

## Philosophy Faculty Reading List and Course Outline 2018-2019

### PART IB PAPER 02:

### LOGIC

#### SYLLABUS

- **Theories of meaning:** Compositionality of meaning; verificationism.
- **Truth:** semantic, deflationary, correspondence and coherence theories of truth.
- **Logical form:** the purposes of formalization; logical form and theories of meaning.
- **Names and descriptions:** sense and reference; Russell's theory of descriptions; descriptive versus causal theories of names; identity.
- **Variants of classical logic:** elements of modal logic; intuitionistic logic.
- **Theories:** the axiomatic method; informal and formal theories; examples.
- **Metatheory of propositional calculus:** the method of proof by induction; normal form; expressive adequacy; soundness and completeness.

#### COURSE OUTLINE

**Meaning** What is the connection between the meaning of a sentence and (i) the meaning of its parts, (ii) its verification conditions?

**Truth** Does truth have a nature? Or is talk of truth a redundant device that has no metaphysical implications?

**Logical form** What is the interest in translating sentences of English into sentences of a formal logic? Are we uncovering the deep and hidden structure of the original English sentence?

**Names and descriptions** How do names refer to their bearers? Is there a significant difference between names and descriptions? How are names and descriptions to be represented in a formal logic?

**Modal logic** We like to classify truths as necessary and as contingent (true but possibly false) and we seem to accept some patterns of inference involving these modal notions as valid (necessarily P; so, P). So how might we go about constructing a modal logic (for example, should we accept as valid: necessarily P; so necessarily necessarily P? Or should we accept: P; so necessarily possibly P?).

**Intuitionistic logic** Intuitionists refuse to regard the law of excluded middle as a law of logic. Likewise, they refuse to treat tertium non-datur, and double-negation elimination, as logical rules of inference. Are they right?

**Theories** To construct a theory of a certain subject matter, such as arithmetic, geometry, psychological states or gravitational forces, is at least to offer true generalisations about it. But what more is needed? Should the theory be presented as a set of axioms from which the rest of theory can be deduced? Should the axioms be self-evident or certain? Can we be content with an informal theory or must a theory be made formal?

**Metatheory of propositional calculus** In Part IA, we introduced the system TFL, also known as the propositional calculus. Now we explore its metatheory: that is, we show that the system has certain important properties.

#### Prerequisites

Some acquaintance with the formal logic in Part IA is essential for the course. If you do not have this background, you should first read an introductory logic text recommended on the IA Logic reading list.

#### Objectives

Students will be expected to:

- 1) Extend their knowledge of formal logic and the philosophical issues it raises.
- 2) Examine critically various issues in the philosophy of language.
- 3) Develop their powers of philosophical analysis and argument through study of these issues.

#### Preliminary Reading

Students will find it useful to look at some of the following:

- BELL, John .L., David DEVIDI, and Graham SOLOMON, *Logical Options* (Peterborough, ON: Broadview Press, 2001).
- BLACKBURN, Simon, *Spreading the Word* (Oxford: Oxford University Press, 1984).
- ENGEL, Pascal, *The Norm of Truth: An Introduction to the Philosophy of Logic* (London: Harvester Wheatsheaf, 1991).
- HAACK, Susan, *Philosophy of Logics* (Cambridge: Cambridge University Press, 1978). Also available online at: <http://doi.org/10.1017/CBO9780511812866>
- PRIEST, Graham, *An Introduction to Non-Classical Logic: From If to Is*. 2nd ed. (Cambridge: Cambridge University Press, 2008). Also available online at: <https://doi.org/10.1017/CBO9780511801174>
- SAINSBURY, Mark, *Logical Forms* (Oxford: Blackwell, 1991).

## THEORIES OF MEANING

### Compositionality of Meaning

The classic text on compositionality is:

DAVIDSON, Donald, *Inquiries into Truth and Interpretation* (Oxford: Oxford University Press, 1984), ch. 1 'Theories of meaning and learnable languages'. Also available online at: <http://doi.org/10.1093/0199246297.003.0001>

These offer some useful general background concerning meaning and truth:

BLACKBURN, Simon, *Spreading the Word* (Oxford: Clarendon Press, 1984), ch. 8 'Truth and semantics'.

PLATTS, Mark de Bretton, *Ways of Meaning* (London: Routledge & Kegan Paul, 1979), ch. 2 'Theories of truth and theories of meaning'.

After that, you should look at:

FODOR, Jerry, and Ernest LEPORE, *The Compositionality Papers* (Oxford: Clarendon Press, 2002), Papers 1 & 2.

FREGE, Gottlob, 'On Concept and Object', in P. Geach and M. Black, eds., *Translations from the Writings of Gottlob Frege* (Oxford: Blackwell, 1960). Reprinted in B. McGuinness, ed., *Collected Papers on Mathematics, Logic, and Philosophy* (Oxford: Blackwell, 1984), pp. 182-94.

WIGGINS, David, 'Meaning and Truth-Conditions: From Frege's Grand Design to Davidson's', in B. Hale and C. Wright, eds., *A Companion to the Philosophy of Language* (Oxford: Blackwell, 1997), pp. 3-28.

### Verificationism

Two classic, early defences of verificationism are:

AYER, A.J., *Language, Truth and Logic*. 2nd ed. (London: Gollancz, 1946), Introduction & ch. 1.

SCHLICK, Moritz, 'Meaning and Verification', *Philosophical Review*, 45 (1936): 339-69. <http://www.jstor.org/stable/2180487>. Reprinted in H. Feigl and W. Sellars, eds., *Readings in Philosophical Analysis* (New York: Appleton-Century-Crofts, 1949).

With early discussions by:

BERLIN, Isaiah, 'Verification', *Proceedings of the Aristotelian Society*, 39 (1938-39): 225-48. <http://www.jstor.org/stable/4544328>. Reprinted in G. Parkinson, ed., *The Theory of Meaning* (Oxford: Oxford University Press, 1968).

There is a wonderful (single paragraph!) criticism of Ayer in the following review:

CHURCH, Alonzo, 'Review of Language, Truth, and Logic', *The Journal of Symbolic Logic*, 14 (1949): 52-53. <http://www.jstor.org/stable/2268980>

And for a classic attack, see at least one of:

HEMPEL, Carl G., 'Problems and Changes in the Empiricist Criterion of Meaning', *Revue Internationale de Philosophie*, 11 (1950): 41-63. Reprinted in L. Linsky, ed., *Semantics and the Philosophy of Language* (Urbana, IL: University of Illinois Press, 1952), pp. 163-85. Also available on [Moodle](#).

HEMPEL, Carl G., 'The Empiricist Criterion of Meaning', in A.J. Ayer, ed., *Logical Positivism* (London: Allen & Unwin, 1959).

You might also find the following surveys helpful:

CREATH, Richard, 'Logical Empiricism', in E.N. Zalta, ed., *The Stanford Encyclopedia of Philosophy* (Summer 2017 edition) [Online]. Available at: <http://plato.stanford.edu/archives/spr2013/entries/logical-empiricism/> (Accessed: 10 September 2018).

HART, W.D., 'Meaning and Verification', in E. Craig, ed., *Routledge Encyclopedia of Philosophy* [Online]. Available at: [www.rep.routledge.com/article/X025](http://www.rep.routledge.com/article/X025) (Accessed: 10 September 2018).

For further reading try:

FOSTER, John, *Ayer* (London: Routledge & Kegan Paul, 1985), Part 1 'Meaning and verification'.

HACKING, Ian, *Why Does Language Matter to Philosophy?* (Cambridge: Cambridge University Press, 1975), ch. 9 'A.J. Ayer's verification'. Also available online at: <http://doi.org/10.1017/CBO9780511627873.010>

MISAK, Cheryl, *Verificationism* (London: Routledge, 1995).

SOAMES, Scott, *Philosophical Analysis in the Twentieth Century*. Vol. 1. *The Dawn of Analysis* (Princeton, NJ: Princeton University Press, 2003), ch. 13 'The rise and fall of the empiricist criterion of meaning'. Also available online at: <https://www.dawsonera.com>

Perhaps the most famous attack on logical empiricism, comes from Quine:

QUINE, W.V., 'Two Dogmas of Empiricism', *Philosophical Review*, 60 (1951): 20-43. <http://www.jstor.org/stable/2181906>. Reprinted in his *From a Logical Point of View* (Cambridge, MA: Harvard University Press, 1953; 2nd ed. 1963).

QUINE, W.V., *The Ways of Paradox* (Cambridge, MA: Harvard University Press, 1966), ch. 10 'Necessary truth'. Also available on [Moodle](#). [A very short piece giving more of Quine's views]

Some useful context to these is provided by:

- REY, Georges, 'The Analytic/Synthetic Distinction', in E.N. Zalta, ed., *Stanford Encyclopedia of Philosophy (Winter 2016 edition)* [Online]. Available at: <https://plato.stanford.edu/archives/win2016/entries/analytic-synthetic> (Accessed: 10 September 2018). [Read just sects. 1-3]
- HOOKEYWAY, Christopher, *Quine: Language, Experience and Reality* (Cambridge: Polity Press, 1988), ch. 2 'Rules and rationality'.

Nonetheless, Quine's attack comes from within empiricism. And his (holistic) empiricist theory of meaning is a natural successor of verificationism. See:

- DANCY, Jonathan, *Introduction to Contemporary Epistemology* (Oxford: Blackwell, 1985), ch. 6 'Empiricist theories of meaning'.
- HAACK, Susan, *Philosophy of Logics* (Cambridge: Cambridge University Press, 1978), ch. 7 'Theories of truth'. Also available online at: <http://doi.org/10.1017/CBO9780511812866.008>

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## TRUTH

Here are two very helpful introductions, to be read before you embark on anything else:

- BLACKBURN, Simon, and Keith SIMMONS, *Truth* (Oxford: Oxford University Press, 1999), 'Introduction', pp. 1-28.
- WALKER, Ralph, 'Theories of Truth', in B. Hale and C. Wright, eds., *Companion to the Philosophy of Language* (Oxford: Blackwell, 1997), pp. 309-30.

### Correspondence Theories of Truth

For an overview, read:

- KIRKHAM, Richard, *Theories of Truth* (Cambridge, MA: MIT Press, 1992).

Then read the following exchange:

- AUSTIN, J.L., 'Truth', *Proceedings of the Aristotelian Society Suppl. Vol.*, 24 (1950): 111-29. <http://www.jstor.org/stable/4106745>. Reprinted in S. Blackburn and K. Simmons, eds., *Truth* (Oxford: Oxford University Press, 1999), pp. 149-61.
- STRAWSON, P.F., 'Truth', *Proceedings of the Aristotelian Society Suppl. Vol.*, 24 (1950): 129-56. <http://www.jstor.org/stable/4106745>. Reprinted in S. Blackburn and K. Simmons, eds., *Truth* (Oxford: Oxford University Press, 1999), pp. 162-82. Also in M. Lynch, ed., *The Nature of Truth* (Cambridge, MA: MIT Press, 2007), pp.447-71.

Finishing up with:

- DAVIDSON, Donald, 'True to the Facts', *The Journal of Philosophy*, 66 (1969): 748-64. <http://www.jstor.org/stable/2023778>. Reprinted in his *Inquiries into Truth and Interpretation* (Oxford: Oxford University Press, 1984). Also available online at: <http://doi.org/10.1093/0199246297.003.0003>
- FIELD, Hartry, 'Tarski's Theory of Truth', *The Journal of Philosophy*, 69 (1972): 347-75. <http://www.jstor.org/stable/2024879>

### The Semantic Theory of Truth

Across this topic, you will find frequent references to the work of Tarski. A detailed knowledge of Tarski's technicalities is probably not necessary, since the technical semantic concepts can be set up in alternative ways. However, some familiarity with the basic idea is absolutely essential. Try:

- TARSKI, Alfred, 'The Semantic Conception of Truth and the Foundations of Semantics', *Philosophy and Phenomenological Research*, 4 (1944): 341-76. <http://www.jstor.org/stable/2102968>

### Deflationary Theories of Truth (and Their Successors)

This paper inspired the deflationary theory of truth:

- RAMSEY, Frank, 'Facts and Propositions', *Proceedings of the Aristotelian Society Suppl. Vol.*, 7 (1927): 153-70. <http://www.jstor.org/stable/4106403>. Reprinted in his *Philosophical Papers* (Cambridge: Cambridge University Press, 1990), pp.34-51.

Various theorists have attempted to develop the deflationary theory. Here are some nice overviews:

- ARMOUR-GARB, Bradley, 'Deflationism (About Theories of Truth)', *Philosophy Compass*, 7 (2012): 267-77. Available online at: <http://doi.org/10.1111/j.1747-9991.2011.00464.x>
- BAR-ON, Dorit, and Keith SIMMONS, 'Deflationism', in E. Lepore and B. Smith, eds., *The Oxford Handbook of Philosophy of Language* (Oxford: Oxford University Press, 2008). Also available online at: <http://doi.org/10.1093/oxfordhb/9780199552238.001.0001>

But fullest single defence of deflationary theory is:

- HORWICH, Paul, *Truth*. 2nd ed. (Oxford: Oxford University Press, 1998). Also available online at: <http://doi.org/10.1093/0198752237.001.0001>

This has attracted many interesting critical responses, including:

- FIELD, Hartry, 'Truth, by Paul Horwich', *Philosophy of Science*, 59 (1992): 321-30. <http://www.jstor.org/stable/188251>

DAVIDSON, Donald, 'The Folly of Trying to Define Truth', *The Journal of Philosophy*, 93 (1996): 263-78. <http://www.jstor.org/stable/2941075>

GUPTA, Anil, 'A Critique of Deflationism', *Philosophical Topics*, 21 (1993): 57-81. <http://dx.doi.org/10.5840/philtopics199321218> [Advanced]

BAR-ON, Dorit, and Keith SIMMONS, 'The Use of Force against Deflationism: Assertion and Truth', in D. Graimann and G. Siegart, eds., *Truth and Speech Acts: Studies in the Philosophy of Language* (London: Routledge, 2007), pp. 61-89. Also available online at: [http://philosophy.sites.unc.edu/files/2013/10/Bar-On\\_Simmons2007\\_UseOfForce.pdf](http://philosophy.sites.unc.edu/files/2013/10/Bar-On_Simmons2007_UseOfForce.pdf) [Advanced]

### Coherence Theories of Truth

You should start with a beautiful pair of classics:

JAMES, William, 'Humanism and Truth', *Mind*, 13 (1904): 457-75. <http://www.jstor.org/stable/2248582>

JAMES, William, *Pragmatism* (London: Longmans Green, 1907), lecture 6. Also available online at: [www.gutenberg.org/etext/5116](http://www.gutenberg.org/etext/5116). Reprinted in S. Blackburn and K. Simmons, eds., *Truth* (Oxford: Oxford University Press, 1999), pp. 53-68.

And then read the following critiques of anything with a coherentist flavour:

KIRKHAM, Richard, *Theories of Truth* (Cambridge, MA: MIT Press, 1992), ch. 3 'Nonrealist theories'.

RUSSELL, Bertrand, 'On the Nature of Truth' *Proceedings of the Aristotelian Society*, 7 (1906): 28-49. <http://www.jstor.org/stable/4543744>

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## LOGICAL FORM

### The Purposes of Formalisation

For classic statements of the purpose of formalisation, see:

QUINE, W.V., *Word and Object* (Cambridge, MA: MIT Press, 1960), ch. 5, especially sect. 33.

SAINSBURY, Mark, *Logical Forms*. 2nd ed. (Oxford: Blackwell, 2001), ch. 1, sects. 10-12 & ch. 6, sects. 1-3.

Two further introductions might prove helpful:

ALLWOOD, Jens, Lars-Gunnar ANDERSSON, and Östen DAHL, *Logic in Linguistics* (Cambridge: Cambridge University Press, 1977), ch. 10, sects. 10.3 & 10.4.

DAVIDSON, Donald, and Gilbert HARMAN, *The Logic of Grammar* (Encino, CA: Dickenson, 1975), pp. 1-5.

Further interesting reflections are found in:

GEACH, Peter, 'Quine's Syntactical Insights', in D. Davidson and J. Hintikka, eds., *Words and Objections: Essays on the Works of W. V. Quine* (Dordrecht: Reidel, 1969), pp. 146-57. Reprinted in P. Geach, *Logic Matters* (Oxford: Blackwell, 1972).

QUINE, W.V., *Ways of Paradox and Other Essays*. Rev. ed. (Cambridge, MA: Harvard University Press, 1976), ch. 6 'Logic As A Source of Syntactical Insights'.

And for a discussion of the kinds of inference we should be trying to capture with formal logic, and why, look at:

PRIOR, Arthur N., 'What Is Logic?' in P.T. Geach and A.J.P. Kenny, eds., *Papers in Logic and Ethics* (Amherst, MA: University of Massachusetts Press, 1976), pp. 122-29.

READ, Stephen, 'Formal and Material Consequence', *Journal of Philosophical Logic*, 23 (1994): 247-65. <http://www.jstor.org/stable/30227075>

SMILEY, Timothy, 'A Tale of Two Tortoises', *Mind*, 104 (1995): 725-36. <http://www.jstor.org/stable/2254480>

### Logical Form and Grammatical Form

Start with an excellent introduction:

SAINSBURY, Mark, *Logical Forms*. 2nd ed. (Oxford: Blackwell, 1991), ch. 6 'The project of formalization'.

Then look at:

ETCHEMENDY, John, 'The Doctrine of Logic as Form', *Linguistics and Philosophy*, 6 (1983): 319-34. <http://www.jstor.org/stable/25001132>

EVANS, Gareth, 'Semantic Structure and Logical Form', in G. Evans and J. McDowell, eds., *Truth and Meaning* (Oxford: Oxford University Press, 1976), pp. 199-222. Also available online at: <http://lib.myilibrary.com/?id=81009>. Reprinted (with an afterthought, pp. 405-7) in his *Collected Papers* (Oxford: Oxford University Press, 1985), pp. 49-75; and in P. Ludlow, ed., *Readings in the Philosophy of Language* (Cambridge, MA: MIT Press, 1997).

OLIVER, Alex, 'A Few More Remarks on Logical Form', *Proceedings of the Aristotelian Society* 99 (1999): 247-72. <http://www.jstor.org/stable/4545309>

### Davidson on Logical Form

DAVIDSON, Donald, *Essays on Actions and Events* (Oxford: Oxford University Press, 1980), ch. 6 'The Logical Form of Action Sentences'. Also available online at: <http://doi.org/10.1093/0199246270.003.0006>. [Read also the reply to Cargile, pp. 137-46]

Then consider the following:

- OLIVER, Alex, 'The Matter of Form: Logic's Beginnings', in J. Lear and A. Oliver, eds., *The Force of Argument* (Abingdon: Routledge, 2010), pp. 165-85. [Section 12 engages particularly with Davidson]
- SAINSBURY, Mark, *Logical Forms*. 2nd ed. (Oxford: Blackwell, 1991), ch. 4, sect. 6.

For further reflections on Davidson's project, and his notion of logical form, look at:

- CARGILE, James, 'Davidson's Notion of Logical Form', *Inquiry*, 13 (1970): 129-39.  
<http://dx.doi.org/10.1080/00201747008601603>
- DAVIDSON, Donald, *Inquiries into Truth and Interpretation* (Oxford: Oxford University Press, 1984), ch. 4 'Semantics for Natural Language'. Also available online at: <http://doi.org/10.1093/0199246297.003.0004>
- GRANDY, Richard, 'Some Remarks About Logical Form', *Noûs*, 8 (1974): 157-64.  
<http://www.jstor.org/stable/2214783>
- WIGGINS, David, "'Most" And "All": Some Comments on a Familiar Programme, and on the Logical Form of Quantified Sentences', in M. Platts, ed., *Reference, Truth and Reality* (London: Routledge & Kegan Paul, 1980), pp. 318-46.

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## NAMES AND DESCRIPTIONS

For an introduction to the historical setting, start with:

- POTTER, Michael, 'The Birth of Analytic Philosophy', in D. Moran, ed., *The Routledge Companion to Twentieth Century Philosophy* (London: Routledge, 2008), pp. 43-75. Also available online at: <http://lib.myilibrary.com/?id=183799>

### Sense and Reference

You must start with:

- FREGE, Gottlob, 'On Sense and Reference', in M. Black and P. Geach, eds., *Translations from the Philosophical Writings of Gottlob Frege* (Oxford: Blackwell, 1952), pp. 56-78. Also available on [Moodle](#). Reprinted in A.W. Moore, ed., *Meaning and Reference* (Oxford: Oxford University Press, 1993); and in P. Ludlow, ed., *Readings in the Philosophy of Language* (Cambridge, MA: MIT Press, 1997).

In that paper, Frege mentions that he had held a different view when he wrote the Begriffsschrift. You might want to look at his earlier account, for the contrast:

- FREGE, Gottlob, *Conceptual Notation* (Oxford: Oxford University Press, 1972), sect. 8 'Identity of nContent'.

For discussion of Frege's view, read:

- DUMMETT, Michael, *Origins of Analytical Philosophy* (London: Duckworth, 1993), ch. 7.

- KENNY, Anthony, *Frege* (London: Penguin, 1995), chs. 6 & 7.
- NOONAN, Harold, *Frege: a Critical Introduction* (Cambridge: Polity Press, 2000), chs. 4 & 5.

And for a difficult but interesting approach, read:

- MCDOWELL, John, 'On the Sense and Reference of a Proper Name', *Mind*, 86 (1977): 159-85. <http://www.jstor.org/stable/2253711>. Reprinted in M. Platts, ed., *Reference, Truth, and Reality: Essays on the Philosophy of Language* (London: Routledge & Kegan Paul, 1980); and in A.W. Moore, ed., *Meaning and Reference* (Oxford: Oxford University Press, 1993).

### Russell's Theory of Descriptions

Russell's Theory, which you encountered in Part IA, is explained in more detail in:

- RUSSELL, Bertrand, 'On Denoting', *Mind*, 14 (1905): 479-93.  
<http://www.jstor.org/stable/2248381>. Reprinted in his *Logic and Knowledge: Essays 1901-1950*, edited by R.C. Marsh (London: Allen & Unwin, 1956); and in his *Collected Papers*. Vol. 4 (London: Routledge, 1994).

Initial discussion of Russell's views can be found in:

- MAKIN, Gideon, 'Making Sense of "on Denoting"', *Synthese*, 102 (1995): 383-412.  
<http://www.jstor.org/stable/20117994>
- POTTER, Michael, *Reason's Nearest Kin* (Oxford: Oxford University Press, 2000), sects. 5.1-5.3. Also available online at: <http://doi.org/10.1093/acprof:oso/9780199252619.001.0001>.
- SAINSBURY, Mark, 'Russell on Names and Communication', in A.D. Irvine and G.A. Wedeking, eds., *Russell and Analytic Philosophy* (Toronto, ON: University of Toronto Press, 1993), pp. 3-21. Reprinted in his *Departing from Frege* (London: Routledge, 2002), pp. 85-101.

These articles discuss the Gray's Elegy argument. For more detailed discussion, including the question of whether it makes contact with Frege, see:

- BLACKBURN, Simon, and A. CODE, 'On the Power of Russell's Criticism of Frege: "On Denoting" Pp. 48-50', *Analysis*, 38 (1978): 65-77.  
<http://www.jstor.org/stable/3327496>
- GEACH, Peter, 'Russell on Meaning and Denoting', *Analysis* 19 (1959): 69-72.  
<http://www.jstor.org/stable/3326567>. Reprinted in his *Logic Matters* (Oxford: Blackwell, 1972), pp. 27-31.
- SEARLE, John, 'Russell's Objections to Frege's Theory of Sense and Reference', *Analysis* 18 (1958): 137-43. <http://www.jstor.org/stable/3326570>

Finally, for interesting dissent from Russell, look at:

SMILEY, Timothy, 'The Theory of Descriptions', in T.R. Baldwin and T.J. Smiley, eds., *Studies in the Philosophy of Logic and Knowledge* (Oxford: Oxford University Press, 2004), pp. 131-61.

### Other Descriptivist Theories

First look at:

GEACH, Peter, *Mental Acts* (London: Routledge & Kegan Paul, 1957), ch. 16 'Judgments involving identifications'.

SEARLE, John, 'Proper Names', *Mind*, 67 (1958): 166-73.  
<http://www.jstor.org/stable/2251108>. Reprinted in P.F. Strawson, ed., *Philosophical Logic* (Oxford: Oxford University Press, 1967); and in P. Ludlow, ed., *Readings in the Philosophy of Language* (Cambridge, MA: MIT Press, 1997).

And then read:

WITTGENSTEIN, Ludwig, *Philosophical Investigations*, translated by G.E.M. Anscombe (Oxford: Blackwell, 1953), sect. 79. Also available online at: <http://pm.nlx.com>

### Descriptive versus Causal Theories of Names

The causal theory of names is most famously advanced by Kripke:

KRIPKE, Saul, *Naming and Necessity* (Oxford: Blackwell, 1980), Lecture 1 and 2.  
Reprinted in P. Ludlow, ed., *Readings in the Philosophy of Language* (Cambridge, MA: MIT Press, 1997).

At about the same time, Putnam also offers some attacks on descriptivism, although his arguments focus more closely on natural kind terms (e.g. "water") than proper names for individuals (e.g. "Aristotle"). Nonetheless, this paper is justly regarded as a classic:

PUTNAM, Hilary, *Mind, Language, and Reality* (Cambridge: Cambridge University Press, 1975), ch. 12 'The meaning of "meaning"'. Also available online at: <http://doi.org/10.1017/CBO9780511625251>

There are some excellent discussions of the causal theory of names, e.g.

AHMED, Arif, *Saul Kripke* (London: Continuum, 2007), ch. 2 'Names'. Also available online at: <http://lib.myilibrary.com/?id=327232>

EVANS, Gareth, 'The Causal Theory of Names', *Proceedings of the Aristotelian Society Suppl. Vol.*, 47 (1973): 187-208. <http://www.jstor.org/stable/4106912>. Reprinted in his *Collected Papers* (Oxford: Oxford University Press, 1985), pp. 1-24. Also in P. Ludlow, ed., *Readings in the Philosophy of Language* (Cambridge, MA: MIT Press, 1997).

MCCULLOCH, Gregory, *The Game of the Name* (Oxford: Oxford University Press, 1989), chs. 4 & 8.

MORRIS, Michael, *An Introduction to the Philosophy of Language* (Cambridge: Cambridge University Press, 2007), ch. 4 'Kripke on proper names'. Also available online at: <http://lib.myilibrary.com/?id=239517>

For further discussions, consider:

DEVITT, Michael, and Kim STERELNY, *Language and Reality* (Cambridge, MA: MIT Press, 1999), ch. 4 'A causal theory of reference: names'.

LYCAN, William G., *Philosophy of Language*, 2nd ed. (London: Routledge, 2008), chs. 3 & 4.

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## VARIANTS OF CLASSICAL LOGIC

### Elements of Modal Logic

Three philosophically minded introductions to modal logic are:

KUHN, Steven T., 'Modal Logic', in E. Craig, ed., *Routledge Encyclopedia of Philosophy* [Online]. Available at: [www.rep.routledge.com/article/Y039](http://www.rep.routledge.com/article/Y039) (Accessed: 10 September 2018).

MELIA, Joseph, *Modality* (London: Acumen, 2003), chs. 1 & 2. Also available online at: <http://lib.myilibrary.com/?id=292135>

SAINSBURY, Mark, *Logical Forms*. 2nd ed. (Oxford: Blackwell, 2001), ch. 5 'Necessity'.

The topic is unavoidably technical. At some point, you need to gain some mastery of different modal systems and their semantics. In the end, you need to find a text book that works for you. Here are some recommendations. (Note that these textbooks typically go well beyond what is covered in the syllabus):

HUGHES, George E., and Maxwell J. CRESSWELL, *A New Introduction to Modal Logic* (London: Routledge, 1996), parts 1 & 2. [NB: they use 'L' for necessity and 'M' for possibility]

GARSON, James W., *Modal Logic for Philosophers* (Cambridge: Cambridge University Press, 2006).

MINTS, Grigori, *A Short Introduction to Modal Logic* (Stanford, CA: CSLI, 1992).

Kripke was instrumental in offering a semantics for modal logics; the following paper is important, but hard-going, and you might find it easier to read it alongside Loux's article:

PRIEST, Graham, *An Introduction to Non-Classical Logic*, 2nd ed. (Cambridge: Cambridge University Press, 2008), chs. 2 & 3. Also available online at: <https://doi.org/10.1017/CBO9780511801174>

LOUX, Michael J., ed., *The Possible and the Actual* (Ithaca, NY: Cornell University Press, 1979), pp. 15-28.

Finally, if you have a hankering for quantified modal logic, consider:

KRIPKE, Saul, 'Semantical Considerations on Modal Logic', in L. Linsky, ed., *Reference and Modality* (Oxford: Oxford University Press, 1971).  
LEWIS, David, *Philosophical Papers*. Vol. 1 (Oxford: Oxford University Press, 1983), ch. 3 'Counterpart Theory and Quantified Modal Logic'. Also available online at: <http://doi.org/10.1093/0195032047.003.0003>

### Intuitionistic Logic: Introduction

From a technical point of view, the key thing to remember is simple: intuitionistic (propositional) logic is obtained from the natural deduction system you learned in part IA by deleting both the (basic) rule TND (tertium non datur), and the (derived) rule DNE (double-negation elimination). Without these rules, you cannot prove the Law of Excluded Middle; so " $P \vee \neg P$ " is not a theorem of intuitionistic logic.

For more technical details, including a Kripke-style semantics for intuitionistic logic (i.e. something which looks a lot like modal logic), you might want to look at:

VAN DALEN, Dirk, *Logic and Structure*. 3rd ed. (Berlin: Springer, 1994), ch. 5, sects. 5.1 & 5.2.  
PRIEST, Graham, *An Introduction to Non-Classical Logic An Introduction to Non-Classical Logic*, 2nd ed. (Cambridge: Cambridge University Press, 2008), ch. 6. Also available online at: <https://doi.org/10.1017/CBO9780511801174>

But our primary concern is with philosophical motivations for intuitionism. See:

HEYTING, A., *Intuitionism: An Introduction* (Amsterdam: North Holland, 1956), ch. 1 'Disputation'.  
MCCARTY, David C., 'Intuitionism', in E. Craig, ed., *Routledge Encyclopedia of Philosophy* [Online]. Available at: [www.rep.routledge.com/article/Y062](http://www.rep.routledge.com/article/Y062) (Accessed: 10 September 2018).

### Intuitionistic Logic: Elimination Rules

One might think that you can stipulate a logical connective into existence by laying down any introduction / elimination rules. But this natural thought hits a famous problem:

PRIOR, Arthur N., 'The Runabout Inference Ticket', *Analysis*, 21 (1960): 38-39. <http://www.jstor.org/stable/3326699>. Reprinted in P.F. Strawson, ed., *Philosophical Logic* (Oxford: Oxford University Press, 1967).  
BELNAP, Nuel D., 'Tonk, Plonk and Plink', *Analysis*, 22 (1962): 130-34. <http://www.jstor.org/stable/3326862>. Reprinted in P.F. Strawson, ed., *Philosophical Logic* (Oxford: Oxford University Press, 1967).

PRIOR, Arthur N., 'Conjunction and Contonktion Revisited', *Analysis*, 24 (1964): 191-95. <http://www.jstor.org/stable/3326464>

The link to intuitionism is drawn thus: tonk is bad because is not "harmonious"; and classical negation is not "harmonious" either; but intuitionistic negation is "harmonious". The following is an advanced, but very thorough, treatment of this line of thought:

STEINBERGER, Florian, 'What Harmony Could and Could Not Be', *Australasian Journal of Philosophy*, 84 (2011): 617-39. <http://doi.org/10.1080/00048402.2010.528781>

### Intuitionistic Logic: Link with Verificationism

Michael Dummett was the foremost proponent of intuitionistic logic in recent times. His work is always linked to verificationism, and a nice introduction to this is offered by:

MISAK, Cheryl, *Verificationism: Its History and Prospects* (London: Routledge, 1995), ch. 4.

You should also look at the last few sections from:

HART, W.D., 'Meaning and Verification', in E. Craig, ed., *Routledge Encyclopedia of Philosophy* [Online]. Available at: <http://www.rep.routledge.com/article/X025> (Accessed: 10 September 2018).

Having read these, it might help to read one of Dummett's earliest statements, where the connection with verificationism is fairly clear. The article really starts to connect with intuitionism, from the point where Dummett starts to discuss "or":

DUMMETT, Michael, 'Truth', *Proceedings of the Aristotelian Society*, 59 (2001): 141-62. <http://www.jstor.org/stable/4544609>. Reprinted in his *Truth and Other Enigmas* (London: Duckworth, 1978).

This is discussed, in difficult but rewarding detail, here:

MCDOWELL, John, 'Truth Conditions, Bivalence and Verificationism', in G. Evans and J. McDowell, eds., *Truth and Meaning* (Oxford: Oxford University Press, 1976), pp. 42-66. Also available online at: <http://lib.myilibrary.com/?id=81009>

### Intuitionistic Logic: Paradox of Knowability

Dummett's arguments for intuitionism seem to trade on an objection to the idea of utterly unknowable truths. But a famous argument, first presented by Fitch, suggests that we cannot maintain that all truths are knowable. You should start by reading:

WILLIAMSON, Timothy, 'Intuitionism Disproved?' *Analysis*, 42 (1982): 203-07. <http://analysis.oxfordjournals.org/content/42/4/203.full.pdf>

And then consider two follow-up articles:

EDINGTON, Dorothy, 'The Paradox of Knowability', *Mind*, 94 (1985): 557-68.

<http://www.jstor.org/stable/2254726>

WILLIAMSON, Timothy, 'On the Paradox of Knowability', *Mind*, 96 (1987): 256-61.

<http://www.jstor.org/stable/2255152>

How, though, should the intuitionist react? Dummett changed his mind:

DUMMETT, Michael, 'Victor's Error', *Analysis*, 61 (2001): 1-2.

<http://www.jstor.org/stable/3329148>

DUMMETT, Michael, 'Fitch's Paradox of Knowability', in J. Salerno, ed., *New Essays on the Knowability Paradox* (Oxford: Oxford University Press, 2009), pp. 51-52. Also available on [Moodle](#)

A very thorough survey of the paradox, and possible responses, is offered by:

BROGAARD, Berit, and Joe SALERNO, 'Fitch's Paradox of Knowability', in E.N. Zalta, ed., *The Stanford Encyclopedia of Philosophy (Winter 2013 edition)* [Online].

Available at: <https://plato.stanford.edu/archives/win2013/entries/fitch-paradox>

(Accessed: 10 September 2018).

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## THEORIES

The received understanding of (formal) theories is nicely articulated in:

WILDER, Raymond L., *Introduction to the Foundations of Mathematics* (New York: Wiley, 1952), chs. 1 & 2.

This could be read alongside this accessible history to the rise of axiomatics approaches:

BLANCHE, Robert, *Axiomatics* (London: Routledge & Kegan Paul, 1962).

See also:

BLANCHETTE, Patricia, 'Axioms in Frege', forthcoming in M. Rossberg and P. Ebert, eds., *Essays on Frege's Basic Laws of Arithmetic* (Oxford: Oxford University Press, 2013). Penultimate version is online at:

<http://www3.nd.edu/~pblanche/Axioms%20in%20Frege.pdf>

However, many of the most interesting philosophical questions about theories are raised and explored in a fascinating exchange of letters between Frege and Hilbert:

FREGE, Gottlob, and David HILBERT, 'The Frege-Hilbert Correspondence', in G. Gottfried, et al., eds., *Gottlob Frege: Philosophical and Mathematical Correspondence*, translated by H. Kaal (Oxford: Blackwell, 1980).

For commentary on this debate, read:

BLANCHETTE, Patricia A., 'Frege and Hilbert on Consistency', *Journal of Philosophy*, 93

(1996): 317-36. <http://www.jstor.org/stable/2941124>

DUMMETT, Michael, *Frege and Other Philosophers* (Oxford: Oxford University Press, 1991), ch. 1 'Frege On the Consistency of Mathematical Theories'. Also available online at: <http://doi.org/10.1093/019823628X.003.0001>

The Frege-Hilbert debate took place against the background of work in non-Euclidean geometries, for which you might want to read:

BARKER, Stephen, *Philosophy of Mathematics* (Englewood Cliffs, NJ: Prentice-Hall, 1964), ch. 3 'Non-Euclidean geometry'.

DEMOPOULOS, William, 'Frege, Hilbert and the Conceptual Structure of Model Theory', *History and Philosophy of Logic*, 15, no. 2 (1994): 211-25.

<http://doi.org/10.1080/01445349408837233>

GRAY, Jeremy, *Ideas of Space: Euclidean, Non-Euclidean, and Relativistic*. 2nd ed. (Oxford: Oxford University Press, 1989).

SHAPIRO, Stewart, 'Categories, Structures, and the Frege-Hilbert Controversy: The Status of Meta-Mathematics', *Philosophia Mathematica*, 13, no. 1 (2005): 61-77.

<http://doi.org/10.1093/philmat/nki007>

Finally, take a look at:

LAKATOS, Imre, *Philosophical Papers*. Vol. 2 'Mathematics, Science and Epistemology' (Cambridge: Cambridge University Press, 1978), ch. 2 'A Renaissance of Empiricism in the Recent Philosophy of Mathematics?' Reprinted in T. Tymoczko, ed., *New Directions in the Philosophy of Mathematics* (Princeton, NJ: Princeton University Press, 1998).

POTTER, Michael, *Set Theory and Its Philosophy* (Oxford: Oxford University Press, 2004), sect. 1.1. Also available online at: <http://lib.myilibrary.com/?id=75496>

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## METATHEORY OF PROPOSITIONAL CALCULUS

The main textbook for the course is available online:

BUTTON, Tim, *Metatheory* [Online]. Available at

<http://people.ds.cam.ac.uk/tecb2/Metatheory.pdf>. (Accessed: 12 September 2018).

For a very brief, but very clear, discussion of proofs by induction on complexity of the sort this topic requires, look at:

PRIEST, Graham, *An Introduction to Non-Classical Logic: From If to Is*. 2nd ed. (Cambridge: Cambridge University Press, 2008), sect. 0.2.

<https://doi.org/10.1017/CBO9780511801174>



For alternative textbook treatments of similar terrain, try:

BOSTOCK, David, *Intermediate Logic* (Oxford: Clarendon Press, 1997), ch. 2 'Truth-functors'.

TELLER, Paul, *A Modern Formal Logic Primer*. Vol. 2 (Englewood Cliffs, NJ: Prentice Hall, 1989), chs. 10, 11 & 13. Also available online at:

<http://tellerprimer.ucdavis.edu>

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We welcome your suggestions for further readings that will improve and diversify our reading lists, to reflect the best recent research, and important work by members of under-represented groups. Please email your suggestions to [phillib@hermes.cam.ac.uk](mailto:phillib@hermes.cam.ac.uk) including the relevant part and paper number. For information on how we handle your personal data when you submit a suggestion please see <https://www.information-compliance.admin.cam.ac.uk/data-protection/general-data>.