

# Table Talking:

## Conversational Rendering of Table Data

Presented:

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**Emmett Coin**  
*Industrial Poet*

# Who Am I?

- Emmett Coin
  - Speech Scientist
    - Advanced conversational systems
      - Adaptive natural synthetic agents
    - Technologies:
      - Embedded/wearable/harsh-environment
      - Synthetic Agent (SA) network systems
  - Architect
  - Advisor
  - Industrial Poet
    - Rugged solutions
    - Compact and elegant methodology
    - The power of the spoken word

# What Is “” Talk

- Mapping the Frontier
  - What is required to “converse with the machine”?
  - Charting a course to the next level
  - Can we make it meta?
- Helping Others
  - Evaluate dialog/conversation technologies
  - Guide development using advanced methods
  - Embed sophisticated new components

# Ideas this talk should provoke...

- How can we address an **entire class** of conversation?
  - How it will **simplify** dialog design.
  - Why it will **improve** conversational efficiency.
- Reducing big problems into manageable chunks.
  - Why **reassembled chunks** are better
- Dealing with the task at hand
  - Delegate the rest to **derived behavior**
  - Why it improves **consistency**.
- What do we **expect** from a real conversation?

# Tapping into Automaticity

- Automaticity:
  - Doing something so well that you do not have to think about it while doing it
  - Complex activity that requires little effort or attention
  - Doing things without dwelling on details
  - The delegation of behavioral nuance
  - Less micro-management
  - Second nature
  - Riding a bike

# Tapping into Automaticity

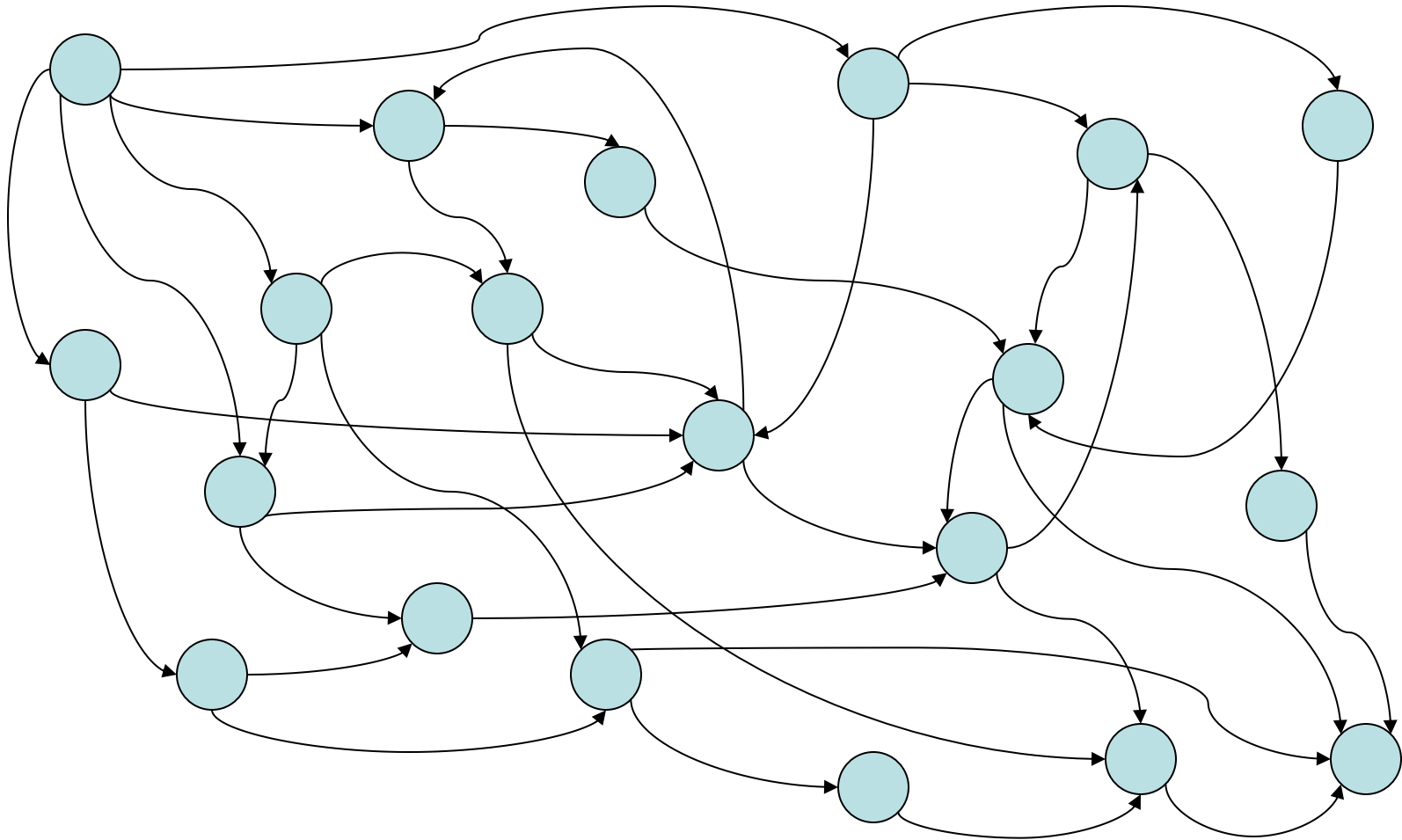
- Automaticity:
  - Doing something so well that you do not have to think about it while doing it
  - Complex activity that requires little effort or attention
  - Doing things without dwelling on details
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  - Less micro-management
  - Second nature
  - Riding a bike

# “Automatic” Implies

- Rules
  - Proven algorithms
  - Describable by a formalism
  - High level semantics – derivable syntax
- Delegation
  - Relinquish control to a “separate” intelligence
  - Trust it will be accomplished
  - Accept a “high-level” activity summary.

# Dialog Network

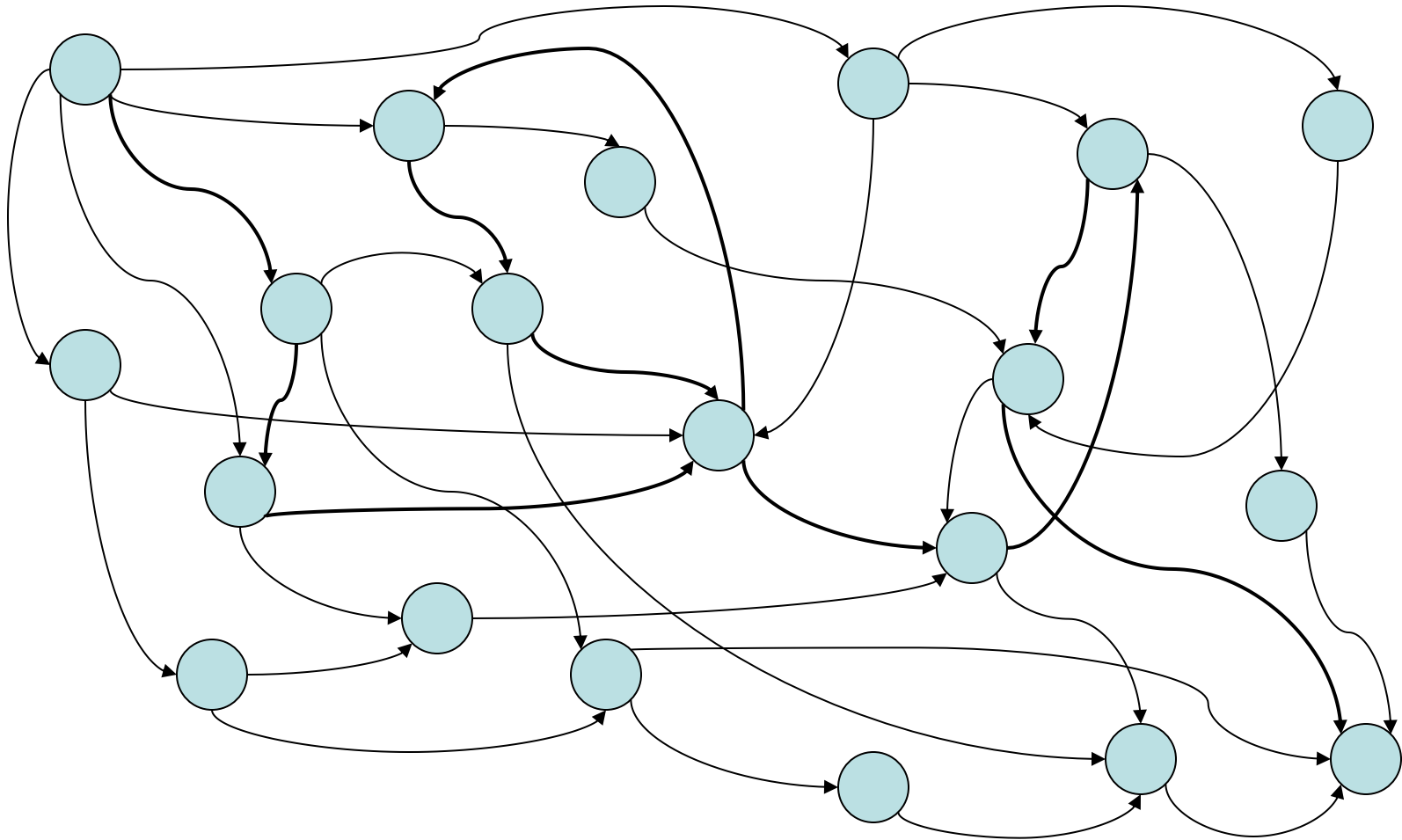
## Meta Memory





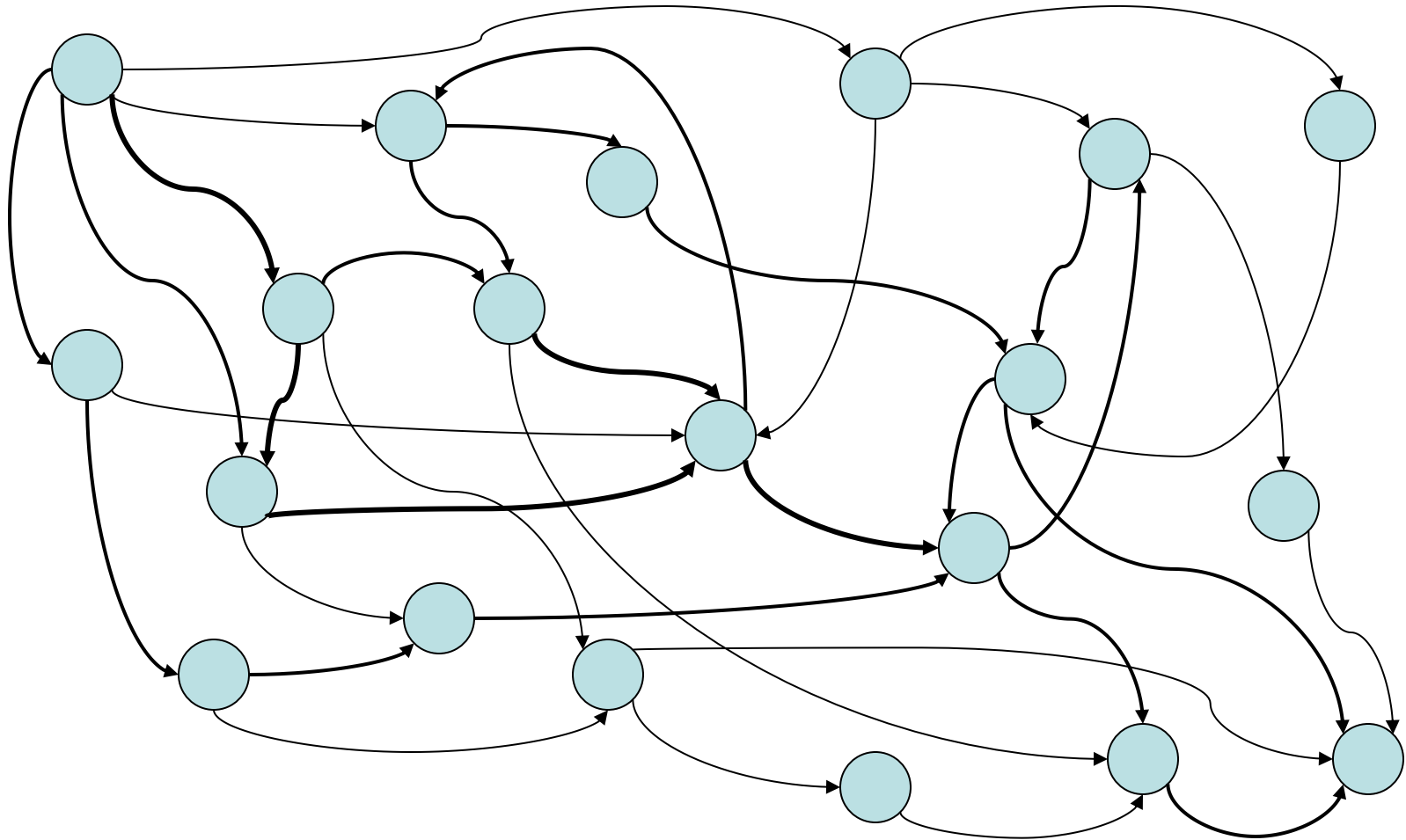
# Dialog Network

## Meta Memory



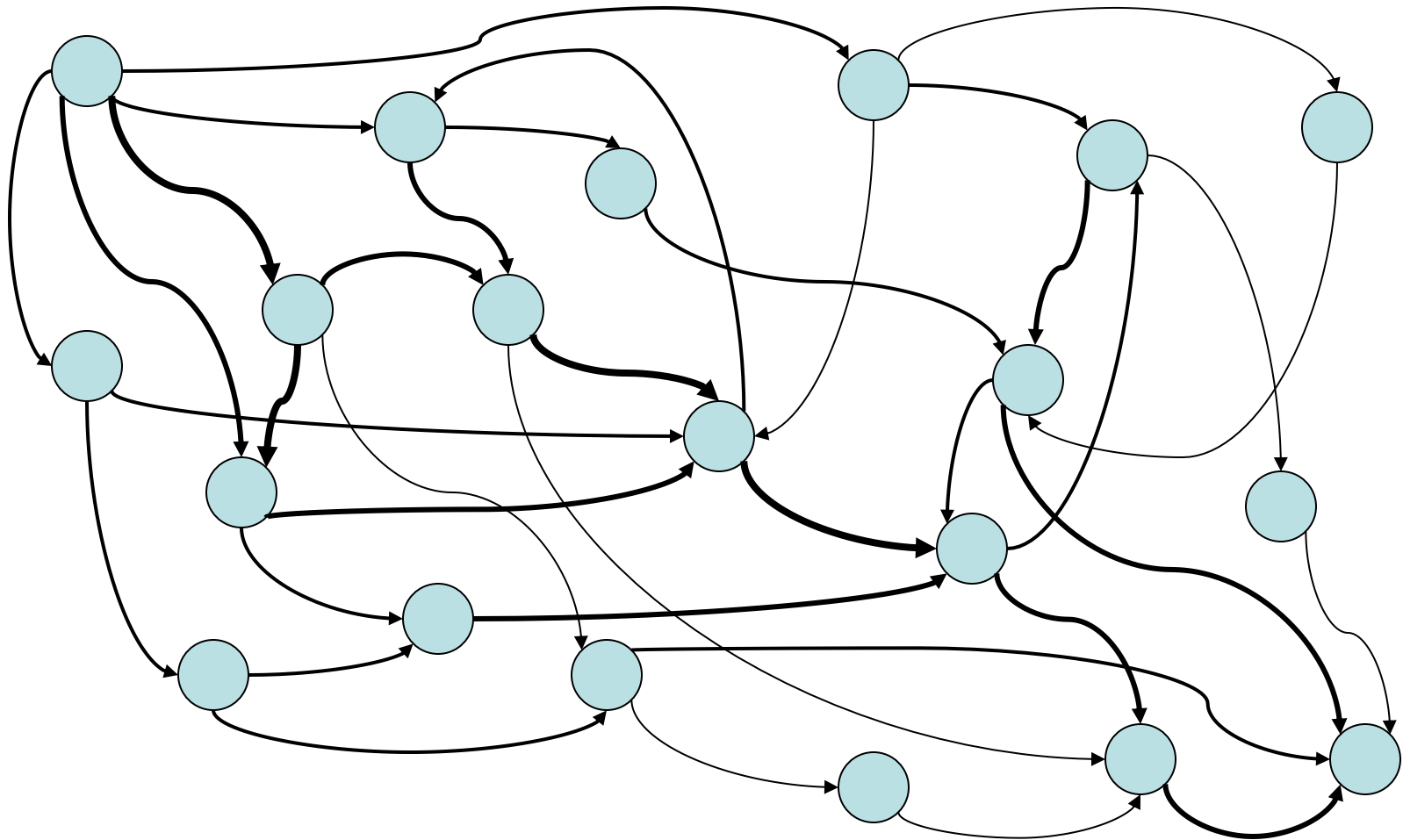
# Dialog Network

## Meta Memory



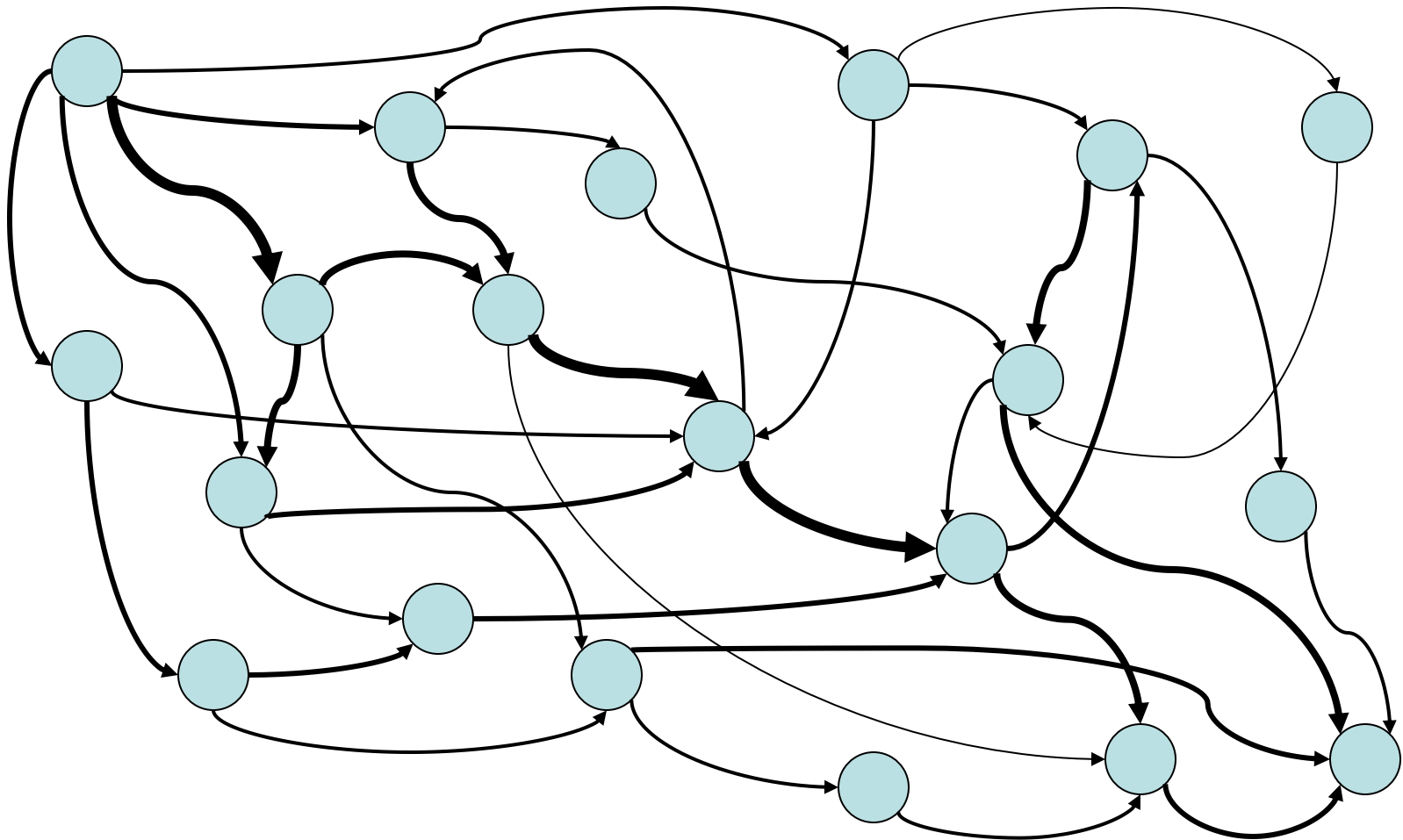
# Dialog Network

## Meta Memory



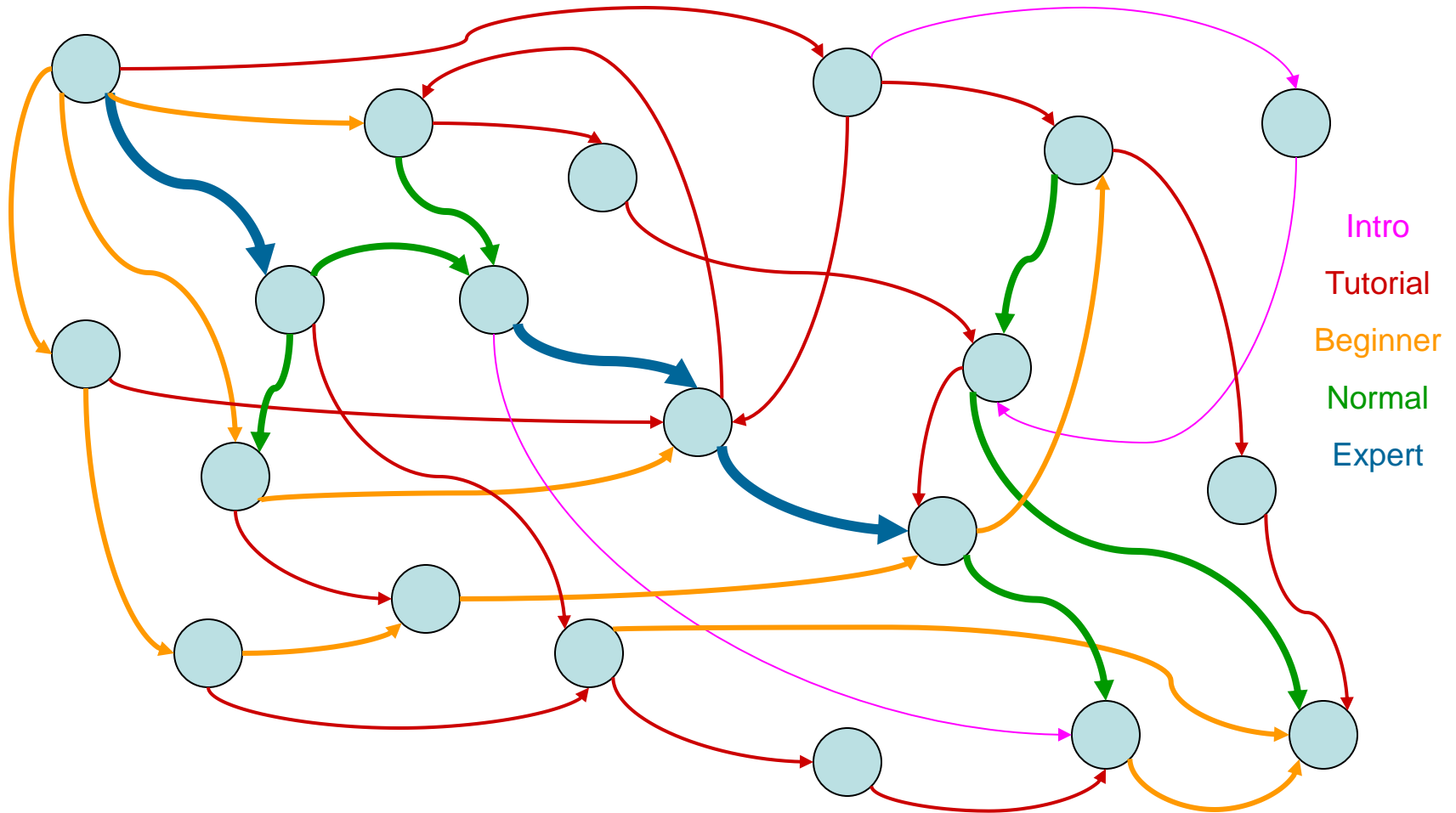
# Dialog Network

## Meta Memory



# Dialog Network

Meta Memory



# Tables: a Meta Concept

- Universal Concepts of Table Interaction
  - Display
    - Show the table, highlight the elements at the focus
  - Focus
    - Use more “in context” domain language when appropriate
  - Manipulate
    - Add, Delete, Inquire, Sort the elements
  - Reference
    - Name, Index, Relative Position, Deixis
  - Multimodality
    - Operations by voice and/or keystrokes and/or ???

# Display

Display Focus Manipulate Reference Multimodality

- Language (grammar)
  - “show me my [someListName] table” variations
  - Use simple listOfListNames grammar to flavor a generic (standard) ejListControl.srgs grammar
- Remember
  - Previously used row/column manipulation focus
- Render
  - Read the table data (from the BlackBoard)
  - Format it as HTML (including “touch” responses)
  - Insert it into the page on the browser

# Name of Planet Table Domain

(to move the focus to the domain)

```
<grammar LANGID="409" root="grammar">
  <rule id="ejListType" semFormat="listTypeSpecific">
    <one-of semName="ejListCategory">
      <item semValue="ejAppointmentList">appointment</item>
      <item semValue="ejAppointmentList">appointments</item>
      <item semValue="ejReminderList">reminder</item>
      <item semValue="ejReminderList">reminders</item>
      <item semValue="ejGroceryList">shopping</item>
      <item semValue="ejGroceryList">grocery</item>
      <item semValue="ejHardwareList">hardware</item>
      <item semValue="ejSuppliesList">supplies</item>
      <item semValue="ejToDoList">to_do</item>
      <item semValue="ejPlanets">planet</item>
      <item semValue="ejPlanets">planets</item>
      <item semValue="ejPlanets">solar_system</item>
    </one-of>
  </rule>
</grammar>
```



# List of Planet Names

(to incorporate into generic list control grammar)

```
<grammar LANGID="409" root="grammar">
  <rule id="ejPlanetNames">
    <one-of semName="ejPlanetType">
      <item semValue="real">Mercury</item>
      <item semValue="real">Venus</item>
      <item semValue="real">Earth</item>
      <item semValue="real">Mars</item>
      <item semValue="real">Jupiter</item>
      <item semValue="real">Saturn</item>
      <item semValue="real">Uranus</item>
      <item semValue="real">Neptune</item>
      <item semValue="dwarf">Pluto</item>
    </one-of>
  </rule>
</grammar>
```

# Display: table format

(to paint the table in html for display)

```
<listFormat name="planetListFormat2">
  <tableTitle>The Planets</tableTitle>
  <tableFormat>ejTable2</tableFormat>
  <primaryValue>name</primaryValue>
  <rowFocusClass>ejTableRowFocus</rowFocusClass>
  <rowIndexClass>ejTableIndex</rowIndexClass>
  <fieldFocusClass>ejTableFieldFocus</fieldFocusClass>
  <record node="planet" showColumnTitles="TRUE" numberOfRows="TRUE">
    <field title="Planet">
      <data>name</data>
      <format>ejText</format>
      <displayClass>ejNormal</displayClass>
    </field>
  </record>
</listFormat>
```

# Data on the BB

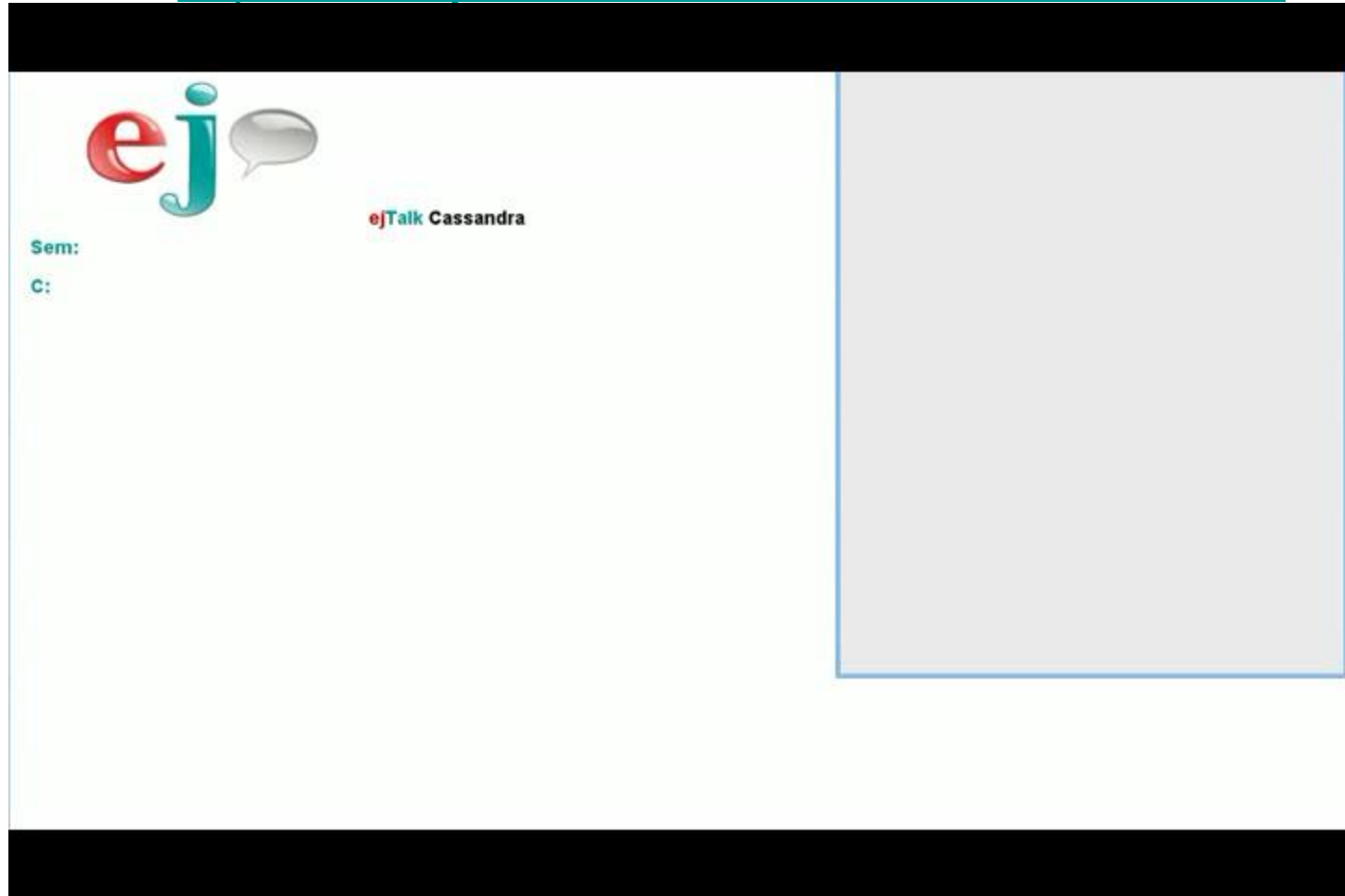
(ejTalker short and long term memory)

```
<planets>
  <list open="TRUE" format="planetListFormat2.xml" dataPath="planets/list" focusRecord="6" focusPath="name"
  focusValue="Saturn" pathClicked="name">
    <planet>
      <name>Mercury</name>
      <distFromSunAU>
        <avg>0.387</avg>
        <perihelion>0.307</perihelion>
        <aphelion>0.467</aphelion>
      </distFromSunAU>
      <radiusKmEQ>2439</radiusKmEQ>
      <volumeEU>0.054</volumeEU>
      <massEU>0.055</massEU>
      <densityEU>0.984</densityEU>
      <!-- lots more data here -->
    </planet>
    <planet>
      <name>Venus</name>
      <distFromSunAU>
        <avg>0.723</avg>
        <perihelion>0.730</perihelion>
        <aphelion>0.716</aphelion>
      </distFromSunAU>
      <!-- lots more data here -->
    </planet>
    <!-- and lots more planets -->
  </list>
</planets>
```

.....

# Display Demo

link: [https://www.youtube.com/watch?v=nB9UOxXH\\_LI](https://www.youtube.com/watch?v=nB9UOxXH_LI)



# Focus

Display **Focus** Manipulate Reference Multimodality

- Domain shifters
  - “show me the planets table”
  - “add coffee to my shopping list”
- Domain specific dialog
  - “What about Pluto?” makes sense for planets (or Disney characters?)
  - “Add coffee” is only obvious if the conversation domain is *the shopping list*

# Step Rule to Focus Table

(a <rule> in the ejPlanets.xml Step File)

```
<rule name="displayPlanetNames">
  <pattern input="{R:ejShowCMD:ejExist}_{S:ejListCategory:}">TRUE_ejPlanets</pattern>
  <examplePattern>
    <ex>show me a list of the planets</ex>
  </examplePattern>
  <action>
    <function>
      <AFS function="list.display">
        <paramNode>
          <listFormatName>planetListFormat2.xml</listFormatName>
          <dataLocation>planets/list</dataLocation>
        </paramNode>
        <resultNode>planets</resultNode>
      </AFS>
    </function>
    <presay>
      <text>Here you go.</text>
    </presay>
    <displayHTML>
      <information type="treeReference">planets/display/form/div</information>
    </displayHTML>
  </action>
  <goto>ejPlanets.xml</goto>
</rule>
```

# Manipulate

Display Focus **Manipulate** Reference Multimodality

- Add things
  - “put coffee on the list”
- Delete things
  - “delete bananas”
- Test existence
  - “Is Jupiter on the list?”
  - Confirm with TTS and text
  - Highlight in display
- Sort the list
  - “sort by distance from the Sun”
  - “group by aisle number”

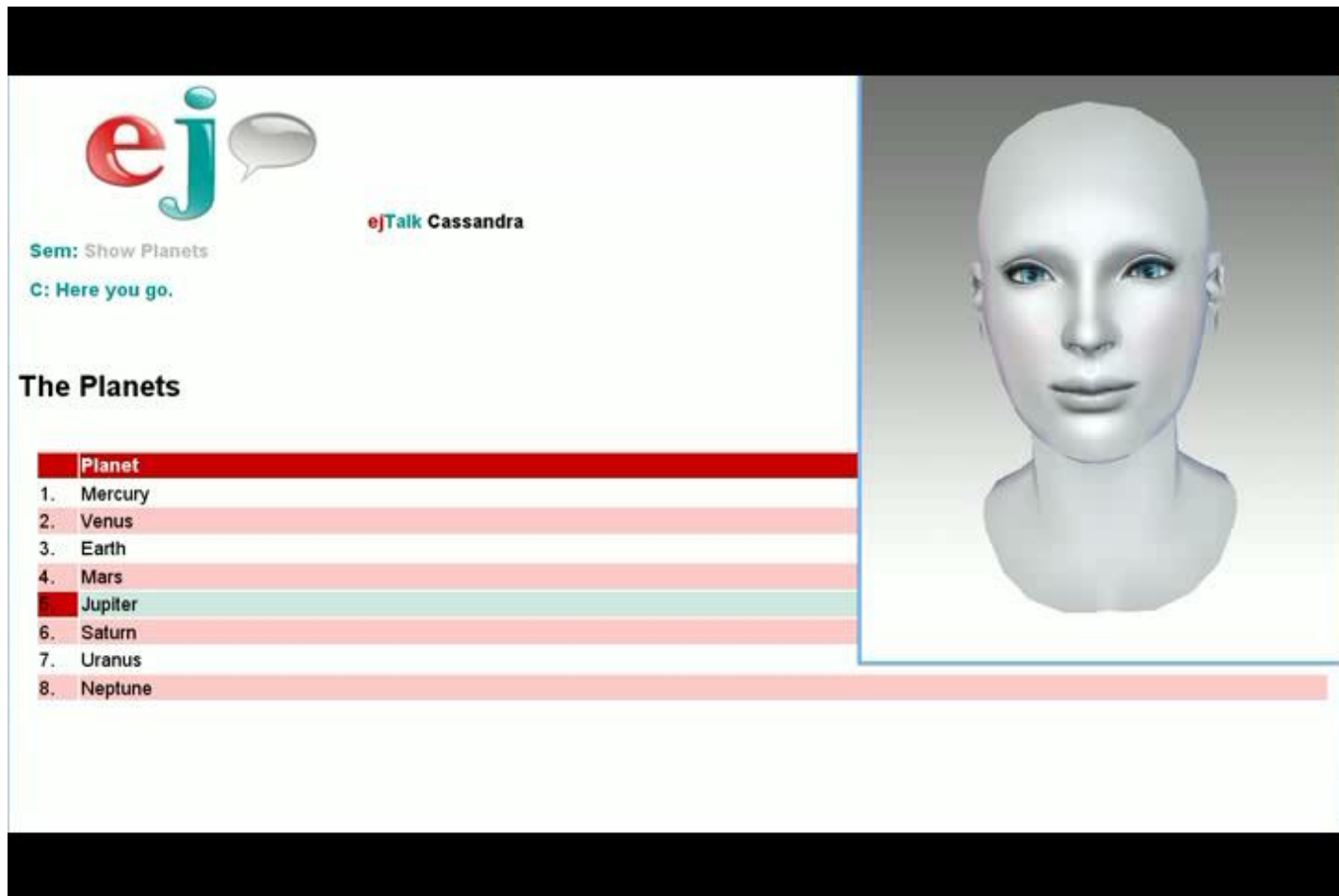
# Step Rule to Add Item

```
<rule name="simpleAddVar" maxDeriveDepth="0">
  <pattern input="{R:ejListSimpleOP:ejExist}_{R:ejAddCMD:ejExist}_{R:groceryItems:ejExist}">TRUE_TRUE_TRUE</pattern>
  <examplePattern>
    <ex>add scallops</ex>
  </examplePattern>
  <action>
    <function>
      <AFS function="list.addRecordValue">
        <paramNode>
          <listFormatName>shoppingListFormat1.xml</listFormatName>
          <dataLocation>grocery/currentList</dataLocation>
          <field name="description">{R:groceryItems:ejSpanText}</field>
        </paramNode>
        <resultNode>grocery</resultNode>
      </AFS>
    </function>
  </action>
  <branch>
    <case id="RECORD_ADDED">
      <action>
        <presay>
          <text>I added {V:grocery/addedValue:} to the list.</text>
        </presay>
        <displayHTML>
          <information type="treeReference">grocery/displayform/div</information>
        </displayHTML>
      </action>
    </case>
    <case id="RECORD_EXISTS">
      <!-- do stuff if the record is already on the list -->
    </case>
  </branch>
</rule>
```



# Focus and Manipulate

link: <https://www.youtube.com/watch?v=FY731vQWFA4>



The screenshot displays the ejTalk interface. On the left, the 'ej' logo is visible, along with the text 'Sem: Show Planets' and 'C: Here you go.'. Below this, a section titled 'The Planets' contains a list of planets, each with a corresponding colored bar. The list is as follows:

	Planet
1.	Mercury
2.	Venus
3.	Earth
4.	Mars
5.	Jupiter
6.	Saturn
7.	Uranus
8.	Neptune

On the right side of the interface, there is a 3D rendered avatar of a woman's head and shoulders, which is currently blank and grey.

# Reference

Display Focus Manipulate Reference Multimodality

- Name
  - Use a “key” field
  - Say: “What kind of planet is Jupiter?”
- Index
  - Use the row number
  - Say: “delete item 3”
- Relative
  - Say: “read the first one”
- Deixis
  - Say: “are bananas on the list?”
  - Then say “delete them”
  - Then say “sorry add them”

```

<rule name="whatTypeOfPlanetAnaphora">
  <pattern input="{R:ejPlan_typeofPlanet:ejExist}">TRUE</pattern>
  <examplePattern>
    <ex>What kind of planet is that?</ex>
  </examplePattern>
  <action>
    <function>
      <AFS function="list.isPresentInList">
        <paramNode>
          <listFormatName>planetListFormat2.xml</listFormatName>
          <dataLocation>planets/list</dataLocation>
          <field name="name">{V:planets/ejPlanetNames:Earth}</field>
        </paramNode>
        <resultNode>planets</resultNode>
      </AFS>
    </function>
  </action>
  <branch>
    <case id="RECORD_EXISTS">
      <action>
        <function>
          <AFS function="list.getValue">
            <paramNode>
              <listFormatName>planetListFormat2.xml</listFormatName>
              <dataLocation>planets/list</dataLocation>
              <fieldFocus name="name"/>
              <fieldSpoken name="type"/>
            </paramNode>
            <resultNode>planets</resultNode>
          </AFS>
        </function>
        <presay>
          <text emotion="ejShy">{V:planets/ejPlanetNames:Earth} is a {V:planets/fieldSpoken:} type planet.</text>
        </presay>
        <displayHTML>
          <information type="treeReference">planets/display/form/div</information>
        </displayHTML>
      </action>
    </case>
    <!-- more cases handled here - - >
  </branch>
</rule>

```

# Anaphoric Reference

Step Rule for “What kind of planet is **that**?”



# Multimodality

Display Focus Manipulate Reference Multimodality

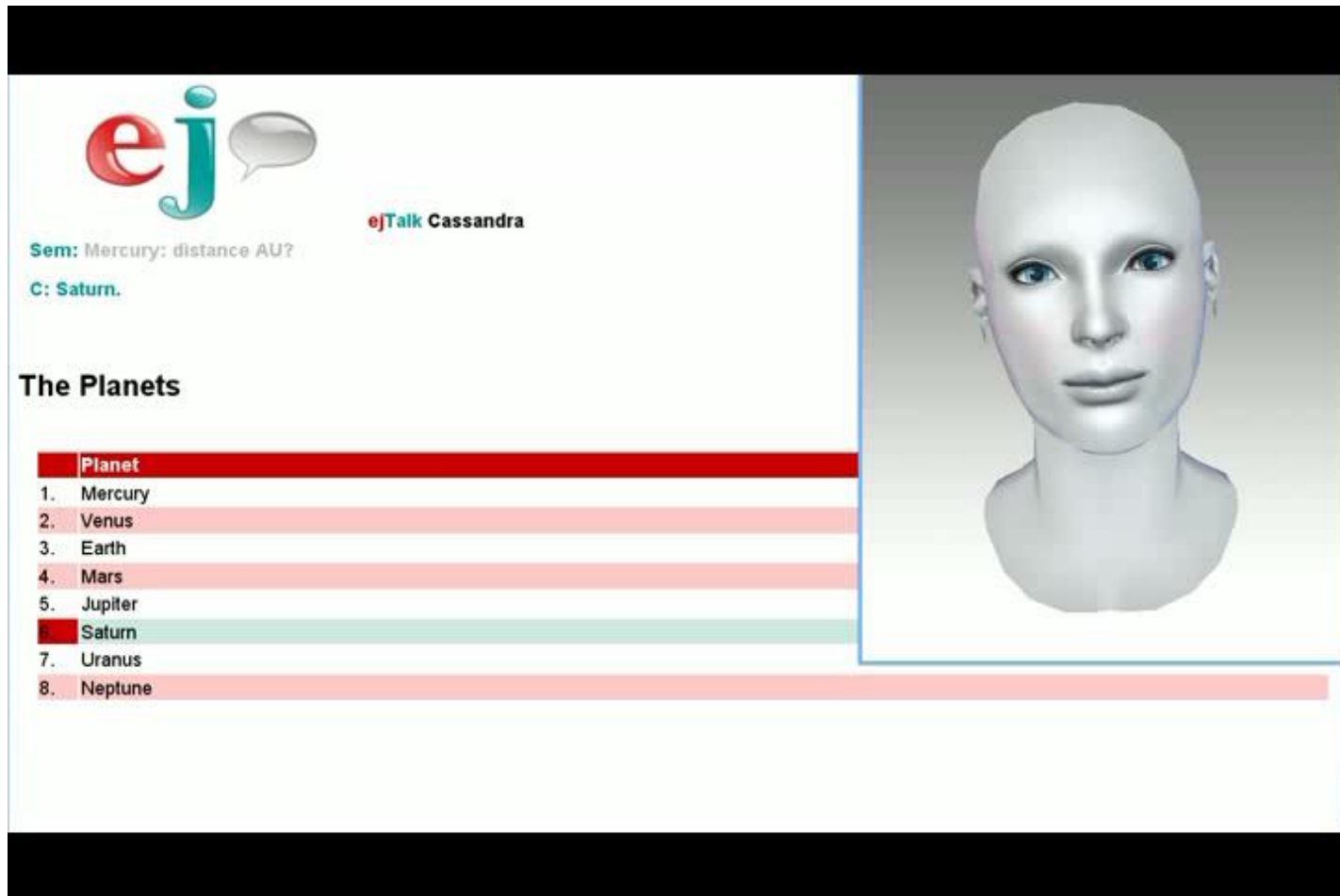
- Atomic
  - Push a button to display and focus a list ... or
  - Say “display the planets list”
- Compound
  - Example 1
    - Click on a row ... then
    - Say “what is the density of that?”
  - Example 2
    - Say “are bananas on my list?” ... then
    - Type over *bananas* with *red bananas*

# Step Rule for Multimodal “touch”

```
<rule name="MMfieldClick">
  <pattern>(ejMM)(TABLE List:[W:tableID],Record:[W:recordIndex],Field:[W:fieldName])</pattern>
  <examplePattern>
    <ex>(ejMM)(TABLE List:shoppingListFormat1.xml+grocery/currentList,Record:5,Field:description)</ex>
  </examplePattern>
  <action>
    <function>
      <AFS function="list.getValue">
        <paramNode>
          <listFormatName>shoppingListFormat1.xml</listFormatName>
          <dataLocation>grocery/currentList</dataLocation>
          <recordFocus>{V:system/asr/vars/recordIndex:}</recordFocus>
          <fieldFocus name="description"/>
          <fieldClicked>{V:system/asr/vars/fieldName:}</fieldClicked>
          <fieldSpoken name="description"/>
        </paramNode>
        <resultNode>grocery</resultNode>
      </AFS>
    </function>
  </action>
  <branch>
    <case id="RECORD_VALUE_SET">
      <action>
        <presay>
          <text>{V:grocery/fieldSpoken:}. |</text>
        </presay>
        <displayHTML>
          <information type="treeReference">grocery/display/form/div</information>
        </displayHTML>
      </action>
    </case>
    <case> <!-- more cases for other conditions --> </case>
  </branch>
  <goto>groceryListDomain.xml</goto>
</rule>
```

# Reference and Multimodality

link: <https://www.youtube.com/watch?v=PsfdCXilXxs>




The screenshot shows a user interface for an AI assistant named ejTalk. On the left, the ejTalk logo is at the top, followed by the name "ejTalk Cassandra". Below that, a conversation log shows a user asking "Sem: Mercury: distance AU?" and the assistant replying "C: Saturn.". A section titled "The Planets" contains a list of planets from 1 to 8. The planet "Saturn" is highlighted with a red bar, and a green bar is positioned to its right, extending towards a 3D avatar of a woman's head and neck on the right side of the screen.

**ejTalk** Cassandra

Sem: Mercury: distance AU?  
C: Saturn.

### The Planets

	Planet
1.	Mercury
2.	Venus
3.	Earth
4.	Mars
5.	Jupiter
6.	Saturn
7.	Uranus
8.	Neptune



# Meta Table Talking

- More Natural
  - The user experience is **less rigid** and can be **more consistent**
- Easier to Author
  - Like systems based on delegation (e.g. military) each level has a **manageable amount of detail** to react to
- Automatic
  - People only drive a manual transmission car for fun and that “fun” **costs more** too!
- What rules?
  - As **subtle** and **sophisticated** as needed but sensibly **encapsulated**

# Remember

- **Delegate** at a semantic level
- Syntax is **Derived** in “the moment”
- **Consistent** of behavior over the entire system
- Simplify dialog design (**Divide/Conquer**)
- Create more **Natural** experiences
- Greater than the sum of the parts  
(**Emergent Behavior**)



# Thank you



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