Philosophy, *St Anne's College*, *University of Oxford*
2008: Visiting Research Fellow, *Tilburg Center for Logic and Philosophy of Science*, *Tilburg University*, The Netherlands

AREA OF ACADEMIC SPECIALIZATION
– Formal Philosophy (Substructural Logics; Dynamic Semantics; Categorical Grammars;
– Procedural Reasoning; Dynamic Information Structures; Formal Epistemology)

AREAS OF ACADEMIC COMPETENCE
- Philosophical Logic
- Philosophy of Language
- Philosophy of Mathematics
- Frege
- Epistemology
- Philosophy of Mind
- Philosophy of Psychology and Neuroscience
- Philosophy of Science
- Philosophy of Computing and Artificial Intelligence

EDUCATION
2008: D.Phil. in Philosophy, *Balliol College*, *Faculty of Philosophy*, *University of Oxford*, Thesis: *Information and Logical Equivalence*
2005: B.Phil. in Philosophy *Balliol College*, *Faculty of Philosophy*, *University of Oxford*, 2 year graduate degree, assessed on 6 papers (5,000 words each) and 30,000-word thesis. Thesis: *Information and Logical Equivalence*
2004: M.Phil. in Philosophy *Department of Philosophy*, *University of Sydney,* Thesis: *Two-Dimensional Semantics and Doxastic Reports*
2003: BA (Hons) in Philosophy (1st in University & First Class Honours) *Department of Philosophy*, *University of Sydney,* Thesis: *Epistemic Space and Intensional Semantics*

Selected PUBLICATIONS
EDITED VOLUMES:
2009: Editor (with Luciano Floridi): The Philosophy of Information and Logic, special edition of *Synthese*, March 2009, (Section: *Knowledge, Rationality, and Action*).
ENCYCLOPEDIA ENTRIES:
2010: Logic and Information (with Maricarmen Martinez): forthcoming in the *Stanford Encyclopedia of Philosophy*.
2010: Philosophy of Information (with Luciano Floridi): forthcoming in the *Routledge Encyclopedia of Philosophy.*
2010: Philosophy of Information, forthcoming in the *Internet Encyclopedia of Philosophy*.
JOURNAL ARTICLES:
2010: Epistemic Closure and Commuting Nonassociating Residuated Structures, forthcoming in *Synthese*.
2010: Lambek Calculi with **0** and Test-Failure in DPL, forthcoming in *Linguistic Analysis*.
2009: Dynamic Negation and Negative Information, *Review of Symbolic Logic*, **2**: 1, pp. 233-248.
2009: A Positive Information Logic for Inferential Information, *Synthese*. **167**: 2, pp. 409-431.
2008: The Scandal of Deduction, *Journal of Philosophical Logic*, **37**: 1, pp. 67-94.
2007: The Metaphilosophy of Information, *Minds and Machines*, **17**: 3, pp. 331-344.
2006: Information Flow and Impossible Situations, *Logique et Analyse*, **49**: 196, pp. 371-398.
CONFERENCE PROCEEDINGS:
2011: A Note on (In)Compatibility Relations, forthcoming in Michael Pelis (ed): *The Logica Yearbook 2010*, College Publications, London, 2011.
2010: Ajdukiewicz Functions and Basic Inference, forthcoming in Michael Pelis (ed.): *The Logica Yearbook 2009*, College Publications, London, 2010.
2009: Mono-Agent Dynamics, in Xiangdong He, John Horty, and Eric Pacuit (Eds.): *Logic, Rationality, and Interaction*: *Second International Workshop, LORI 2009, Chongqing, China, October 8-11, 2009, Proceedings*, LNAI 5834, Springer-Verlag, Berlin Heidelberg,

Germany, pp. 321-33.

2009: Non-Commuting Residuation Models with Process Exclusion, in C. Drossos, P. Peppas, and C. Tsinakis (Eds.): *Proceedings of the 7th Pan-Hellenic Symposium of Logic,* Patras University Press, pp. 79-84.

2009: Negative Information and Informational Asymmetry, Jordi Vallverdu (ed.): ECAP09, Proceedings of the 7th European Conference on Philosophy and Computing, Universitat Autonoma de Barcelona, pp. 123-25.

2009: A Procedural Interpretation of Split Negation, Michael Pelis (ed.): *The Logica Yearbook 2008*, College Publications, London, 2009, pp. 211-22.

2008: Metasemantic Information and the Scandal of Deduction, in Michael Pelis (ed.): *The Logica Yearbook 2007*, Filosofia, Prague, pp. 171-86.

2007: Information Gain from Inference, in Xabier Arrazola and Jesus M. Larrazabal (eds.): *LogKCA-07: Proceedings of the First ILCLI International Workshop on Logic and Philosophy of Knowledge, Communication and Action*, The University of Basque Country Press, Donostia, pp. 351-360.

COLUMNS AND SHORT PIECES ETC.:

2009: In Man's Own Image, *Exposition*, Issue 1, Michaelmas 2009, University of Oxford pp. 28-31.

2009- Formal Philosophy Report, weekly post to *LORIWEB*.

2009- What's Hot in Formal Epistemology? Monthly column in *The Reasoner*.

2009: Interview with Igor Douven, *The Reasoner*, May issue.

2009: Editorial for *The Reasoner*, May issue.

PRESENTATIONS

2010: *What is a Deduction? Integrating Logical, Psychological, and Philosophical Perspectives*,

[logic component], with Catarina Dutilh [philosophical component], and Andy Fugard & Niki Pfeifer [psychological component], 2010 meeting of the European Society for Philosophy and Psychology (ESPP), Essen, Germany, August.

2010: *Non-symmetric (In)Compatibility Relations and Non-Commuting Types*, Logica 2010: 24th

International Symposium, Hejnice Monastery, Czech Republic, June 24-25.

2010: *Structured Reasoning as Database Constraints*, Second International Workshop on the Philosophy of Information, Anakara, Turkey, May 20-21.

2010: *Permuting Nonassociating Lambek Calculus and Cognitive Grammars*, UNILOG III, April 22-25, Lisbon, Portugal.

2010: *Negation as Test-Failure in DPL and Negation as Process Exclusion in Categorical Grammar*, UNILOG III, April 22-25, Lisbon, Portugal.

2010: *(In)Compatibility Relations, Operational Semantics, and Test-Failure*, DIP-Colloquium, Institute for Logic, Language, and Computation (ILLC), University of Amsterdam, The Netherlands, March 12.

2010: *Lexicons and Databases, Agents and Systems*, The Data Explosion Seminar Series, Centrum Wiskunde and Informatica, Amsterdam Science Park, The Netherlands, March 11.

2010: *Non-Stop Action: The Agent as a Database*, Internal Seminar, Formal Epistemology Project, University of Leuven, Belgium, February 23.

2010: *Epistemic Closure and Information Processing*, International Workshop on the Philosophy of Information and Computing Sciences, Lorentz Centre, Leiden, The Netherlands, February 8-12.

2009: *Mono-Agent Dynamics*, LORI-II: The Second Workshop on Logic, Rationality, and Interaction, Chonqing, China, October 8-11.

2009: *Non-Commuting Residuation Models with Process Exclusion*, PLS7: The Seventh Pan-

Hellenic Logic Symposium, Patras, Greece, July 15-19.

2009: *Negative Information and Informational Asymmetry*, ECAP-09, Barcelona, Spain, July 02-04.

2009: *Ajdukiewicz Functions and Basic Inference*, Logica 2009: 23rd International Symposium, Hejnice Monastery, Czech Republic, June 22-26.

2009: *Negation and Process*, Philform, IHPST, The Sorbonne, Paris 1, France, April 27.

2008: *A Procedural Interpretation of Split Negation*, Logic Tea Colloquium, Institute for Logic, Language, and Computation (ILLC), University of Amsterdam, The Netherlands, September 15.

2008: *Negative Information and Split Negation*, Logica 2008: 22nd International Symposium, Hejnice Monastery, Czech Republic, June 16-20.

2008: *Inferential Information-Gain and Negative Information*, EPS-Research Seminar, Tilburg

Institute for Logic and Philosophy of Science, *Tilburg University*, The Netherlands, March 27.

2007: *Information Gain from Inference*, LogKCA-07, International Workshop on Logic and Philosophy of Knowledge, Rationality, and Action: Donostia – San Sebastian, Spain, 28-30 November, 2007.

2007: *Revising Whose Logic? –* Reply to Hartry Field's *Revising Our Logic*: Keynote at the 11th Annual Oxford Philosophy Graduate Conference, *University of Oxford*, November 10-11.

2007: *A Positive Information Logic*, PIL-07, The First Workshop on the Philosophy of Information and Logic, IEG, *Faculty of Philosophy*, *University of Oxford*, 3-4 November.

2007: *Metasemantic Information and the Scandal of Deduction*, Logica 2007: 21st International

Symposium, Hejnice Monastery, Czech Republic, June 18-22.

2006: *From Semantic Information to Psychological Information*, E-CAP 2006, European Conference on Computing and Philosophy*, Norwegian University of Science and Technology*, Trondheim, Norway, June 22-24.

2005: *Information Flow and Relevance Semantics*, Research Seminar of the IEG, *Computing Laboratory*, *University of Oxford.*

2003: *Two-Dimensional Semantics and Doxastic Reports*, Research Seminar at the *Faculty of Philosophy*, *University of Sydney.*

2002: *Two Notions of A-Prioricity*, 3rd Annual Conference of the Russellian Philosophical Society, *University of Sydney*

Abstracts

Perceptual Information

Luciano Floridi[1, 2, 3]

[1]Research Chair in Philosophy of Information and GPI, University of Hertfordshire; [2]Faculty of Philosophy and IEG, University of Oxford; [3]UNESCO Chair in Information and Computer Ethics. Address for correspondence: Department of Philosophy, University of Hertfordshire, de Havilland Campus, Hatfield, Hertfordshire AL10 9AB, UK; l.floridi@herts.ac.uk

What is the relationship between information and knowledge? Recently (Floridi [forthcoming 2], Floridi [2011]), I argued that semantic information— understood as well-formed, meaningful and truthful data—upgrades to knowledge if and only if it is *correctly* (Floridi [forthcoming 1], Floridi [2011]) accounted for. The basic idea is rather simple. Each piece of semantic information (e.g., "the beer is in the fridge") is constituted by a Boolean question and answer ("Is the beer in the fridge?" + "Yes"), which, as a standalone item, does not yet constitute knowledge, but poses further questions about itself. Such further questions require the right sort of information flow in order to be answered correctly, through an appropriate network of relations with some informational source. If all Mary can do, when asked why she holds that the beer is in the fridge, is to repeat that that is the place where the beer is to be found, the fact that the beer is actually in the fridge only warrants the conclusion that Mary holds the information about the location of the beer, but nothing else. For all we know, Mary might have uttered "the beer is in the fridge" as the only English sentence she knows, or she might have dreamed or guessed correctly the location of the beer. Indeed, the beer that she reports to be in the fridge might have been removed by John, but then more beer might have been placed in the fridge by Peter, making Mary right, yet only accidentally.

The result of such analysis is an informational definition of knowledge according to which a knowing subject *S* knows that *p* if and only if:

1. *p* qualifies as semantic information;
2. *A* accounts for *p*, that is, **A** (*A*, *p*);
3. *S* is informed that *p*; and
4. *S* is informed that **A** (*A*, *p*).

The articulation of this analysis in terms of a network theory of account, and its defense, especially against a potential Gettierization, are explicit tasks with which I have dealt in Floridi [forthcoming 2]. In this paper I shall explore an important consequence of the informational definition of knowledge: if knowledge is accounted information, what happens when we apply this definition to the analysis of perception and testimony? The thesis defended is that perception and testimony are the only two sources of information about the world, but, strictly speaking, they do not yet provide knowledge of the world. They are the necessary information providers.

References
Floridi, L. 2011, *The Philosophy of Information.* Oxford: Oxford University Press. Floridi, L. forthcoming 1. "Semantic Information and The Correctness Theory of Truth", *Erkenntnis.* Floridi, L. forthcoming 2. "Semantic Information and The Network Theory of Account", *Synthese.*

Towards an extensional calculus of hyperintensions

Marie Duží, VSB-Technical Univeristy Ostrava, Czech Republic

Abstract

By 'intensional logic' one often means a logic which fails to heed various laws of extensional logic, such as compositionality, referential transparency, existential generalization, and substitution of identicals. But 'intensional logic' may also mean that the logic in question comes with a rich ontology of intensional entities and the means to logically manipulate them. This is the notion both of intensionality and hyperintensionality germane to Transparent Intensional Logic (TIL). TIL is a large-scale framework of procedural semantics that flouts none of the principles of extensional logic and is, insofar, an extensional logic.

Extensionality is achieved by distinguishing between three levels of abstraction, offering three different kinds of complements for the same logical rules. The highest level is the hyperintensional level of *procedures* that produce intensional or extensional entities, as well as lower-order procedures, as their products. These procedures are in TIL defined as algorithmically structured *constructions* consisting of constituents which are the operations that are to be applied to input entities in order to produce a product (if any). The second level is the *intensional* level of partial functions conceived as set-theoretical mappings, some of which are defined on possible worlds. Finally, the lowest level is the *extensional* level of functional values.

TIL is an anti-contextualist, pro-transparency semantics, because TIL constructions are assigned to expressions as their context-*in*variant meanings. But depending on the context in which a construction occurs, different derivation rules must be specified in order to logically manipulate the product of the relevant construction. Yet TIL lacks as yet a proof theory for hyperintensions. This paper presents a sizeable fragment of such a proof theory, in the shape of a calculus for TIL constructions. This work builds on Tichý (1982, 1986), where particular derivation rules have been specified for the intensional portion of TIL based on a simple theory of types. However, current TIL is hyperintensional, constructions being typed within a ramified theory of types.

A fragment of such a theory has been specified in Duží et al. (2010, §2.6 and §2.7). First, the supposition with which a construction can occur and the three kinds of context were defined. Second, the *rules of substitution* were specified following these principles: (a) in a *hyperintensional* context only *procedurally isomorphic* constructions can be substituted, because the very construction is here the object of predication; (b) in an *intensional* context *equivalent* constructions (that is, constructions producing one and the same function) can be substituted, because the whole function is the object of predication; and finally (c) in an *extensional* context *congruent* constructions (that is, constructions that happen to construct the same value of their products for a particular valuation *v*) can be substituted, because this very value is the object of predication. Third, the *rules of existential generalization* relativized again to the particular contexts in which a construction occurs must be defined. In Duží and Jespersen (ms.) the rules of existential generalization into hyperintensional context have been defined. Their generalization to lower intensional and extensional context is straightforward.

What remains to be done is extending Tichý's calculus as presented in (1982, 1986) to the hyperintensional level, which involves cut rules and in particular the β-rules of contraction and expansion. These rules are the fundamental computational rules of the λ-calculi. But in

the logic of partial functions, which is part and parcel of TIL, β-rules must be treated carefully. The reason is the invalidity of β-reduction in case it involves drawing an extensionally occurring construction of an argument into an intensional or hyperintensional context of the construction of a function. To devise a valid rule of β-conversion, we developed a generally valid substitution method that corresponds to the method of lazy evaluation in functional programming languages.

Once such an extensional calculus of hyperintensions has been specified, the next step will be the examination of its meta-mathematical properties such as completeness and decidability.

Bibliography

Duží, Marie, Bjørn Jespersen and Pavel Materna (2010): *Procedural Semantics for Hyperintensional Logic. Foundations and Applications of Transparent Intensional Logic*. Berlin: Springer, Logic, Epistemology, and the Unity of Science.

Duží, Marie and Bjørn Jespersen (ms.): Transparent quantification into hyperpropositional contexts *de dicto.* Submitted.

Tichý, P. (1982): Foundations of partial type theory. *Reports on Mathematical Logic* 14: 52-72. Reprinted in (Tichý 2004: 467-480).

Tichý, P. (1986): Indiscernibility of identicals. *Studia Logica* 45: 251-273. Reprinted in (Tichý 2004: 649-671).

Tichý, P. (2004): *Collected Papers in Logic and Philosophy*, eds. V. Svoboda, B. Jespersen, C. Cheyne. Prague: Filosofia, Czech Academy of Sciences, and Dunedin: University of Otago Press.

Non-Ideal Epistemic Spaces

Jens Christian Bjerring
(jcbjerring@gmail.com)

Abstract

In a possible-world framework, an agent *a* can be said to know a proposition *p* just in case *p* is true at all worlds that are *epistemically possible* for *a*. Roughly, a world is epistemically possible for a just in case the world is not ruled out by anything *a* knows.

This framework presupposes an underlying space of worlds that we can call *epistemic space*. Traditionally, worlds in epistemic space are identified with *possible worlds*, where possible worlds are the kinds of entities that at least verify all logical truths. If so, it follows that any world that may remain epistemically possible for an agent verifies all logical truths. As a result, all logical truths are known by any agent, and the corresponding framework only allows us to model logically omniscient agents. This is one of the familiar hyperintensional problems that emerge in the standard possible-world framework, and it shows that the framework cannot be used to model non-ideal agents that fall short of logical omniscience.

A familiar attempt to model non-ideal agents within a broadly world-involving framework centers around the use of *impossible worlds* where the truths of logic can be false. If we admit impossible worlds where "anything goes" in epistemic space, it is easy to avoid logical omniscience. If any logical truth is false at some impossible world, then no logical truth need be known by any agent. As a result, we can use an impossible-world involving framework to model extremely non-ideal agents that do not know *any* logical truths.

A much harder, and considerably less investigated challenge is to ensure that the resulting epistemic space can also be used to model moderately ideal agents that are not logically omniscient but nevertheless logically competent. Intuitively, while such agents may fail to rule out impossible worlds that verify complex logical falsehoods, they are nevertheless able to rule out impossible worlds that verify obvious logical falsehoods. To model such agents, we need a construction of a *non-trivial epistemic space* that partly consists of impossible worlds where not "anything goes". This involves imposing substantive constraints on impossible worlds to eliminate from epistemic space, say, trivially impossible worlds that verify obvious logical falsehoods.

In this paper, I will show that the following claims form an inconsistent triad:
- (Non-Omni) Worlds in epistemic space allow us to model agents that are not logically omniscient.
- (Non-Tri) Worlds in epistemic space are either possible or non-trivially impossible.
- (Max) Worlds in epistemic space are maximal.

Derivatively, I will argue that this shows that successful constructions of epistemic spaces that can safely navigate between the Charybdis of logical omniscience and the Scylla of "anything goes" are hard, if not impossible to find.

Proposition, procedure, predication

Bjørn Jespersen
Czech Academy of Sciences, TU Ostrava, Czech Republic

ABSTRACT

This paper applies a realist procedural semantics to the problem of propositional unity. The problem is what unifies individuals, properties, etc., into a unit that is not a mere enumeration of entities and which is capable of being true/false, being known and believed to be true/false, and figuring as complement of various logical connectives and operators.

My thesis is that the key to solving the unity problem for atomic propositions consists in accounting for predication and that the key to accounting for predication consists in construing it as an instance of the abstract procedure of functional application. This procedure is the organizing principle of the propositional components, since it organizes them as functions and arguments without executing any applications. This holds whether the functions are 1-place ones like properties or many-place ones like relations. The procedure extends to molecular propositions formed either from extensional or intensional connectives or from hyperintensional operators.

This paper considers two variants of propositions. Propositions are uniformly identified with hyperintesionally individuated logical procedures, but one procedure produces truth-values while the other procedure produces truth-conditions (possible-world propositions). Non-empirical propositions are instances of the procedure of application, while empirical propositions are instances of, first, the procedure of application and, next, the procedure of abstraction (namely, over the values of modal and temporal variables).

The underlying logic of this conception of propositional unity is provided by Tichý's neo-Fregean Transparent Intensional Logic, which is formally a hyperintensional, partial, typed lambda-calculus whose syntax is furnished with a procedural semantics.

BIBLIOGRAPHY

Duží, M., B. Jespersen, P. Materna (2010), *Procedural Semantics for Hyperintensional Logic: Foundations and Applications of Transparent Intensional Logic*, vol. 17 of *Logic, Epistemology, and the Unity of Science*, Dordrecht et al.: Springer.
Tichý, P. (1988), *The Foundations of Frege's Logic*, Berlin: DeGruyter.
Tichý, P. (2004), *Collected Papers in Logic and Philosophy*, V. Svoboda, B. Jespersen, C. Cheyne (eds.), Prague: Filosofia, Czech Academy of Sciences; Dunedin: University of Otago Press.

Logical Hyperintensionality: From Consequences to Actions

Sebastian Sequoiah-Grayson

Logical reasoning gives rise to some of the starkest examples of hyperintensional phenomena. Here, K-axiom-based epistemic closure for explicit knowledge is rejected for even the most trivial cases of deductive inferential reasoning on account of the fact that the closure axiom does not extend beyond a raw consequence relation. The recognition that deductive inference concerns interaction as much as it concerns consequence allows for perspectives from logics of multi-agent information flow to be refocused onto mono-agent deductive reasoning. Instead of modeling the information flow between different agents in a communicative or announcement setting, we model the information flow between different states of a single agent as that agent reasons deductively. The dynamic information structure in question is then seen to have its properties modelled by an operationalised version of the nonassociative Lambek calculus, with commutation restricted to bracketed pairs.