Climbing trees and seeing stars: 
Combinatorial structure in comics and diverse domains.

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In Toivonen, Ida, Piroska Csúri & Emilie van der Zee. (Ed).
Hi there, I'm Neil Cohn.
I'm proud to be able to say that Ray Jackendoff was my mentor throughout graduate school at Tufts University.

In Ray, I found a brilliant, challenging, and encouraging mentor whose expansive vision of cognition afforded the perfect perspective for my own studies.

My own research explores the cognition of visual narratives, particularly those in comics.

This “visual language” is built similarly to any other language, consistent with the structures Ray has discussed across domains.

A key part of this picture is the role of combinatorial structure, which, as Ray’s work has stressed, is not confined to linguistic syntax alone.
All levels of linguistic structure are combinatorial, from **phonology**...

...to **syntax**...

...to **semantics**...

...and **spatial structure**.

...which may be even clearer to see when David Marr does it.

(A favorite of Ray's)

(Marr and Nishihara 1978, 278)

And, these varying structures interface with each other into a **parallel architecture**.
However, Ray’s work has also highlighted combinatorial structure in other domains, such as the various levels of structure in music...

...metrical structure...

...grouping structure...

...or pitch structure.

(Jackendoff and Lerdahl 2006, 38, 56)

Or, the hierarchic organization of complex events.

All of these domains involve the hierarchic embedding of structures within structures.

(Jackendoff 2007, 128)
Along these lines, **visual narratives** have several levels of combinatorial structure, just like language...

For example, a simple comic page often uses **horizontal** and **vertical** arrangements of panels.

Yet, into each column and row, we can embed other columns and rows, making a **hierarchic** structure.

So, a page like this one from the comic *Scott Pilgrim* yields a **right-branching structure** of recursive embedding.

(O’Malley 2005)
The narrative structure of sequential images also can combine in complex ways. The basic schema resembles traditional notions of narrative...

An **Establisher** sets up the interaction of the sequence.  
An **Initial** then sets the events in motion...  
...which climax at the **Peak**...  
...followed by a resolution in the **Release**.

Just like syntactic categories, these narrative categories serve to organize meaning through prototypical correspondences to conceptual structure.

<table>
<thead>
<tr>
<th>Narrative structure</th>
<th>Conceptual Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establisher</td>
<td>Passive actions</td>
</tr>
<tr>
<td>Initial</td>
<td>Preparatory actions</td>
</tr>
<tr>
<td>Peak</td>
<td>Completed actions</td>
</tr>
<tr>
<td>Release</td>
<td>Coda of actions</td>
</tr>
</tbody>
</table>

However, each of these categories can be expanded into another node...

...like here where **conjoined** panels all play the role of **Initials**...  
...or the **Peak** and **Release** each expand into two panels with their own roles.
With this basic structure, several different types of complex structures can be built.

For example, this left-branching tree has climactic Peaks that both fulfill the actions in their previous local panel relationships, and act as Initials at a higher level of structure to set up subsequent Peak panels.

We can also create sequences that embed within the center of others, like here, where the middle sequence provides a parenthetical clause to the larger matrix sequence (with a sentential action of “thinking,” no less!).

This type of center-embedding is a hallmark of complex combinatorial structure.

(Godek 2006)
Given that most actual comic pages organize these narrative structures into page layouts, these two structures need to interface together.

And, lo and behold, together they form a parallel architecture!

Thus, just like language, the comprehension of this visual language involves numerous structures interfacing together in complex ways.
Let’s look at one more convention in comics...

Speaking and thinking are often shown through particular graphic morphemes.

We can also do this with *speech balloons* or *thought bubbles*, but in this case the embedding happens within the visual morpheme, using them as *whole panels*.

In English, the same meaning would be expressed with “she said...” or “he thought...” as frames by which we can embed an additional sentence. This can lead to perpetual embedding...

Ray loves trains.

*Hildy knows that Ray loves trains.*

*Amy thinks that Hildy knows that Ray loves trains.*

*Beth wonders why Amy thinks that Hildy knows that Ray loves trains.*

Unlike in speech, though, we can playfully exploit the *visual- graphic modality* in ways unavailable to the linear nature of verbal speech – like wrapping this *recursion* onto itself!

Examples from (Cohn and Godek 2007)
Altogether, this work recognizes **combinatorial structure** as a key part of cognition across domains.

Such a view would be impossible if we limited ourselves to a single perspective.

Studying language alone would not lead us to such a conclusion.

It has become a common metaphor in science that we view our material from under a spotlight of knowledge that frames what we know about a particular topic.

If we are lucky enough, we can then grow the spotlight ever more to get a better view of the bigger picture.

Under one interpretation, Ray’s work might suggest growing the biggest spotlight possible...
If the career of Ray Jackendoff has taught us anything though, it’s that we should not limit ourselves to a single viewpoint.

From language and music to consciousness, vision, and social relationships to event structure and values...

...all of these things can inform our broader picture of the mind.

Indeed, even studying comics.
Ray’s explorations into music and vision directly changed his theories of language, and his work on language directly informs work outside of linguistics.

He didn’t just expand his “spotlight,” he looked to the work in other fields to provide answers to Big Questions that connect all of these disciplines.

And here is how Ray’s work shows the trouble with disciplinary “spotlights.”

As much as lights illuminate, they also obscure—making it hard to see beyond the places where our lights reach.

When we walk out from under that confinement, we may find that our eyes can adjust...
If we’re lucky, we may even be able to see a little star beside a big star...

...and hopefully we’ll be able to look up and see the beauty of the night sky.

...and in them we can find our place alongside Ray’s contribution to our understanding of cognition.
Note

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References


