

Movies, Comics and Multi-View Displays

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Topics

- How do movies work?
- How do comics work?
- The Interacting Cognitive Subsystem (ICS) model
- A few words on multi-view displays

How do movies work?

James Bond vs Jaws (Moonraker 1979)

How did we see just one scene?

- All cuts within this scene were “continuity edits”
 - Common position of subjects between cuts
 - Common direction of motion
 - Common music/sound effects
- Changes weren’t salient, so we didn’t notice
 - Aligned with eye movements/blinks
 - Masking: lots of action!
 - Perceptually equivalent to looking around in a scene...

What about scene cuts?

- Recall “event segmentation”
 - Tendency to segment events by:
 - Subject - Jaws/Bond
 - Action - Falling
 - Location - Sky
 - So this “scene” aligned with a single “event”
- Natural scene cuts in movies should align with how we naturally segment events
 - Subjects, Action, Location, Time, Goals/Objectives

The circus tent

- And how did we predict that Jaws would fall on the circus tent?
 - Circus music while showing Jaws
 - Cuts back and forth between Jaws and circus tent
 - Common “ridiculousness” of the situation?



Movie Summary

- Effective “cuts” are seamless and unnoticeable
- Continuity cuts: hidden by eye movements, blinks, masking
- Scene cuts: hidden by aligning with natural event boundaries
 - Example of a bad scene cut...

Fonda and Hopper (Easy Rider 1969)

How do comics work?

- In many ways, similar to movies
- Rely on reader's imagination to fill in the gaps between "cuts"
- Many types of transitions...



Transitions in comics



1.
*MOMENT-
TO-
MOMENT*

- Tiny changes
- Like frames in movies



2.
*ACTION-
TO-
ACTION*

- A complete action of a single subject
- Efficient way to show a lot of moments...



3.
*SUBJECT-
TO-
SUBJECT*

- Transition between subjects within a single idea or scene
- Like a continuity cut in a movie



4.
*SCENE-
TO-
SCENE*

- Transport across significant distances of space or time
- Like a scene cut in a movie

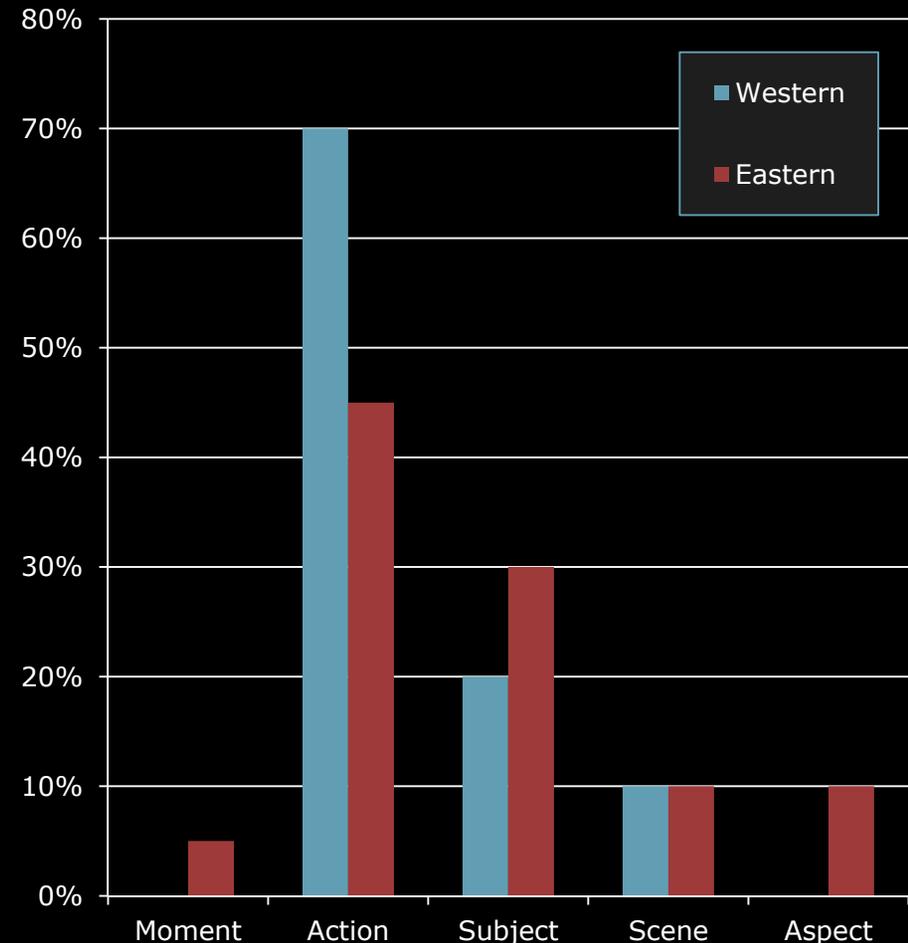


5.
*ASPECT-
TO-
ASPECT*

- Fragments of a single moment that give us a feel for a place, idea, or mood
- Used in the intro or in movies with strong "mood"

Breakdown of transitions

- Western
 - Mostly “action”
 - Concise, efficient
 - Goal-oriented: “Getting there”
- Eastern
 - More “moment” and “aspect”
 - Much longer
 - Cyclical, labyrinth, art: “Being there”



Comics summary

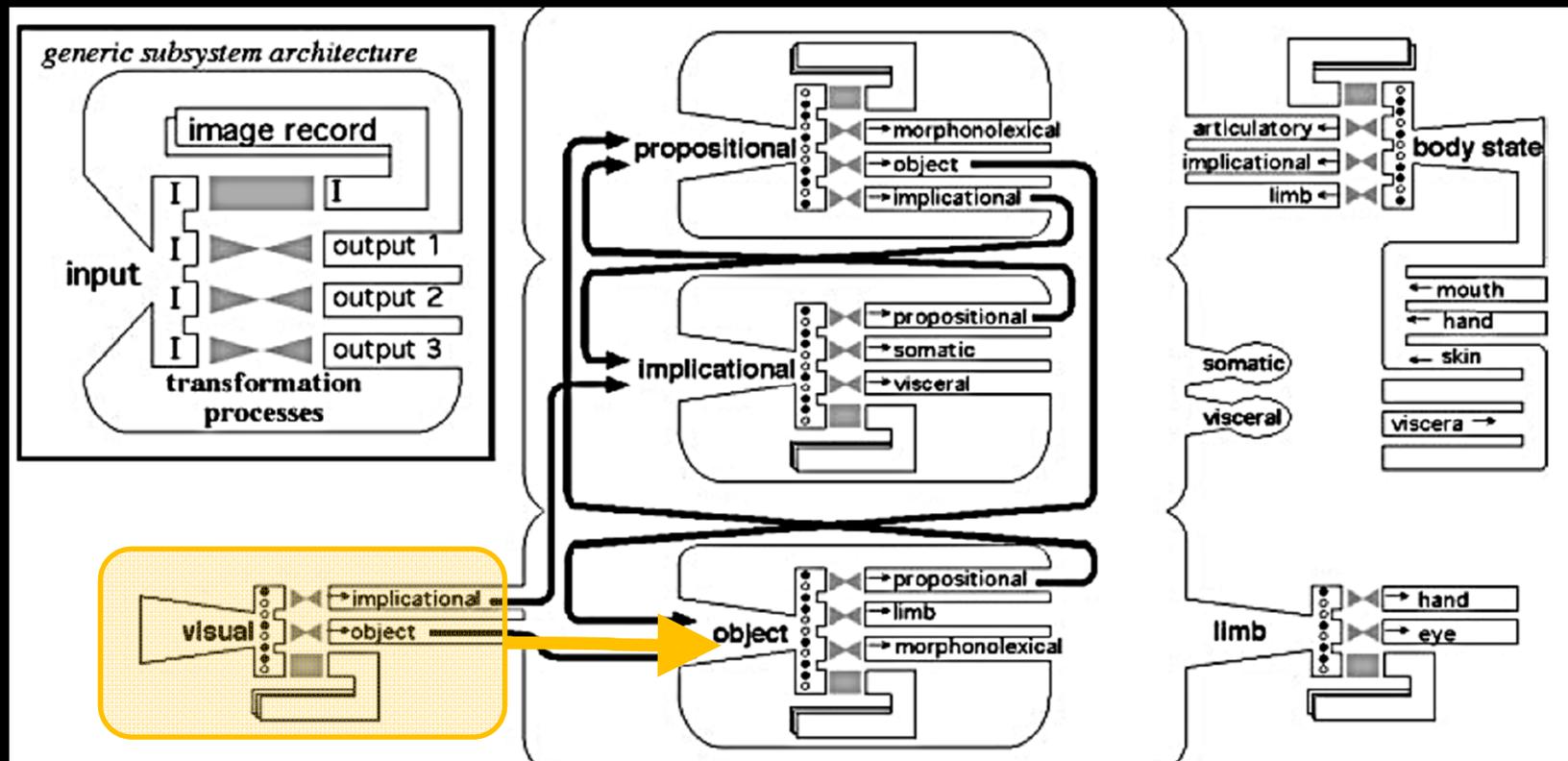
- Comics use transitions or “cuts” much like movies do
- Our imagination fills in the missing frames
- How do we do this? Why?

Interacting Cognitive Subsystem (ICS)

- A model for how we use vision to understand our surroundings
 - Low fidelity of retina outside of fovea
 - Low bandwidth between retina and brain
 - Limited memory capacity
 - Top-down and bottom-up tasks
- Four subsystems
 - Visual, Object, Propositional, Implicational

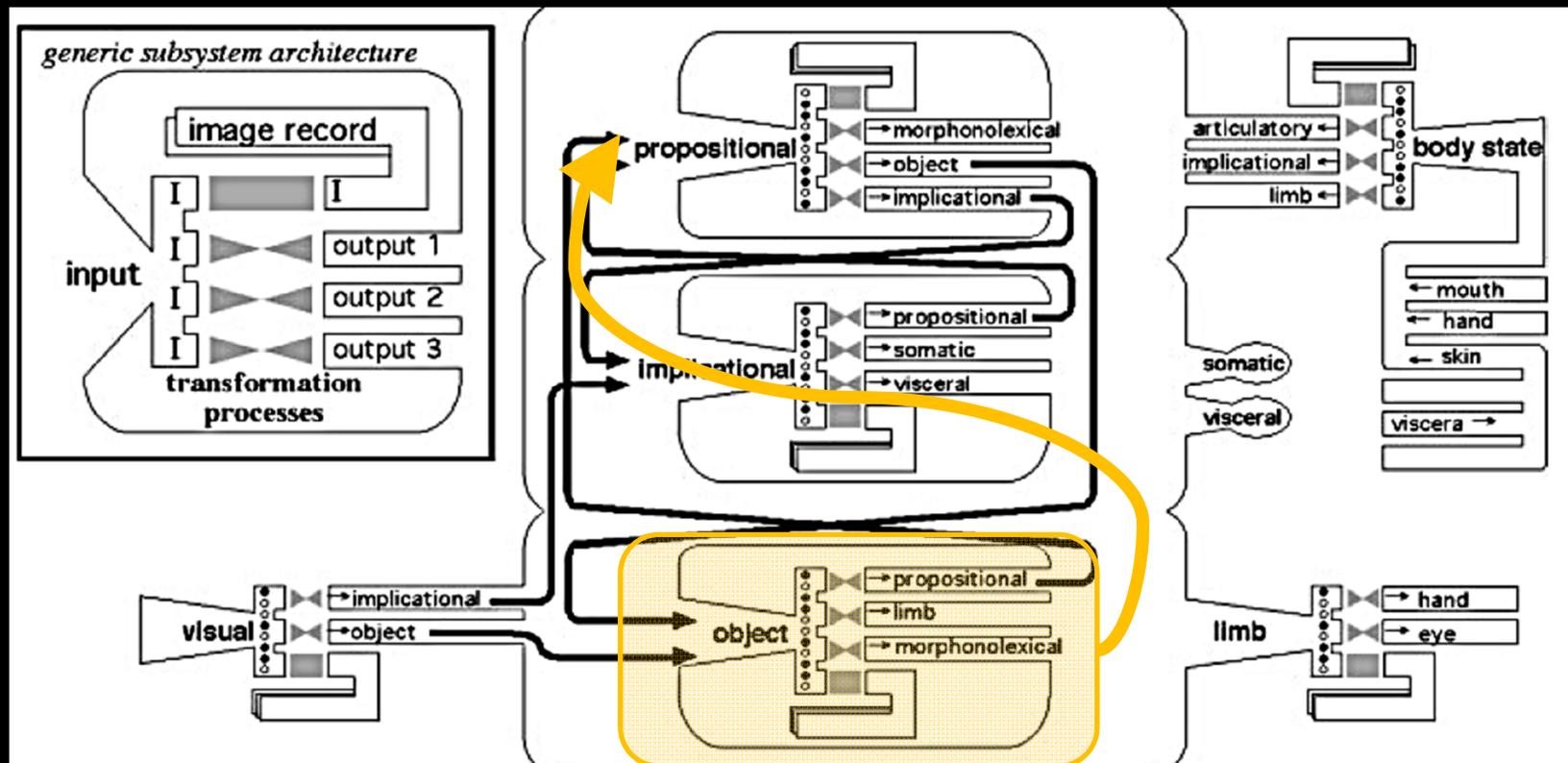
Visual subsystem

- Processes edges, color, motion (pre-attentive)
 - Feeds object subsystem
- Bottom-up approach



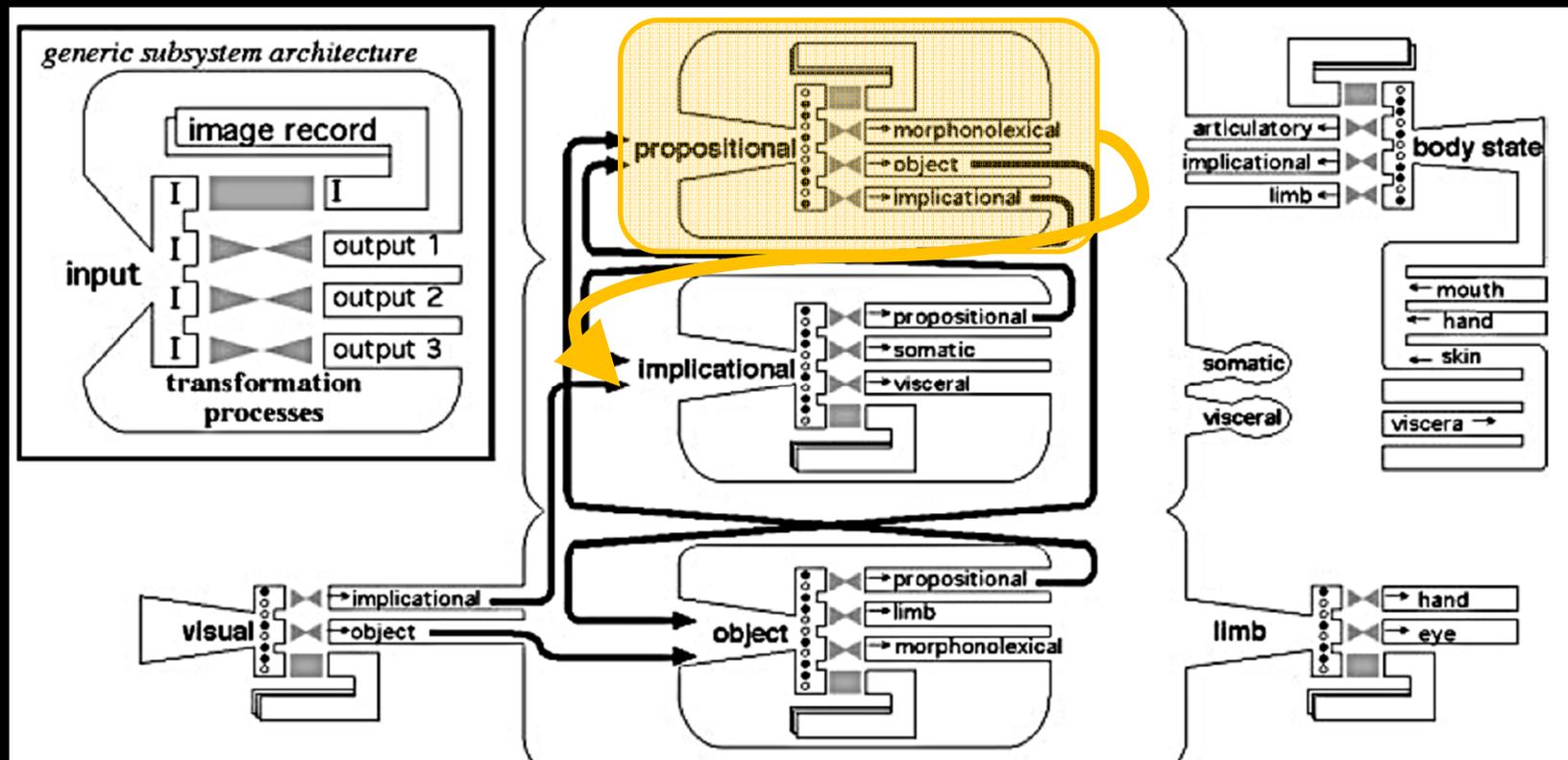
Object subsystem

- Forms abstract, spatially structured objects
 - Feeds propositional subsystem
- The “minds eye” (awareness of visual scene)



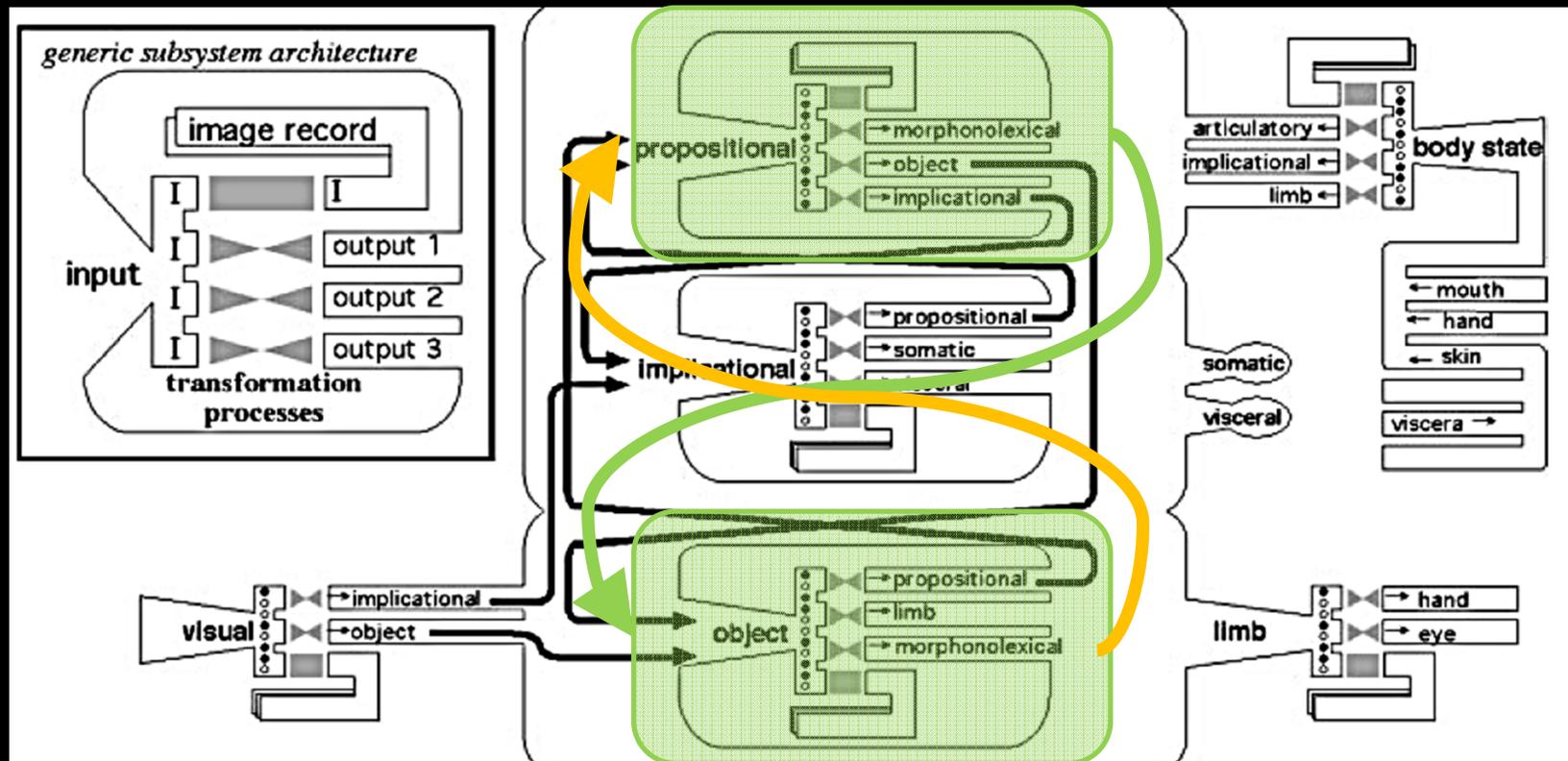
Propositional subsystem

- Forms semantic, relational facts about the scene
 - Feeds implicational subsystem



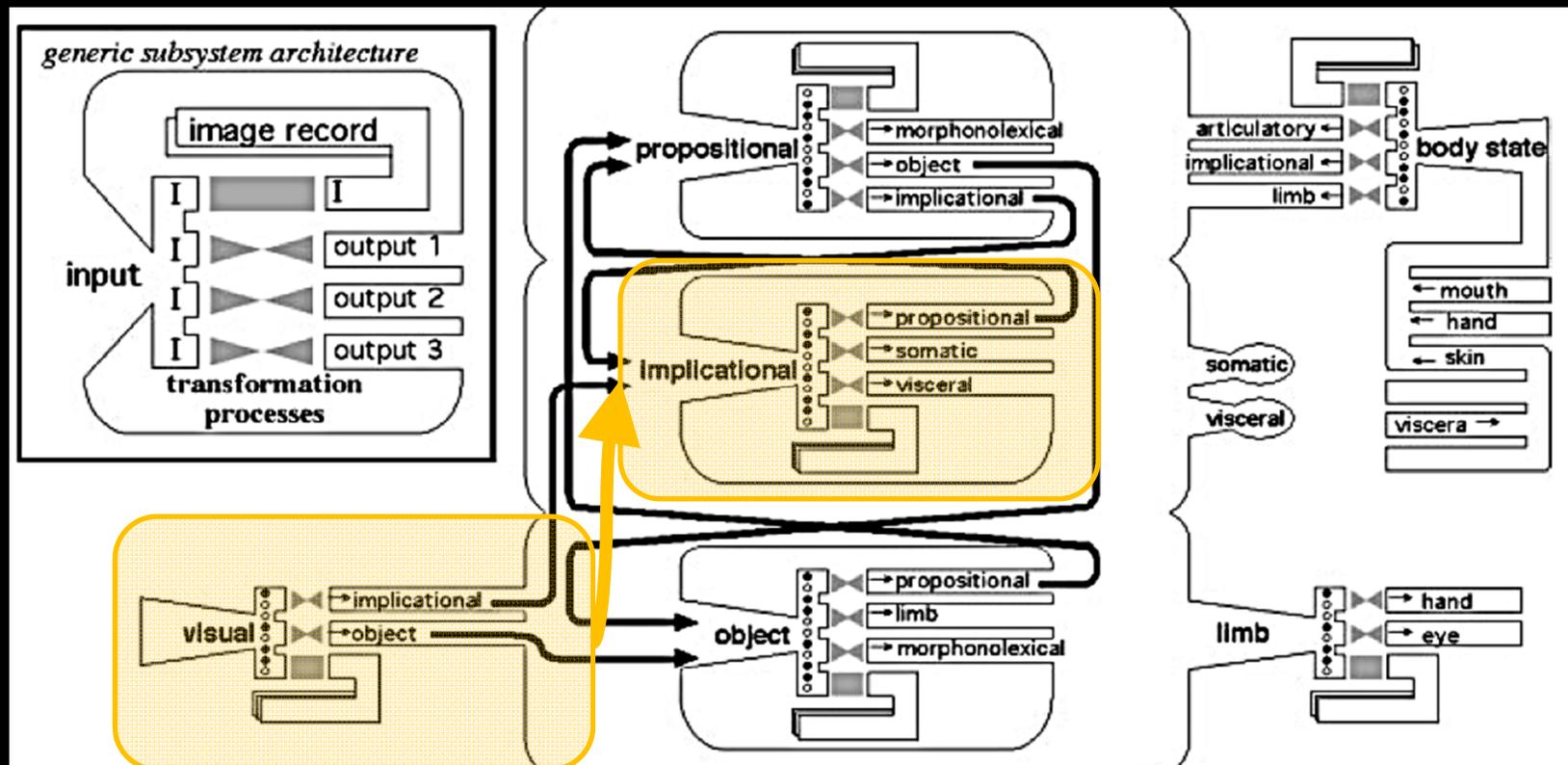
Top-Down

- Propositions can also, in turn, refine objects...
 - And iterate until stable...



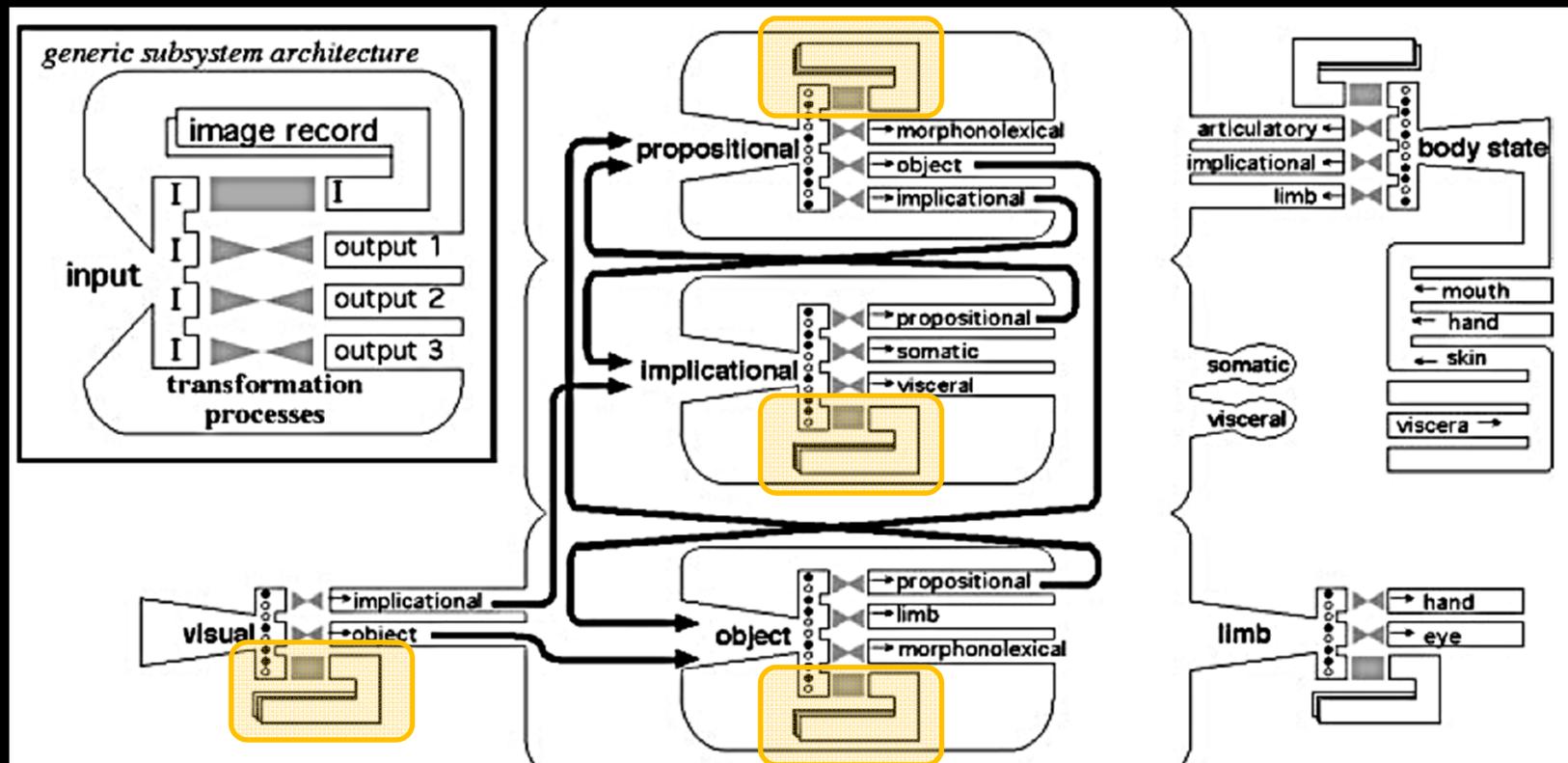
Shortcuts...

- Or the visual subsystem can bypass objects to directly form implications
- Flashing red lights, approaching motion...



Each subsystem has working memory

- Which allows it to operate even without an input
 - Eye movement, occlusion, attention...
 - Or incomplete, fragmented, flickering input...



ICS Summary

- Several subsystems contribute to internal model of our environment
- Working memory
 - stability even with impoverished or missing inputs
- Feedback loops
 - top-down refinements and redirection of attention
- Continual Prediction \leftrightarrow Validation process
- Similarities with Ron's model?
 - Primary processing, proto-objects, nexus, attention, coherence

ICS with Movies and Comics

- Does the ICS explain how we see movies and comics?
- Movies
 - Objects and propositions remain in memory despite flicker and continuity cuts
 - Implications remain in memory despite scene cuts
- Comics
 - Same as movies for action, subject, scene transitions
 - Viewers fill in impoverished information from memory
 - Aspect transitions allow for refinement of implications

A few words on multi-view displays

- Displays allowing multiple representations of related data: Google Finance



When to use multiple views

- Diversity
 - Of attributes, levels of abstraction...
 - Stock price, news, trading volume, summary
- Complimentary
 - Bring out correlations or disparities
 - News vs stock price
- Decomposition
 - Create manageable chunks
 - Time window on bottom



How to use multiple views

- Space/Time optimization
 - Not showing 1mo/6mo/1yr/5yrs simultaneously
 - Changing news relative to time scale
- Self-evident relationships between views
 - Alignment of x-axis, style of news letters
- Consistency of state
 - All views updated to same timeline
- Manage Attention
 - Highlight high trade volumes, certain news articles, etc?



Summary

- Movies and comics use cuts/transitions to tell us a story
- Effective “cuts” are seamless and unnoticeable
- Our imagination or “working memory” fills in the missing information
- Can apply some of the same principles to optimize multi-view displays

Thank you

- Questions?

References

1. Zacks & Magliano. *"Film, Narrative, and Cognitive Neuroscience"*
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4. May. *"Perceptual Principles and Computer Graphics"*
5. Wang-Baldonado et al. *"Guidelines for Using Multiple Views in Information Visualization"*.
6. YouTube for the videos
7. Google Finance