

The k -Order Ladder

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IFLAI
3/22/2021



Second-Order Logic and the k -Order Ladder ...

FOL

✓ FOL

✓ FOL

Epistemic + FOL
 $B_d B_v B_d V v$

✓ FOL

Epistemic + FOL (for coverage of “killer” robots, later)
 $B_d B_v B_d V v$

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✓ FOL

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 $B_d B_v B_d V v$

TOL

$\exists X [X(j) \wedge \neg X(m) \wedge S(X)]$

✓ FOL

✓ Epistemic + FOL (for coverage of “killer” robots, later)
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TOL

$\exists X [X(j) \wedge \neg X(m) \wedge S(X)]$



✓ FOL

✓ Epistemic + FOL (for coverage of “killer” robots, later)
 $B_d B_v B_d V v$

TOL

? $\exists X [X(j) \wedge \neg X(m) \wedge S(X)]$



Double-Minded Man

The Contemporary Craft of Creating Characters Meets Today's Cognitive Architectures: A Case Study in Expressivity*

Selmer Bringsjord • John Licato • Alexander Bringsjord

version of 0121161500NY

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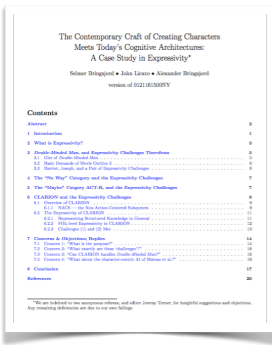
*We are indebted to two anonymous referees, and editor Jeremy Turner, for insightful suggestions and objections. Any remaining deficiencies are due to our own failings.

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Double-Minded Man

Double-Minded Man



A screenshot of a movie outline software interface. The window title is 'Movie Outline - Double-Minded_Man_010316.mvo'. The interface includes a toolbar with various editing tools, a font selection dropdown set to 'Arial', a size dropdown set to '12', and a 'Scene Heading' dropdown. Below the toolbar is a menu bar with options: Outline, Script, Notes, Characters, FeelFactor, Reference, Library, PowerView, Step Cards, and Story Tasks. The main content area is titled '1. TWIRL - DAY' and contains several paragraphs of text. On the right side, there is a vertical list of scene headings: '1. TWIRL - DAY', '2. YES, THAT'S HIM - LATER', and '3. SECOND HOME - LATER'. The bottom status bar shows '1. TWIRL - DAY' and 'Step 1 of 3'.

1. TWIRL - DAY

68-year-old Harriet Smith sits with two wrinkled hands firmly on the wheel of her rust-eaten Subaru wagon, staring straight ahead through the top level of bifocals as she waits serenely at a red light.

Harriet is alone in the car. To her right is another vehicle, also waiting, in this case to make a right turn; it's a sleek, low-slung, black Camaro.

We are inside the cabin with Harriet. The Subaru's sound system softly plays choral music. Harriet's lips move slightly as she internally sings along, mouthing a slow aria. Her head weaves slightly side to side, in the rhythm with the music.

Things are calm as can be here inside the car with Harriet. There are a pair of well-worn Bibles on the empty passenger seat beside her, one with a gold-lettered 'Harriet' on its leather front cover, the other with a matching 'Joseph' on its front cover.

Harriet's eyes swivel up to the light: still red. We wait with her.

Suddenly there is a piercing SCREECH outside. Harriet jerks her head to the right and we follow her line of sight.

A sleek motorcycle has swerved out of its lane and is now streaking straight for the right side of the Camaro beside Harriet's car.

The bike slams with CLANG into the side of the Camaro. Its rider is flung up and forward into the air, twirling passed Harriet's windshield.

We now watch from Harriet's POV, in slow motion. The black-leather-clad motorcyclist sails by Harriet's windshield, airborne. We see a man's face, clearly: His elephant-hide skin tells us that he is well beyond middle-age. Yet thick, black curls of youthful hair emerge from under his helmet. The rider has only one half of a black, bushy, swept-out, waxed mustache. His eyes are weary and grey, and appear to lock with Harriet's for an instant.

We return to normal speed. The body is now lying on the incoming lane to the left of Harriet's Subaru, perfectly still on the blacktop, the head twisted into an impossible angle. Blood seeps from a nostril. Beside the lifeless head, a BMW medallion lies on the pavement, glinting in the sunlight.

1. TWIRL - DAY
2. YES, THAT'S HIM - LATER
3. SECOND HOME - LATER

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Double-Minded Man

The Contemporary Craft of Creating Characters
Meets Today's Cognitive Architecture:
A Case Study in Expertise*

Selmer Bringsjord • John Lewis • Alexander Bringsjord
version of 02/16/2016

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- 6 LABOUR and the Expertise Challenge
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Double-Minded Man

Double-Minded Man
by
S Bringsjord & A Bringsjord

DRAFT #5
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The Contemporary Craft of Creating Characters
Meets Today's Cognitive Architecture:
A Case Study in Expertise*
Silver Strippert • John Linn • Alexander Strippert
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Double-Minded Man

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 Meets Today's Cognitive Architecture:
 A Case Study in Expertise*

Silver Stripling • John Lewis • Alexander Stripling
 volume of EXPERTISE

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Climbing the k -order Ladder

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a is a llama, as is b , a likes b , and the father of a is a llama as well.

Climbing the k -order Ladder

$Llama(a) \wedge Llama(b) \wedge Likes(a, b) \wedge Llama(fatherOf(a))$

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There's some thing which is a llama and likes b (which is also a llama), and whose father is a llama too.

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$$\exists x \exists y \exists R [R(x) \wedge R(y) \wedge Likes(x, y) \wedge R(fatherOf(x))]$$

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Things x and y , along with the father of x , share a certain property; and, x R^2 s y , where R^2 is a positive property.

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$$\exists x, y \exists R, R^2 [R(x) \wedge R(y) \wedge R^2(x, y) \wedge \textit{Positive}(R^2) \wedge R(\textit{fatherOf}(x))]$$

Things x and y , along with the father of x , share a certain property; and, x R^2 s y , where R^2 is a positive property.

SOL $\exists x \exists y \exists R [R(x) \wedge R(y) \wedge \textit{Likes}(x, y) \wedge R(\textit{fatherOf}(x))]$

Things x and y , along with the father of x , share a certain property (and x likes y).

FOL $\exists x [Llama(x) \wedge Llama(b) \wedge \textit{Likes}(x, b) \wedge Llama(\textit{fatherOf}(x))]$

There's some thing which is a llama and likes b (which is also a llama), and whose father is a llama too.

ZOL $Llama(a) \wedge Llama(b) \wedge \textit{Likes}(a, b) \wedge Llama(\textit{fatherOf}(a))$

a is a llama, as is b , a likes b , and the father of a is a llama as well.

Climbing the k -order Ladder

TOL $\exists x, y \exists R, R^2 [R(x) \wedge R(y) \wedge R^2(x, y) \wedge \text{Positive}(R^2) \wedge R(\text{fatherOf}(x))]$

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Climbing the k -order Ladder

⋮

TOL $\exists x, y \exists R, R^2 [R(x) \wedge R(y) \wedge R^2(x, y) \wedge \textit{Positive}(R^2) \wedge R(\textit{fatherOf}(x))]$

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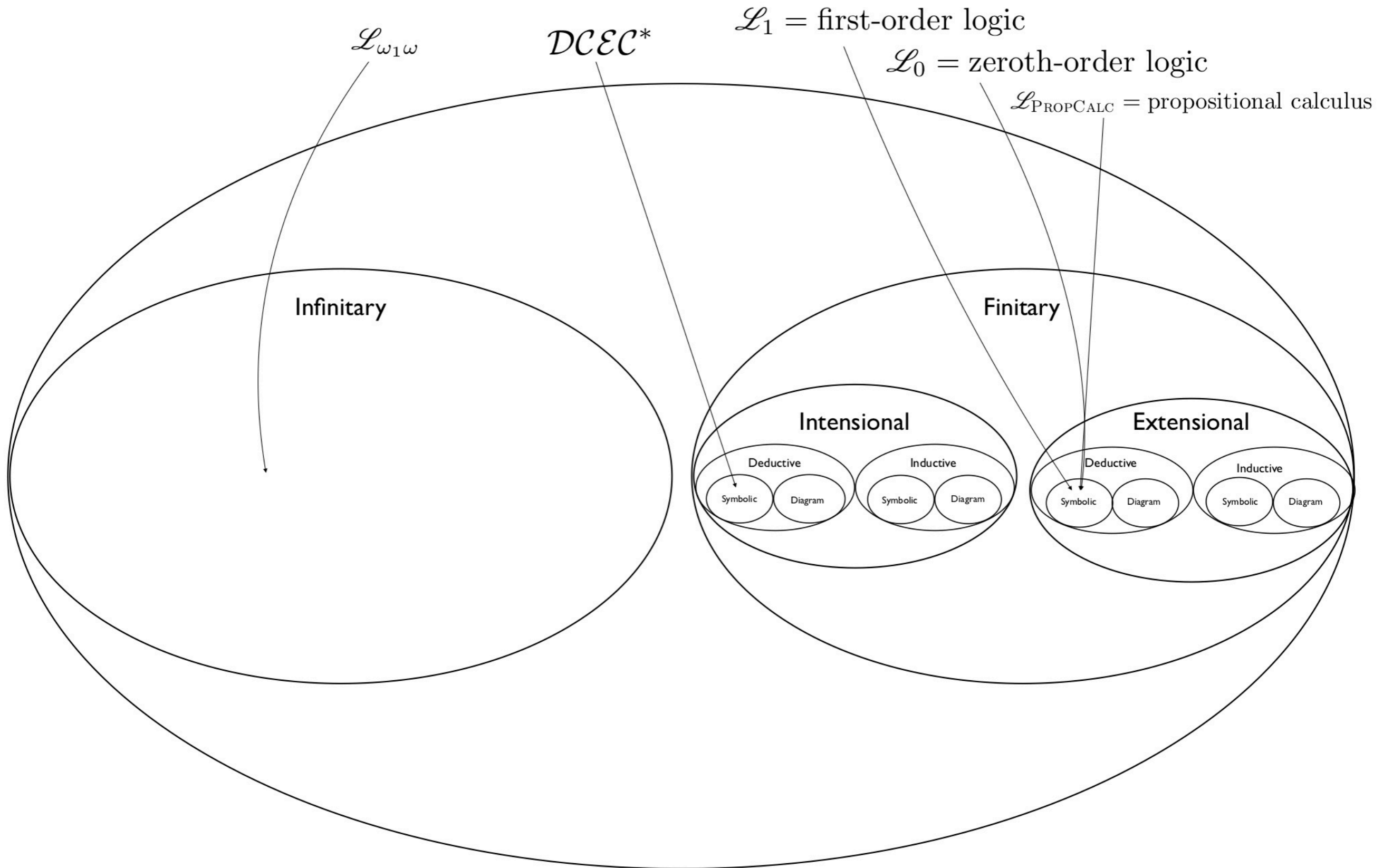
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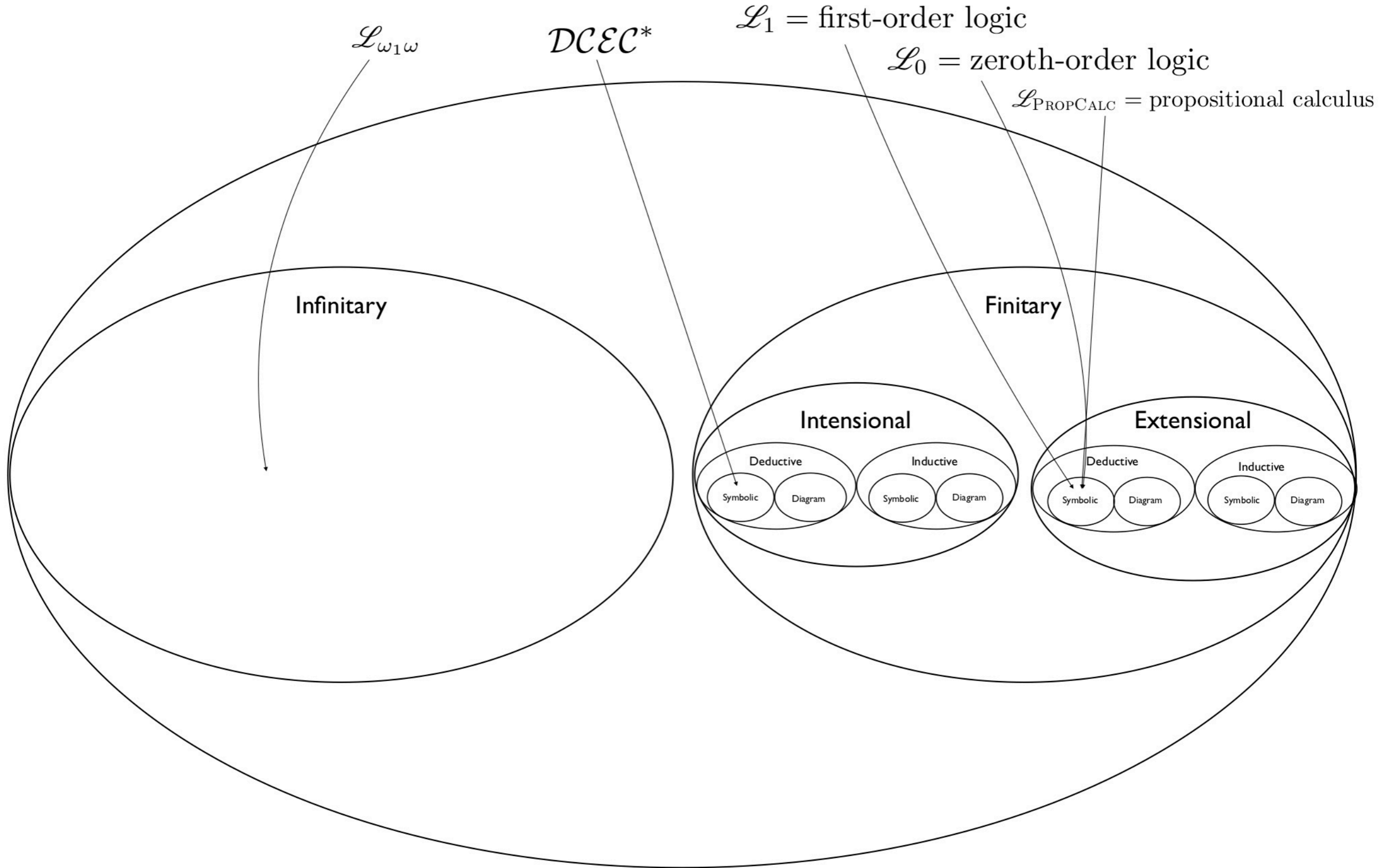
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The Universe of Logics



\mathcal{L}_3
 \mathcal{L}_2

The Universe of Logics



The Universe of Logics

\mathcal{L}_3

\mathcal{L}_2

$\mathcal{L}_{\omega_1\omega}$

\mathcal{DCEC}^*

$\mathcal{L}_1 =$ first-order logic

$\mathcal{L}_0 =$ zeroth-order logic

$\mathcal{L}_{\text{PROPCALC}} =$ propositional calculus

Infinitary

Finitary

Intensional

Extensional

Deductive

Inductive

Deductive

Inductive

Symbolic

Diagram

Symbolic

Diagram

Symbolic

Diagram

Symbolic

Diagram

Climbing the k -order Ladder

⋮

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Climbing the k -order Ladder

⋮

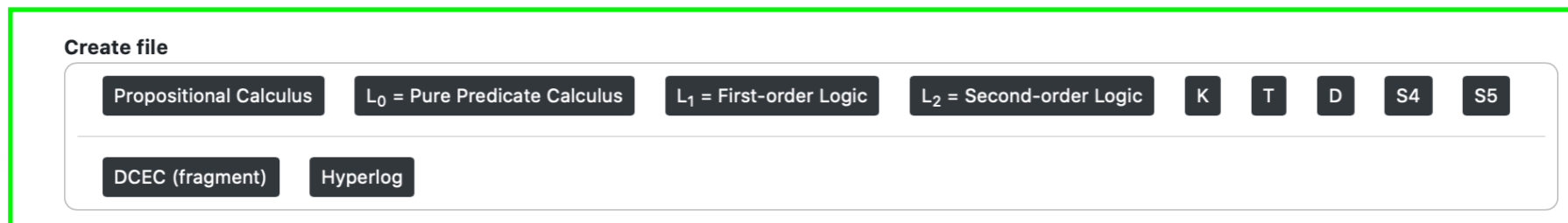
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\mathcal{L}_3

Things x and y , along with the father of x , share a certain property; and, x R^2 s y , where R^2 is a positive property.

SOL $\exists x, y \exists R [R(x) \wedge R(y) \wedge R(x, y) \wedge \text{Positive}(R) \wedge R(\text{fatherOf}(x))]$

\mathcal{L}_2



Things x and y , along with the father of x , share a certain property (and x likes y).

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\mathcal{L}_1

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ZOL $Llama(a) \wedge Llama(b) \wedge Likes(a, b) \wedge Llama(\text{fatherOf}(a))$

\mathcal{L}_0

a is a llama, as is b , a likes b , and the father of a is a llama as well.

Climbing the k -order Ladder

⋮

TOL

$\exists x, y \exists R, R^2 [R(x) \wedge R(y) \wedge R^2(x, y) \wedge \text{Positive}(R^2) \wedge R(\text{fatherOf}(x))]$

\mathcal{L}_3

Things x and y , along with the father of x , share a certain property; and, x R^2 s y , where R^2 is a positive property.



SOL

Create file

Propositional Calculus L_0 = Pure Predicate Calculus L_1 = First-order Logic L_2 = Second-order Logic K T D S4 S5

DCEC (fragment) Hyperlog

\mathcal{L}_2

Things x and y , along with the father of x , share a certain property (and x likes y).

FOL

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ZOL

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