Metaphysics Meets Cognitive Science:
Objects, Causation, Time, and Self

The Shulman Seminar in Science and the Humanities

(Spring 2022)

What, When, & Where

Course #s	:	CGSC 492, HUMS 424, PHIL 492/692, PSYC 424
Distro Groups	:	Humanities + Social Sciences
When	:	Spring 2022, Tuesday afternoons, 3:30 - 5:20 pm
Where	:	Initially online via Zoom (see Canvas home), then eventually HQ401
Webpage	:	https://perception.yale.edu/MetaphysicsSem/

To download readings and other materials, you must be logged in to Canvas via CAS.

Who

Instructors	:	L.A. Paul (Professor of Philosophy and Cognitive Science) Brian Scholl (Professor of Psychology and Cognitive Science)
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Office Hours	:	Just after each class, or by appointment

Seminar Description

The premise (and promise) of cognitive science is that we will come to understand ourselves better by integrating the insights and contributions from multiple fields of inquiry. This interdisciplinary project has been especially vibrant when it has explored the intersection of Philosophy and Psychology (for example when work in ethics integrates empirical work from moral psychology, or when work in the philosophy of mind integrates neuroscientific studies of consciousness). But cognitive science has interacted far less with the study of *metaphysics* — the philosophical exploration of topics such as time, events, and causation. This may seem surprising, since there has been a great deal of fascinating empirical research on the mental representations and cognitive processes involved in such topics. Accordingly, this seminar will attempt to bridge this gap, exploring potential interactions between these fields. In particular, we will explore the possibility of a *cognitive metaphysics*, in which each field is enriched by consideration of the other. How might metaphysical theories raise questions or identify concepts of interest to working cognitive scientists? How might empirical studies from cognitive science on the nature of seeing and thinking contribute to the study of metaphysics? Specific topics will likely include the ways in which we understand the nature (in both the mind and the world) of

space, time, objects, events, causality, and persistence. We will also likely devote considerable discussion to different levels of analysis and ontology, focusing on the metaphysical reality of higher-level computational explanation (as in "Marr's 3 levels").

The Shulman Lectures in Science and the Humanities

This course is also the 2022 *Shulman Seminar in Science and the Humanities*. The Shulman seminar focuses on the convergence of the humanities and sciences, and ties interdisciplinary undergraduate education to the work of distinguished visiting scholars. Accordingly, we will also host several distinguished visitors in conjunction with our seminar. Each of these visiting colleagues will deliver a 2022 Shulman Lecture to a broad university-wide audience (during the first part of a class session), after which they will join our seminar for extended discussion. The visiting speakers for this semester are:

Joshua Tenenbaum (Professor of Computational Cognitive Science, MIT)
https://cocosci.mit.edu/
Marth 8th

David Chalmers (University Professor of Philosophy and Neural Science, NYU)
http://consc.net/
March 29th

Ian Phillips (Bloomberg Distinguished Professor of Philosophy and Brain Sciences, JHU)
https://www.ianbphillips.com/
April 12th

Elizabeth Spelke (Marshall L. Berkman Professor of Psychology, Harvard University)
https://www.harvardlds.org/our-labs/spelke-labspelke-lab-members/elizabeth-spelke/
April 26th

Course Format, Prerequisites, and Selection Process

This course will be run as an interdisciplinary reading and discussion seminar, with occasional visits from distinguished colleagues in cognitive science, philosophy, and psychology. Though there may be occasional mini-lectures and other guest presentations, the usual format will involve an extended group discussion of a set of weekly readings focused on a particular aspect of 'cognitive metaphysics'. The exact topics that we cover will depend on the interests of the seminar attendees and the interest generated about specific research ideas. In almost all cases, however, the majority of the readings will be drawn from the primary research literatures in both philosophy (including both classical and contemporary work on metaphysics) and psychology (including cognitive psychology, psychophysics, neuroscience, and infant cognition).

The seminar is intended primarily for advanced undergraduates in Philosophy, Psychology, and Cognitive Science, and some graduate students may also enroll. There are no specific prerequisites, but we expect that students will have prior background in either philosophy or psychology (or both). To ensure a relatively intimate forum for in-depth discussion, the seminar will be capped at approximately 20 students, so instructor

permission will be required to attend after the first meeting. All participants should be prepared to discuss the material for each day of class in detail, and students will frequently be asked on the spot for their opinions and analyses.

If there are more interested students than available spots, then we'll detail a process for making the decisions during the first session (asking everyone to send us some information that evening), and we'll have the enrollment decisions made within 48 hours. So, to be considered, you must show up to (or contact us before) the first session (which will be held online; see the course's Canvas homepage for the Zoom link for the first day's meeting).

Requirements and Evaluation

You will be expected to carefully study the background reading for each meeting, and to discuss the material in class. In addition, you'll submit brief (~ 1-2 page) weekly reading responses, and will complete a final seminar paper or project on a relevant topic of your own choosing. In more detail:

1. (**20%**) Participation in Discussions
   Your major task: just come to the seminar each week prepared to actively and thoughtfully discuss the day's topic(s)!

2. (**30%**) Weekly Reading Responses
   For each class, the next week's readings will be distributed along with a question to which you'll have to respond in a short (~ 1-2 page) essay. These questions will typically involve your own views on various theoretical issues involved in the readings, and they will often serve as the jumping-off point for the ensuing seminar discussion. Essay responses will be due no later than **5 pm on Sunday** before the meeting when the relevant readings will be discussed — by email to both brian.scholl@yale.edu and la.paul@yale.edu (with no attachments, please!).

3. (**50%**) Final Paper or Project
   The only other requirement for the seminar will be a final paper or project, due at the very end of the semester (typically a week before the final grades are due — a date that may differ for different classes of students). This requirement is flexible: it can be met by a standard research paper or by a proposal for some experiments you think it would be interesting to run (approximately 12 pages [for undergraduates] or 20 pages [for graduate students] — keeping in mind that the exact requirements may differ depending on the type of paper that is being written), or perhaps by actually constructing and running a pilot experiment (with a brief write-up and/or class presentation). (For senior Psychology majors taking the seminar to fulfill part of their senior requirement, the minimum limit will be 5000 words, and the due dates may be a bit different.) In all cases, though, your final paper should somehow integrate work and themes from both metaphysics and cognitive science. We will discuss the nature of this paper more fully in class, and we will frequently highlight potential topics as we encounter them. And at some point near the end of the semester, we will also ask you to submit a brief list of brainstormed ideas for the paper, on which you'll receive

feedback. We invite you to view this paper not as an irritating course-specific requirement, but rather as an opportunity to integrate the seminar with your own more general research goals beyond this seminar (e.g. forming the foundation of a senior thesis or even a published paper, as has often happened in previous seminars).

Tentative Schedule

The schedule below may very well change, since the topics we cover (and how much time we spend on them) will depend on your interests — especially toward the end of the seminar. But this may serve as a rough guide to the kinds of topics we'll discuss:

#	Date	Topic
1	Jan 25th	*Introductions and case studies: Metaphysics and cognitive science*
2	Feb 1st	*Metaphysical methodology*
3	Feb 8th	*How we see*
4	Feb 15th	*Persistence over time and change: Objects and selves*
5	Feb 22nd	*Causation, causal perception, and causal reasoning*
6	Mar 1st	*Events and objects*
7	Mar 8th	***Guest**: Joshua Tenenbaum (MIT)*
8	Mar 15th	*Realism and skepticism*
-	Mar 22nd	[***No class**: Spring break; go crazy*]
9	Mar 29th	***Guest**: David Chalmers (NYU)*
10	Apr 5th	*Time and Temporal Experience*
11	Apr 12th	***Guest**: Ian Phillips (Johns Hopkins)*
12	Apr 19th	*Wildcard (TBA depending on our collective interests)*
13	Apr 26th	***Guest:** Elizabeth Spelke* (Harvard)

Readings

A finalized reading list for the seminar as a whole is not possible, for a few reasons. In particular, we will try to let our seminar discussions determine our future foci to some degree — such that we might introduce new topics that come up organically, or we might end up spending more time on a few topics that we collectively find to be especially fascinating and/or difficult. The exact readings for each meeting will always be distributed at least one week in advance (e.g. announced during the previous session), and will typically involve several papers, with a total of perhaps 30-60 pages per week.

Although we expect the brute amount of reading to be in line with most seminars, you might need to devote more time and study to these readings compared to some of your previous seminar experiences — if only because most of us might be rather less familiar with one of the relevant subfields, and we expect to assign readings from both philosophy and psychology for most meetings. (We expect to have many students with considerable background in either Philosophy or Psychology in our group, but we also expect there to be relatively few students with a great deal of background in *both* disciplines.)

The readings themselves will be drawn from several sources, including classical philosophical texts (e.g. by David Lewis, Derek Parfit, and Peter van Inwagen),

contemporary articles from the philosophical literature (including book excerpts, but also articles from journals such as the *Journal of Philosophy*, *Nous*, and *The Philosophical Review*), and articles reporting empirical studies from leading psychology and cognitive science journals (e.g. *Cognition*, *Perception*, *Trends in Cognitive Sciences*).

Occasionally, different students may be asked to complete different auxiliary readings, so that we can cover more ground. Other times — quite often, actually — you may also be asked to read an additional paper (or paper excerpt) *of your own choosing*, based on citations and discussions in the main assigned papers (or, better, based on your own literature search). In either case, you should be prepared to summarize your auxiliary reading during our class meeting, and we will typically ask you to send it to us ahead of time, along with a 1-paragraph summary of what piqued your interest about it.

There will be no reading packet. All of the readings will be available online, and will be posted on our class webpage, where you can print them out at your leisure, or read them on your computer/tablet/phone/watch, etc.

Sample Readings

Though the specific topics that we cover (and how much we cover them) are subject to change based on our collective interests, here are some of the sorts of readings we may explore together — with a few sample papers listed per topic:

Time and Temporal Experience

Sample Philosophical Readings

Phillips, I. (2014). The temporal structure of experience. In V. Arstila & D. Lloyd (Eds.), *The Philosophy, Psychology, and Neuroscience of Temporality* (pp. 140-158). Cambridge, MA: MIT Press.

Paul, L. A. (2014). Experience and the arrow. In. A. Wilson (Ed.), *Chance and temporal symmetry* (pp. 175-193). Oxford University Press.

Callender, C. (2019). Time lost, time regained. In A. Goldman & B. McLaughlin (Eds.), *Metaphysics and Cognitive Science*. Oxford University Press.

Ismael, J. (2016). From physical time to human time. In Y. Dolev & M. Roubach (Eds.), *Cosmological and Psychological Time* [*Boston Studies in the Philosophy and History of Science*, Volume 285] (pp. 107-124). New York, NY: Springer.

Prior, A. N. (1972). The notion of the present. *Studium Generale, 23*, 245-248.

Williams, D. (1951). The myth of passage. *Journal of Philosophy, 48*, 457-472.

Sample CogSci Readings

Eagleman, D. M. (2008). Human time perception and its illusions. *Current Opinion in Neurobiology, 18*, 131-136.

Matthews, W., & Meck, W. (2014). Time perception: The bad news and the good. *WIREs Cognitive Science, 5*, 429-446.

Ongchoco, J. D. K., Yates, T. S., & Scholl, B. J. (under review). Event segmentation structures temporal experience: Simultaneous dilation and contraction in rhythmic reproductions.

Liverence, B. M., & Scholl, B. J. (2012). Discrete events as units of perceived time. *Journal of Experimental Psychology: Human Perception & Performance, 38*, 549-554.

Buehner, M. J., & Humphreys, G. R. (2009). Causal binding of actions to their effects. *Psychological Science, 20*, 1221-1228.

Choi, H., & Scholl, B. J. (2006b). Perceiving causality after the fact: Postdiction in the temporal dynamics of causal perception. *Perception, 35*, 385-399.

Events and Objects

Sample Philosophical Readings

Kim, J. (1975). Events as property exemplifications. In M. Brand & D. Walton (Eds.), *Action Theory* (pp. 159-177). Dordrecht: D. Reidel.

Lewis, D. (1986). Events. In *Philosophical Papers, Volume II* (pp. 241-269). Oxford University Press.
van Inwagen, P. (1990). Four-dimensional objects. *Nous, 24*, 245-255.
Fine, K. (2003). The non-identity of a thing and its matter. *Mind*, *112*, 195-234.
Heller, M. (1993). Varieties of four dimensionalism. *Australasian Journal of Philosophy*, *71*, 47-59.

Sample CogSci Readings

Scholl, B. J. (2001). Objects and attention: The state of the art. *Cognition, 80*, 1-46.
Ongchoco, J. D. K., & Scholl, B. J. (in press). Figments of imagination: 'Scaffolded attention' creates nonsensory object and event representations. In A. Mroczko-Wąsowicz & R. Grush (Eds.), *Sensory Individuals: Contemporary Perspectives on Modality-specific and Multimodal Perceptual Objects*. Oxford: Oxford University Press.
Franconeri, S. L., Bemis, D. K., & Alvarez, G. A. (2009). Number estimation relies on a set of segmented objects. *Cognition*, *113*, 1-13.
Radvansky, G. A., & Zacks, J. M. (2017). Event boundaries in memory and cognition. *Current Opinion in Behavioral Sciences*, *17*, 133-140.
Kurby, C. A., & Zacks, J. M. (2008). Segmentation in the perception and memory of events. *Trends in Cognitive Sciences*, *12*, 72-79.
Strickland, B., & Scholl, B. J. (2015). Visual perception involves 'event type' representations: The case of containment vs. occlusion. *Journal of Experimental Psychology: General, 144*, 570-580.

Causation, Causal Perception, and Causal Reasoning

Sample Philosophical Readings

Lewis, D. (1973). Causation. *Journal of Philosophy, 70*, 556-567.
Paul, L. A., & Hall, N. (2013). *Causation: A User's Guide* [Excerpts]. Oxford University Press.
McGrath, S. (2005). Causation by omission: A dilemma. *Philosophical Studies, 123*, 125-148.

Sample CogSci Readings

Scholl, B. J., & Tremoulet, P. D. (2000). Perceptual causality and animacy. *Trends in Cognitive Sciences*, *4*, 299-309.
Kominsky, J. F., & Scholl, B. J. (2020). Retinotopic adaptation reveals distinct categories of causal perception. *Cognition, 203*, Article 104339, 1-21.
Bechlivanidis, C., Buehner, M., Tecwyn, E., Lagnado, D., Hoerl, C., & McCormack, T. (in press). Human vision reconstructs time to satisfy causal constraints. *Psychological Science*.
Moors, P., Wagemans, J., & de-Wit, L. (2017). Causal events enter awareness faster than non-causal events. *PeerJ*, *5*:e2932.
Wolff, P. (2007). Representing causation. *Journal of Experimental Psychology: General*, 136, 82-111.
White, P. (2006). The causal asymmetry. *Psychological Review, 113*, 132-147.

Persistence over Time and Change (Object Persistence)

Sample Philosophical Readings

Chisholm, R. (1970). Identity through time. In H. Kiefer & N. Munitz (Eds.), *Language, Belief, and Metaphysics* (pp. 163-182). Albany: State University of New York Press.
Quine, W. V. O. (1963). Identity, ostension and hypostasis. In *From a Logical Point of View* (pp. 65-79). New York: Harper and Row.
Haslanger, S. (2003). Persistence through time. In M. Loux & D. Zimmerman (Eds.), *Oxford Handbook of Metaphysics* (pp. 314-354). Oxford: Oxford University Press.
Merricks, T. (1997). Fission and personal identity over time. *Philosophical Studies, 88,* 163-186.
Benovsky, J. (2015). From experience to metaphysics: On experience-based intuitions and their role in metaphysics. *Nous, 49*, 684-697.
Donnelly, M. (2016). Three-dimensionalism. *Oxford Handbooks Online*.

Sample CogSci Readings

Scholl, B. J. (2007). Object persistence in philosophy and psychology. *Mind & Language, 22*, 563-591.
Flombaum, J. I., Scholl, B. J., & Santos, L. R. (2009). Spatiotemporal priority as a fundamental principle of object persistence. In B. Hood & L. Santos (Eds.), *The Origins of Object Knowledge* (pp. 135-164). Oxford University Press.
Cheries, E. W., Mitroff, S. R., Wynn, K., & Scholl, B. J. (2008). Cohesion as a principle of object persistence in infancy. *Developmental Science*, *11*, 427-432.
Rips, L., Blok, S., & Newman, G. (2006). Tracing the identity of objects. *Psychological Review*. *113*, 1-30.
Schurgin, M., & Flombaum, J. (2017). Exploiting core knowledge for visual object recognition. *Journal of Experimental Psychology: General, 146*, 362-375.

Persistence over Time and Change (The Self)

Sample Philosophical Readings

Lewis, D. (1976). Survival and identity. In A. O. Rorty (Ed.), *The Identities of Persons* (pp. 17-40). Berkeley, CA: University of California Press.
Williams, B. (1970). The self and the future. *Philosophical Review, 79*, 161-180.
Parfit, D. (1971). Personal identity. *Philosophical Review, 80*, 3-27.
Wallace, R. J. (2013). *The View from Here: On Affirmation, Attachment, and the Limits of Regret* [Excerpts]. Oxford University Press.

Sample CogSci Readings

Strohminger, N., & Nichols, S. (2014). The essential moral self. *Cognition, 131*, 159-171.
Starmans, C., & Bloom, P. (2018). Nothing personal: What psychologists get wrong about identity. *Trends in Cognitive Sciences, 22,* 566-568.
Haslam, N., Bastian, B., & Bissett, M. (2004). Essentialist beliefs about personality and their implications. *Personality and Social Psychology Bulletin, 30*, 1661-1673.
Molouki, S., & Bartels, D. (2017). Personal change and the continuity of the self. *Cognitive Psychology, 93*, 1-17.
Chen, S., Urminsky, O., & Bartels, D. (2016). Beliefs about the causal structure of the self-concept determine which changes disrupt personal identity. *Psychological Science, 27*, 1398-1406.

Levels of Analysis and Ontology

Sample Philosophical Readings

Paul. L. A. (2010). The puzzles of material constitution. *Philosophy Compass, 5/7*, 579-590.

Sample CogSci Readings

Marr, D. (1982). "General Introduction" + "The Philosophy of the Approach". Preface and Chapter 1 of *Vision* (pp. 3-38). Cambridge, MA: MIT Press.
Griffiths, T., Chater, N., Kemp, C., Perfors, A., & Tenenbaum, J. (2010). Probabilistic models of cognition: Exploring representations and inductive biases. *Trends in Cognitive Sciences, 14*, 357-364.
Griffiths, T., Lieder, F., & Goodman, N. (2015). Rational use of cognitive resources: Levels of analysis between the computational and the algorithmic. *Topics in Cognitive Science, 7*, 217-229.
Jonas, E., & Kording, K. (2017). Could a neuroscientist understand a microprocessor? *PLoS Computational Biolology, 13*(1): e1005268.