Hypothesis formation and testing in an interpretive domain

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Collin Lynch, ISP

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Outline

• What are hypotheticals?
• Examples from Supreme Court oral arguments
• Role of hypotheticals in legal reasoning
• Why is this kind of reasoning important?
• How can it be taught?
• Sketch of three on-going research approaches.

Research sponsored by NSF Award IIS-0412830
Definitions

**Hypothesis** \(\equiv\) tentative assumption made in order to draw out and test its normative, logical or empirical consequences.

**Hypothetical** \(\equiv\) an imagined situation that involves a hypothesis; used to draw out the consequences.

- In Supreme Court oral arguments, hypotheticals perform an important function.

- The *hypotheses* are an advocate’s proposed test or standard for deciding a case.

- Justices pose *hypotheticals* to probe advocates’ tests: their meaning, consistency, legal and policy implications.
Example

*SONY Corp. v. Universal City Studios, 464 U.S. 417 (1984)*

**Facts:** Some members of the general public used Sony Betamax VTRs to record copyrighted broadcasts.

**Issues:**

1. Does SONY’s sale of video tape recorders contribute to infringement of plaintiff owners’ copyrights in television programs by enabling consumers to infringe those copyrights directly?

2. What is the appropriate standard for contributory liability for copyright infringement?

**Proposed test:**

Kroft (for Universal): if there were only one show on the air that was copyrighted and which could not be copied without objection, if SONY sold this device with knowledge that it would be used to copy that show, the Petitioners would be liable.
Excerpt from SONY oral argument* (1)

106. QUESTION: Suppose the evidence in the case put on by witnesses that your friend referred to indicated, just suppose it indicated, that about ten percent of all programming could be copied without any interference by the producer or whoever owned the program. Suppose that there was at least ten percent that a homeowner could copy without violating anybody's copyright.

107. Would you think that would make any difference in this case?

108. MR. KROFT: I don't think that would make any difference. I think ten percent is too small of an amount.

109. QUESTION: Well, what about 50?

110. MR. KROFT: I'll go you one better, Justice White. If there was only one show on the air that were copyrighted and which could not be copied without objection, if the Petitioners sold this device with knowledge that it would be used to copy that show, under the Inwood test laid down by this Court in the trademark area I believe the Petitioners would be liable.

111. However, I would concede that I think it might be very difficult for us to prove if there was only one show.

112. QUESTION: Well, let's take 50 percent. You certainly would argue that Sony would be liable if it sold this machine knowing that homeowners would copy a good many of the 50 percent that are copyrighted, in which there would be an infringement.

113. MR. KROFT: Yes, I would, and the reason I would --
125. QUESTION: Well, specifically for copying purposes. Under your test, supposing somebody tells the Xerox people that there are people who are making illegal copies with their machine and they know it. Must they -- what are they supposed to do?

126. MR. KROFT: I think that probably now puts the cart before the horse, Justice Stevens. That wasn't happening when Xerox began selling its machine. Xerox first started selling the machine for business applications. We can all remember what they looked like. You'd have to put one page in. You couldn't run through pages and pages and pages like you can today.

127. And over the years I suppose people have come to use Xerox for different reasons. Xerox has tried to protect itself -- and I don't know if it's doing it adequately or not -- by giving every Xerox renter -- and I believe most of these machines are rented -- a little list of do's and don'ts. And one of the don't's is don't copy copyrighted material.

128. QUESTION: But you just said that wouldn't protect Sony.

129. MR. KROFT: I don't believe it would, and that's why I say I'm not sure –

130. QUESTION: Does it protect Xerox?

131. MR. KROFT: That's why I just said I'm not sure if it does.

132. QUESTION: But your view of the law is that as long as Xerox knows that there's some illegal copying going on, Xerox is a contributory infringer?

133. MR. KROFT: To be consistent, Your Honor, I'd have to say yes.

134. QUESTION: A rather extreme position.
**Propose test t:**
\[ t(cfs) \rightarrow x \] 
& reason(s)

**Outcome x**

**Attack t:** pose r.a.a hypo h s.t.:
\[ t(h) \rightarrow x \] but should \( \neg(t(h) \rightarrow x) \) & reason(s)

**QUESTION:** Under your test, supposing somebody tells the Xerox people that Xerox people tell that there are people who are making illegal copies with their machine and they know it...what are they supposed to do?

**MR. KROFT:** If there was only one show on the air that were copyrighted and which could not be copied without objection, if the Petitioners sold this device with knowledge that it would be used to copy that show, ... the Petitioners would be liable.

**Abandon t**

**Modify t \rightarrow t':**
\[ t'(cfs) \rightarrow x; \neg(t'(h) \rightarrow x) \]

**Attack**

“should \( \neg (t(h) \rightarrow x) \)” by Analogizing (cfs, h)

**QUESTION:** But your view of the law is that as long as Xerox knows that there's some illegal copying going on, Xerox is a contributory infringer?

**MR. KROFT:** To be consistent, Your Honor, I'd have to say yes.

**QUESTION:** A rather extreme position.
Example

_California v. Carney, 105 S. Ct. 2066 (1985)_

**Issue:** Legality, under 4th Amendment, US Constitution, of warrantless search of a motor home.

**Facts:** Police suspected def. Carney of trading drugs for sex in motor home located in downtown San Diego parking lot. After questioning a boy leaving Carney’s motor home, agents entered without a warrant or consent, observed drugs, and arrested Carney.

**Conflicting principles:**
- b. Constitutional right of autonomy and privacy in ones home.
- c. Bright line rule that police can apply.

**Proposed tests:**
- State of CA (Mr. Hanoian): Like automobile exception. If place-to-search has wheels and is self-propelling → no warrant.
- Carney (Mr. Homann): If place to be searched has indicia of home then warrant is required.
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<tr>
<th>Argument excerpt – Carney -1-</th>
<th>Self-expl. prompt</th>
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<tr>
<td><strong>48. MR. HANOIAN:</strong> I think I would, Your Honor, yes. That would provide a bright line. But I am looking a little bit more beyond just wheels. We are looking for self-locomotion, self-propelling.</td>
<td>What is Mr. Hanoian's proposed test?</td>
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<td><strong>61. QUESTION:</strong> Well, what if the vehicle is in one of these mobile home parks and hooked up to water and electricity but still has its wheels on?</td>
<td>How does this hypothetical relate to Mr. Hanoian's test?</td>
</tr>
<tr>
<td><strong>62. MR. HANOIAN:</strong> If it still has its wheels and it still has its engine, it is capable of movement and it is capable of movement very quickly.</td>
<td>Do you think Mr. Hanoian's response is effective?</td>
</tr>
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<td><strong>63. QUESTION:</strong> Even though the people are living in it as a home and are paying rent for the trailer space, and so forth?</td>
<td>Why are the Justices adding these features to the hypothetical?</td>
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<td><strong>66a. MR. HANOIAN:</strong> Well, I am not suggesting that there is no expectation of privacy in those circumstances, Your Honor.</td>
<td>By conceding expectations of privacy in the hypotheticals, does Mr. Hanoian reduce his chances of winning the case at hand?</td>
</tr>
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<td><strong>66b. MR. HANOIAN:</strong> What I am suggesting is that society -- this Court has determined that society is not willing to recognize that expectation of privacy as justifying a different rule from another motor vehicle; and that, because of its mobility, the capacity for it to move --</td>
<td>Does Mr. Hanoian make an effective argument in 66a/66b?</td>
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Attack test with disanalogous hypo – Carney example

Propose test t:
\( t(cfs) \rightarrow x \) & reason(s)

1. t: If place-to-search has wheels and is self-propelling → no warrant. Motorhome in cfs has wheels and is self-propelling.

Pa: Prevent loss of evidence.

2. Attack t: pose hypo h
s.t.: \( t(h) \rightarrow x \) but Should \( \neg (t(h) \rightarrow x) \) & reason(s)

h: Well, what if the vehicle is in one of these mobile home parks and hooked up to water and electricity but still has its wheels on?...But what about a self-propelled vehicle that's plugged into the plumbing and the electricity?...And you would apply it, even if it had been parked there three months or so, because your officer wouldn't really know how long it had been parked?

Pb: Privacy; Pb > Pa

3. Abandon t

Modify t → t':
\( t'(cfs) \rightarrow x; \neg (t'(h) \rightarrow x) \)

Attack
“should \( \neg (t(h) \rightarrow x) \)” by
Analogizing (cfs, h)

Analogize cfs, h: “MR. HANOIAN: What I am suggesting is that society -- this Court has determined that society is not willing to recognize that expectation of privacy as justifying a different rule from another motor vehicle; and that, because of its mobility, the capacity for it to move…”

Also, both are self-propelled and police cannot know how long the place-to-search has been there, attached to the plumbing, etc.

Pc: Bright-line Rule; Pa, Pc > Pb.
<table>
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<tr>
<th>Argument excerpt – Carney -2-</th>
<th>Model explanation</th>
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<td>182. MR. HOMANN: The motor home was parked; the drapes were closed. It contained upholstered furniture. It contained a table, kitchen features, a refrigerator. It contained all of the indicia of a home.</td>
<td>Proposed test 1: If place to be searched has the indicia of a home then a warrant is required.</td>
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<td>231. QUESTION: We're getting closer to your case. Suppose somebody drives a great big stretch Cadillac down and puts it in a parking lot, and pulls all the curtains around it, including the one over the windshield and around all the rest of them. Would that be a home?</td>
<td>Hypo focuses on determining when a vehicle exhibits sufficient indicia of being a home.</td>
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<tr>
<td>236. MR. HOMANN: Does it have a bed? 237. Q: Yes, yes. 238. MR. HOMANN: If it is reasonably objectively observable that it has the attributes of a home in it, then I think we have to give it those -- I think we have to give it the same protections that we ordinarily give dwelling compartments.</td>
<td>Proposed test 2: If vehicle has the &quot;reasonably objectively observable attributes of a home&quot; then it requires a warrant to search.</td>
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<td>275. QUESTION: Mr. Homann, what about a van? …In order to help you out, the van is running down the road at 55 miles per hour.</td>
<td>This flips over to Mr. Hanoian’s test. Mr. Homann’s concession suggests a modification of his test:</td>
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<td>276. MR. HOMANN: That helps me tremendously, because the rule that I've proposed at least is not going to preclude the police from entering the van or the motor home, for that matter, when it is speeding down the highway in most circumstances.</td>
<td>Proposed Test 3: If a vehicle has the &quot;reasonably objectively observable attributes of a home&quot; then it requires a warrant to search <strong>unless</strong> it is imminently capable of motion.</td>
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</table>
Series of attacks and modifying rule

1. Propose test $t$: $t(cfs) \Rightarrow \text{outcome } x$ & reason(s)
   - $t1$: If place to be searched has indicia of home then warrant is required.
   - Pb: privacy

2. Attack $t$: pose hypo $h$ s.t.: $t(h) \Rightarrow x$ but should $\neg(t(h) \Rightarrow x)$ & reason(s)
   - h1: Suppose somebody drives a great big stretch Cadillac down and puts it in a parking lot, and pulls all the curtains around it, including the one over the windshield and around all the rest of them.
   - Pc: bright-line rule; Pc > Pb

3. Modify $t \Rightarrow t'$: $t'(cfs) \Rightarrow x$; $\neg(t'(h) \Rightarrow x)$
   - h2: What about a van? ... In order to help you out, the van is running down the road at 55 miles per hour.
   - Pa: Prevent evidence-loss; Pa > Pb
Model attacking proposed test with (dis-)analogous hypo

Propose test $t$: $t(cfs) \rightarrow \text{outcome } x$ & reason(s)

1. Attack $t$: pose hypo $h$ s.t.:
   $t(h) \rightarrow x$ but should $\neg(t(h) \rightarrow x)$ & reason(s)

2. Modify $t \rightarrow t'$:
   $t'(cfs) \rightarrow x$;
   $\neg(t'(h) \rightarrow x)$

3. Abandon $t$

   Attack “should $\neg (t(h) \rightarrow x)$” by Analogizing $(cfs, h)$

4. Attack $t$: pose hypo $h$ s.t.:
   $\neg(t(h) \rightarrow x)$ but should$(t(h) \rightarrow x)$ & reason(s)

5. Abandon $t$

   Modify $t \rightarrow t'$:
   $t'(cfs) \rightarrow x$;
   $t'(h) \rightarrow x$

   Attack “should$(t(h) \rightarrow x)$” by Distinguishing $(cfs, h)$
Lakatos-style hypothetical reasoning

1. Propose conjecture \( t \): \( t(cfs) \rightarrow \text{true} \) & reason(s)

2. Induction; Exists proof: (1) remove one face of polyhedron and stretch flat on blackboard....

3. Cylinder: \( V - E + F = 0 - 2 + 3 = 1 \)

4. Attack \( t \): pose hypo \( h \) s.t.: \( \neg(t(h) \rightarrow \text{true}) \) but should\( (t(h) \rightarrow \text{true}) \) & reason(s)

5. Abandon \( t \)
   - Attack “should\( (t(h) \rightarrow \text{true}) \)” by Distinguishing \( \text{(cfs, h)} \)
   - Modify \( t \rightarrow t' \):
     \( t'(cfs) \rightarrow x; \neg(t'(h) \rightarrow x) \)

\( t' \equiv \text{for any polyhedra which, by removing one face, can be stretched flat on a blackboard and the resulting network be connected } V - E + F = 2 \)
Why is hypothetical reasoning important?

- Systematic methodology for creative, exploratory reasoning
- Makes assumptions explicit
- Explores linkages among facts, theory, evaluation criteria
- Tools for exploring concepts’ meanings
- Real world methodology, sometimes predictive of real outcomes
Teaching moral (or legal) imagination

• “It is by studying cases that we can most easily develop the abilities necessary to engage in constructive ethical analysis. Cases stimulate the moral imaginations by challenging us to anticipate the possible alternatives in resolving them and the consequences of the alternatives. Through cases we learn to recognize the presence of ethical problems and to develop the analytical skills necessary to resolving them.”

• “If in general the role of settled cases in [normative] deliberation is somewhat analogous to that of experimental data in scientific theorizing, then the role of hypothetical cases in particular may be regarded as somewhat analogous to that of thought experiments.”
Hypothetical reasoning: a cognitive phenomenon

• In psychology [cognition]: the mental processes of an individual, with particular relation to a view … that the mind has internal mental states (such as beliefs, desires and intentions) and can be understood in terms of information processing,

• especially when a lot of abstraction or concretization is involved, or processes … involving knowledge, expertise or learning for [sic by?] example are at work.

• It is also used in a wider sense to mean the act of knowing or knowledge, and may be interpreted in a social or cultural sense to describe the emergent development of knowledge and concepts within a group that culminate in both thought and action. (From Wikipedia)
What’s hard in learning hypothetical reasoning skills?

• Getting good examples (e.g., Sup. Ct. oral arguments)
• Understanding the oral argument examples?
  – Oblique dialogues assume familiarity with case background.
  – Hard to see/explain interpretive relations in the argument texts:
    1) Identify and formulate proposed tests
    2) Explain how a hypothetical relates to a test and why
    3) Explain how an advocate responds to a hypothetical and why
    4) Evaluate response to hypothetical vis a vis the test
• Making such arguments?
  – Would an explicit model help them understand? Perform?
  – Does identifying/explaining components and relations help or hinder?
  – Do visual (or other) representations help or hinder?
Three research goals

1. How well do law students understand the interpretive role of hypothetical reasoning in Sup. Ct. oral arguments?

2. Can tech-supported collaborative instruction help them learn to reason with hypotheticals?

3. Can the process of reasoning with hypotheticals be modeled computationally and facilitate instruction?
1. Experiment

Task: Study transcripts of Sup. Ct. oral arguments (two 3-hour sessions.)

Participants: 17 students in pre-law summer program

Hypothesis: Detailed self-explanation prompts can scaffold students’ understanding of oral argument transcripts.

Experimental condition: Specific prompts ask student to track if/how the attorneys change their proposed tests in response to Justices’ questioning.

Control condition: Generic prompts (“Explain”) in the same place as the specific prompts.

Post-test argument skills assessment: argumentation questions (e.g., generate hypotheticals) about similar problem (near transfer) and novel problem (far transfer) (3 hrs).
Assessment form excerpts

■ SONY, 4a: How well did the student pose and explain a hypothetical that would violate some version of a test for determining whether SONY was contributorily liable for copyright infringement customers committed with VCRs supplied by SONY?

   1 ○  2 ○  3 ○  4 ○  5 ○  

1 = Not well at all  
5 = Very well

■ SONY, 4a: Briefly state the test which, the student implies, the hypothetical would violate:

■ SONY, 4a: Check any that apply: The student’s hypothetical was:

   ○ Abstract and conclusory  ○ Not really there
   ○ Concise with no irrelevant details  ○ Not well focused
   ○ Factually specific  ○ Relevant to the argument
   ○ Irrelevant to the argument  ○ Very creative
   ○ Nonsensical  ○ Very similar to one in the transcript
   ○ Not mentioned in the transcript  ○ Well focused
2. Collaborative mark-up tools
37. QUESTION: Haven't you noticed a lot of Christmas celebrations without creches?
38. MR. MC MAHON: That is correct, Justice.
39. QUESTION: You keep saying they all go along together.
40. MR. MC MAHON: Well, of course, any symbol of Christmas may be used alone.
41. QUESTION: But this case is not aimed at all of the decorations, right?
42. MR. MC MAHON: That is correct, Justice.
43. QUESTION: This case is aimed at one item.
44. MR. MC MAHON: That is correct.
45. QUESTION: Well, why don't we talk about that one item without all of the others?
46. MR. MC MAHON: Because that one item cannot be properly evaluated in terms of what it is doing without relating it to the overall celebration of which it is a part. The creche --
47. QUESTION: Mr. McMahon, do you think that for -- the city could display a nativity scene alone without other displays, such as Santa Claus and Christmas trees and so forth?
48. MR. MC MAHON: Well, obviously, Justice, that would be --
49. QUESTION: In your view?
56. The Christmas holiday, although it clearly has its origin in Christian [*] observance, is a secular folk festival. The nativity scene is intertwined into the American celebration, but the American celebration is a combination of feeding and fraternizing and music and art and various types of socializing, and the religious portion of Christmas is simply one component of it, and it is a component that recognizes its religious heritage.

57. QUESTIONS. Mr. McMahon, could the city display a cross for the celebration of Easter under your view?

58. MR. MCMAHON: Justice, I think that, first of all, Easter is not a recognized public holiday, and the association of a cross with a specifically religious holiday might well imply the promotion of religion. I would point out, however, that even that it probably less religious than the Thanksgiving Day established by President Washington's proclamation in 1789, but I would say that shows that historical base, the cross is not necessarily a religious symbol but rather a representation of a religious holiday.

Hypothetical:
- A nativity scene without Santa Claus or Christmas trees
- A city display of a cross or Easter
56. The Christmas holiday, although it clearly has its origin in Christian [*9] observance, is a secular folk festivity. The nativity scene is intertwined into the American celebration, but the American celebration is a combination of feasting and fraternalizing and music and art and various types of socializing, and the religious portion of Christmas is simply one component of it, and it is a component that recognizes its religious heritage.

57. QUESTION: Mr. McMahon, could the city display a cross for the celebration of Easter under your view?

58. MR. McMAHON: Justice, I think that, first of all, Easter is not a recognized public holiday, and the association of a cross with a specifically religious holiday might well implicate the promotion of religion. I would point out, however, that even that is probably less religious than the Thanksgiving Day established by President Washington's proclamation in 1789, but I would say that absent that historical base, the cross is not a recognized national holiday.
3. Can computational model help?

- Can a program engage students in pedagogically valuable examples of hypothetical reasoning?
- AI models of Lakatos-style reasoning in machine learning:
  - card game plans (Hearts) (Hayes-Roth, R. 1983)
  - number theory concepts: HR (Pease, Colton, et al. 2002)
- CATO (Aleven, 1997; Aleven & Ashley, 1997) CATO-Dial (Ashley, et al. 2002): engaged students in making case-based legal arguments analogizing and distinguishing cases, but not posing hypos to assess tests.
- HYPO (Ashley, 1988): posed hypothetical variations of problem situation to strengthen/weaken argument.
  - Used heuristics to pose hypos by modifying cases along dimensions.
  - Some response types modeled, but not in dialogical context in which hypos put pressure on proposed tests and their concepts.
HYPO heuristics for posing hypotheticals

Define dimensions: stereotypical fact patterns that tend to strengthen or weaken claim in a case.

**H1:** Make a near miss dimension apply

**H2:** Strengthen or weaken a case along applicable dimension

**H3:** Move a case along a related dimension

**H4:** Make a case extreme along a dimension

**H5:** Make a case into a near-win given a target

Define which hypothetical modifications are meaningful:
- Argument context (and Claim Lattice) helped choose hypothetical modifications.
- Goal to show how plaintiff’s position in current fact situation (cfs) can be strengthened/weakened in light of near-by cases.
HYPO model of SONY hypotheticals

Define dimensions:

– possible-noninfringing-use:
  • percentage of copied programs not copyrighted
– known-infringing-uses:
  • percentage of copyrighted programs def. knew were copied

Hypos1-3: 10% of programs copied are not copyrighted; 50%; 99.9%
  – weaken seed case (cfs) for plaintiff along possible-noninfringing-use dimension:
  – Heuristics:
    H2 (weaken along applicable dimension)
    H4 (make extreme along dimension)

Hypo4: only .1% of copyrighted programs copied were infringing, but defendant knew they were being copied.
  – strengthen Hypo 3 for plaintiff along known-infringing-uses dimension:
  – Heuristics:
    H1 (make near miss dimension apply)
    H3 (move case along related (i.e., conflicting) dimension)
**Toward a computational model...**

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<thead>
<tr>
<th>Advocate:</th>
<th>Rule:</th>
<th>Concept</th>
<th>Arg:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal: &lt;5♠,8♣,4♦&gt;</td>
<td>If (suit(C2) ≠ ♥) → ♦</td>
<td></td>
<td>Rule uses general criterion</td>
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<tr>
<td>Cases: &lt;7♠, A♥,6♣&gt;, &lt;3♠,5♦,10♦&gt;</td>
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<td>suit; simple, complete coverage</td>
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<tr>
<td>Interrogator:</td>
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<td>Response: Not about case but complement</td>
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<tr>
<td>Hypo: &lt;9♥, 3♥, 8♠&gt;</td>
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<tr>
<td>Hand: 9♥, 3♥, J♥, 6♣,8♠,…</td>
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<tr>
<td>Advocate:</td>
<td>Rule:</td>
<td>Arg: Rule simple, complete coverage, about case (but less general criterion)</td>
<td></td>
</tr>
<tr>
<td>Goal: &lt;5♠,8♣,4♦&gt;</td>
<td>If (val(C2) ≤ 8) → ♦</td>
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<tr>
<td>Cases: &lt;9♥, 3♥, 8♠&gt;, &lt;7♠, A♥,6♣&gt;, &lt;3♠,5♦,10♦&gt;</td>
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<tr>
<td>Advocate:</td>
<td>Rule:</td>
<td>Arg: Rule simple, complete coverage, about case, focus on essential concepts (but new, less general criterion)</td>
<td></td>
</tr>
<tr>
<td>Goal: &lt;5♠,8♣,4♦&gt;</td>
<td>If (7 &lt; sum(C1,C2) &lt; 14) → ♦</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cases: &lt;3♠, K♣, 2♦&gt;, &lt;5♥, 2♥, 6♣&gt;, &lt;9♥, 3♥, 8♠&gt;, &lt;7♠, A♥,6♣&gt;, &lt;3♠,5♦,10♦&gt;</td>
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Toward a computational model... (cont.)

| Advocate: | Rule: If \(((\text{FaceCase}(C) \text{ and } \text{diff}(C_1, C_2) < 3) \text{ or } (\text{FaceCase}(C) \text{ and } (\text{diff}(C_1, C_2 > 1) \text{ and } (7 < \text{sum}(C_1, C_2) < 14))) \Rightarrow \text{♦}) \text{ Concept Defs: } \text{sum}(C_x, C_y) = (\text{val}(C_x) + (\text{val}(C_y))) \text{ Diff}(C_x, C_y) = |\text{val}(C_x) - \text{val}(C_y)| \text{ FaceCard} = \{C_x \mid \text{val}(C_x) \geq 10\} \text{ FaceCase} = \{C_x, C_y, C_z\} \mid \text{FaceCard}(C_x) \text{ or } \text{FaceCard}(C_y)\text{ Arg: Revise FaceCard to cont. existing rule; good coverage.} | Arg: High coverage, ... |
| --- | --- | --- |
| Goal: \(<5\spadesuit, 8\spadesuit, 4\spadesuit>\) Cases: \(<9\spadesuit, 10\spadesuit, J\spadesuit>, <4\heartsuit, 4\clubsuit, 8\clubsuit>, \ldots, <3\spadesuit, K\spadesuit, 2\spadesuit>, <5\heartsuit, 2\heartsuit, 6\heartsuit>, <9\heartsuit, 3\heartsuit, 8\heartsuit>, <7\clubsuit, A\heartsuit, 6\clubsuit>, \ldots\) | Response: \text{Uses span, rejects monster} | |
| Interrogator: | Hypo: \(<2\spadesuit, 7\spadesuit, 4\spadesuit>\) Hand: \(K\spadesuit, 2\spadesuit, J\heartsuit, \ldots\) | |
| Advocate: ... | Rule: If \(((C_1 \not\in \text{SharpCards}) \text{ and } (C_2 \not\in \text{SharpCards})) \text{ and } (\text{suit}(C_1) \neq \text{suit}(C_2))) \text{ or } (\text{if}(C_1 \in \text{FaceCards}) \text{ and } (C_2 \in \text{FaceCards})) \Rightarrow \text{♦} \text{ Concept Defs: } \text{SharpVals} = \{4, 7, K, A\} \text{ SharpCards} = \{C_x \mid \text{val}(C_x) \in \text{SharpVals}\} \ldots | Arg: \text{Revise FaceCard to cont. existing rule; good coverage.} |
Conclusions

• Hypothetical reasoning is a systematic cognitive methodology for creative, exploratory reasoning. It makes assumptions explicit, explores concepts’ meanings and the linkages among facts, theories, and evaluation criteria.

• Supreme Court oral arguments are unique examples of hypothetical reasoning at work. How can they best be used as pedagogical examples?

• Three on-going projects to assess:
  1. How well do law students understand the interpretive role of hypothetical reasoning in Sup. Ct. oral arguments? Can we objectively assess improvements?

  2. Whether tech-supported collaborative instruction can help them learn to reason with hypotheticals?

  3. Whether the process of reasoning with hypotheticals can be modeled computationally and facilitate instruction?