How to analyze visual narratives:

A tutorial in Visual Narrative Grammar

Neil Cohn

neilcohn@visuallanguagelab.com

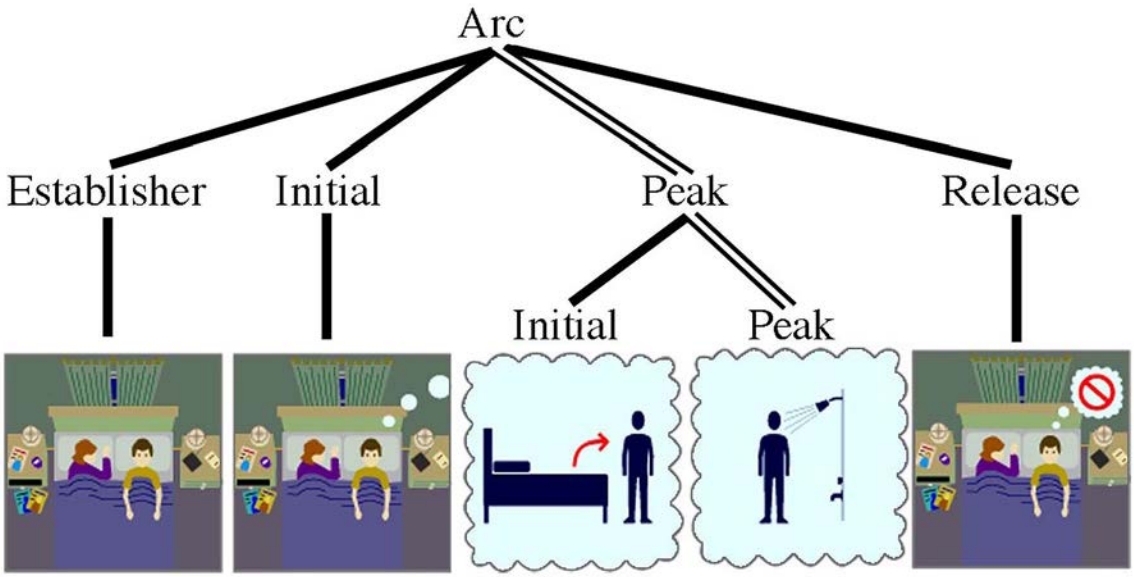
www.visuallanguagelab.com

Abstract

Recent work has argued that narrative sequential images use a Visual Narrative Grammar (VNG) that assigns panels categorical roles and organizes them into hierarchic constituents. Though empirical research has supported the psychological validity of this theory, its complexity may make it hard to apply for students and researchers unfamiliar with its details. This "tutorial" describes the step-by-step methods by which sequences are analyzed in VNG.

Introduction

This supplement is designed to help students and researchers analyze comics and sequential images using the theory of Visual Narrative Grammar (VNG). This theory argues that panels become categorized into specific types, and that there may be hierarchic groupings of panels into constituents. For example, below is the hypothesized structure for a sequence from Tym Godek's *One Night*:



This sequence starts with an Establisher which sets up the scene, and then progresses to an Initial which starts the main actions: the man is thinking in bed. The Peak of the sequence—its climax or primary information—occurs in a *constituent* of two panels. In this case the Peak constituent shows the man's contemplation of whether to get out of bed (an Initial) and take a shower (a Peak). The final panel is a Release, the resolution or aftermath, with the man deciding not to get out of bed. This sequence illustrates several of the primary features of VNG: Each panel has a narrative category, and panels can combine to form groupings that also have categories.

This "tutorial" aims to help explain how an analyst might identify these elements when examining a sequence. Because this document is aimed at application, I will not describe the basic principles of VNG any further than the above example. For this, I refer the reader to my book, *The Visual Language of Comics* (Cohn, 2013b), and to my papers on the topic (Cohn, 2013c, 2015b). The methods described here should help instruct how to analyze the properties of VNG in visual sequences, and they emerge from the underlying logic of the system.

Diagnostic tests

Before jumping into how we do analyses, it should be noted that not all sequences of images use the principles of VNG. In particular, narrative sequences used in multimodal contexts (i.e., combining text and image) may not have a clear-cut narrative structure, due to the meaning being distributed into both text and image. If the text conveys as much if not more meaning than the visuals, it may be likely that the visuals do not actually use this narrative grammar. The

structures of VNG appear most strongly in wordless visual narratives. A simple test can suffice here: If you can delete the visuals and retain the overall gist of the sequence, the visuals may not use a narrative grammar. If you can delete the text and the visuals retain their overall gist, the visuals likely do use a narrative grammar. For more on this, see Cohn (2015a).

Now let's discuss how to analyze sequences. Importantly, applying VNG is *not a matter of looking at a sequence and assigning categories/constituents to it*. This may be a decent starting point, but actual analyses should make use of ***diagnostic tests*** that reveal the structure of the sequence. While intuitions are used at each stage of these diagnostic tests, tests provide a methodology beyond merely looking at a sequence and labeling things. These diagnostics can also extend beyond the contexts of analyzing a given sequence, and can be used as the basis for psychological experimentation (and indeed, many already have).

Diagnostic tests manipulate a sequence of images in order to reveal its structure. These manipulations are based on methods developed over decades from linguistics (e.g., Cheng & Corver, 2013), and also draw on the underlying logic of the system itself. In many cases, diagnostics are supported by empirical evidence from psychology experiments. Diagnostics can test for the categories of particular panels and the groupings of those panels into constituents. Additional diagnostics apply to other modifiers in VNG, such as conjunction, Refiners, and Perspective Shifts, for which the reader is referred to specific publications (e.g., Cohn, 2015b).

Most diagnostic tests involve manipulating a panel or sequence through deletion of panels, rearranging panels, or substituting panels for other elements. These methods are spelled out in the appendix at the end, along with the results that should occur when these tests applied to categories and constituents. For now, we'll jump right into the order that tests are applied and then a sample analysis.

Order of operations

When analyzing a sequence of images, you should use an "order of operations" for applying intuitions and diagnostic tests. The order described here is what has worked so far, but other methods are conceivable if justified.

1) Categories before constituents – The categorical status of individual panels is easier to determine than the breakdown of whole constituents (which also may hinge on the categories inside them). So, identify the panels' categorical roles before attempting to identify the segmentation of the constituents.

1.1) Find the Peak(s) – Because a sequence hinges on the information in the Peak, they should be the first thing(s) to be identified in a sequence. The following steps should be used:

- ***a. Semantic intuitions*** – A good first step is to use your intuitions for what sort of information panels convey. Peaks contain primary actions and often have the "climax" of a sequence. You can treat this identification of panel(s) as a "hypothesis" for which panels may be Peaks.
- ***b. Action Star Substitution*** – Now test those hypotheses by replacing those posited Peak panels for action star panels. Can they be replaced and still make sense? If so, they may be Peaks.

c. ***Deletion*** – A second test may use deletion. Try omitting those panels you thought were Peaks. Does the sequence still make sense? Does it force you to infer a lot of information? If so, they may be Peaks.

1.2) Find Initials and Releases – Now that you have identified the Peaks, it is best to identify panels supporting those Peaks. Initials and Releases are the next most important panels in a sequence, and are often adjacent to Peaks.

a. ***Semantic intuitions*** – Again, starting with your intuitions about the content of a sequence is a good first step. Initial panels often show preparatory information, while Releases show resolutions or aftermaths. Instead of basing this on content alone, you might also think about what is happening relative to the Peaks you've already found: Does a panel preceding a Peak lead up to it (Initial)? Does a panel following the Peak provide an aftermath or resolution to it (Release)?
b. ***Deletion –*** A deletion test can be a good follow up here. If a panel preceding a Peak is deleted and makes it feels like the Peak is suddenly more abrupt, it is likely an Initial. If a panel following the Peak is deleted and makes it feels like the sequence is "left hanging," it may be a Release.
c. ***Modification –*** You may also want to try a "Jeez, what a jerk!"-test for Releases. Can this phrase be added in a balloon to the panel? Maybe it's a Release then.

1.3) Find Establishers and Prolongations – Establishers and Prolongations are often the least necessary of all categories, and so they can be identified last.

a. ***Semantic intuitions*** – Again, a good starting hypothesis can use intuitions about the semantics of a panel or its relations to other images. Does the panel "set up" the situation without providing any actions? Are characters introduced to each other in the panel? If so, it may be an Establisher. Is a panel preceding a Peak but following an Initial? Does it only show the extension of a path (like only a ball sailing through the air)? If so, it may be a Prolongation.
b. ***Deletion*** – Both Establishers and Prolongations can both be omitted from a sequence without affecting its understanding. If your hypothesized panels can be deleted with little impact on the sequence, they may be Establishers or Prolongations.
c. ***Reordering*** – Another test you can do is to move your hypothesized Establisher to the end of the sequence or to swap it with a Release. Is the narrative still comprehensible (even if the meaning changes)? This may be an Establisher then.
d. ***Framing*** – Can the panel be incorporated into the content of the prior Initial panel via a motion line? If so, that panel could be a Prolongation.

2) Identify constituents – Now that you have hypotheses about the narrative categories, you can begin to identify the constituents. Here are some good ways to do this:

a. ***Semantic intuitions*** – Like in identifying categories, recognizing where boundaries start and stop between constituents can begin by looking at the meaningful relations between images. For example, breaks between constituents often have changes in characters or locations, or start a new set of actions. If you can identify the place that this occurs (perhaps also starting with a new Establisher), you can find the break between groupings.

b. ***Grammatical patterns*** – Another way to hypothesize about constituents is to look at the sequencing patterns that are left by your analysis of narrative categories. The canonical narrative phase uses a sequence of *E-I-L-P-R*. Thus, constituents may be formed by any categories in your analyzed strip that go in that order (or shorter subsets of that order, like *I-P* or *I-P-R*). If you find places that do not go in that order, it may be places where there is a break between constituents (ex. *I-**P-E***…, *P-**R-I***…, *P-**R-R***, etc.).

c. ***Deletion test*** – A good first test is, again, to try to delete constituents. If you can delete a whole span of panels, it may be a constituent. Deletion of panels that "leaves behind" some weird sequencing may be the deletion of only part of a constituent, or may possibly delete across the boundary of multiple constituents.

d. ***Reordering –*** Now try rearranging those groupings of panels in the sequence. Can you move a whole group for another group? Maybe those panels form constituents.

e. ***Sliding Window –*** Finally, try analyzing the sequence using a sliding window. A windowed grouping of panels that form a constituent, or part of a constituent, should be identifiable as a coherent sequence. Windowed panels that do not form a constituent may be harder to understand. You can then line up your analyses to see which panels consistently are harder to understand, and the boundary between constituents should appear. For example, consider this simple dataset:

Good: 1-2-3
Bad: 2-**3-4**
Bad: **3-4**-5
Good: 4-5-6

Each of these lines represents a selection from a 6-panel sequence where each "windowed segment" includes only three panels. The first and last segments are considered to be understandable, while the middle segments are considered less understandable. The only string that appears in both of the "less understandable segments", while not appearing in the "understandable segments", is *only* the string of 3-4 (bold and underlined). We might hypothesize that this is where the boundary between segments lies: between these panels. Thus, we might posit that this sequence has a segmentation of: [1-2-3]-[4-5-6]

This order of operations can be applied to sequences of images under analysis. Note that these instructions have so far been applied only to "normal" sequences with only simple categorical sequencing. If a sequence uses modifiers like conjunction or Refiners, the analysis may become more complicated. See Cohn (2015b) for details on diagnostic tests for those elements.

Sample Analysis

With our order of operations now in place, let's illustrate how this works with an actual example. Here, we'll use a Sunday *Peanuts* strip, since it has fairly clean depictions, a good number of panels, and a well-defined start and end. VNG can apply to sequences within long-form visual narratives as well (such as comic books, manga, graphic novels, etc.), though discrimination of the boundaries of those sub-sequences would need to be found. This can follow

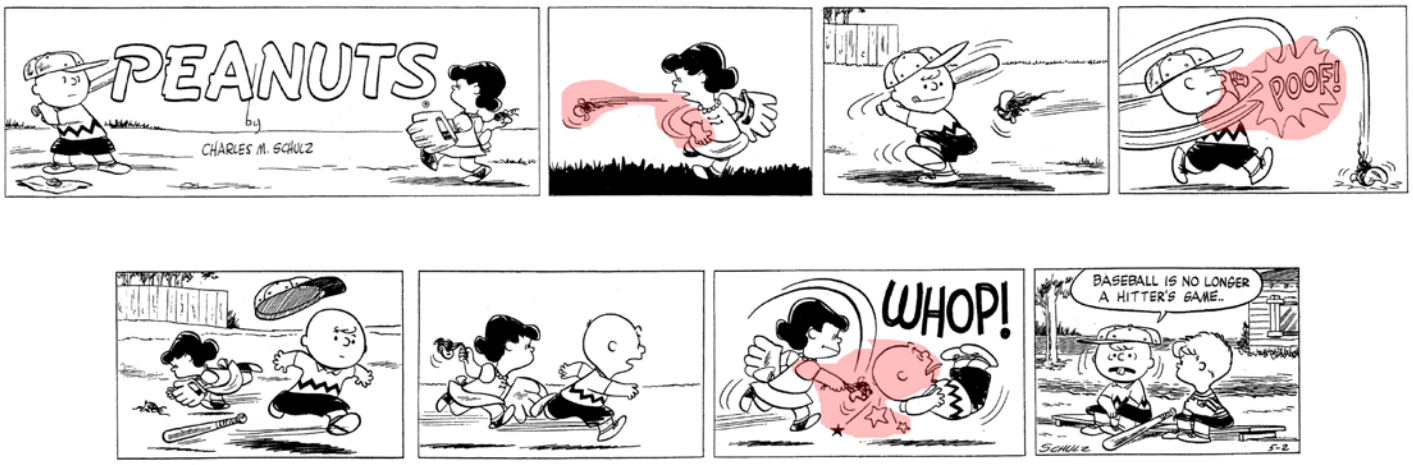
the same types of criteria described above. However, for simplicity, we will use an isolated sequence.

First, here is the sequence as a whole, as it appears in its original layout. This sequence shows the *Peanuts* gang playing baseball. Lucy throws a beat-up baseball to Charlie Brown, who hits it, and while running the bases gets whopped by Lucy and the beat-up ball.

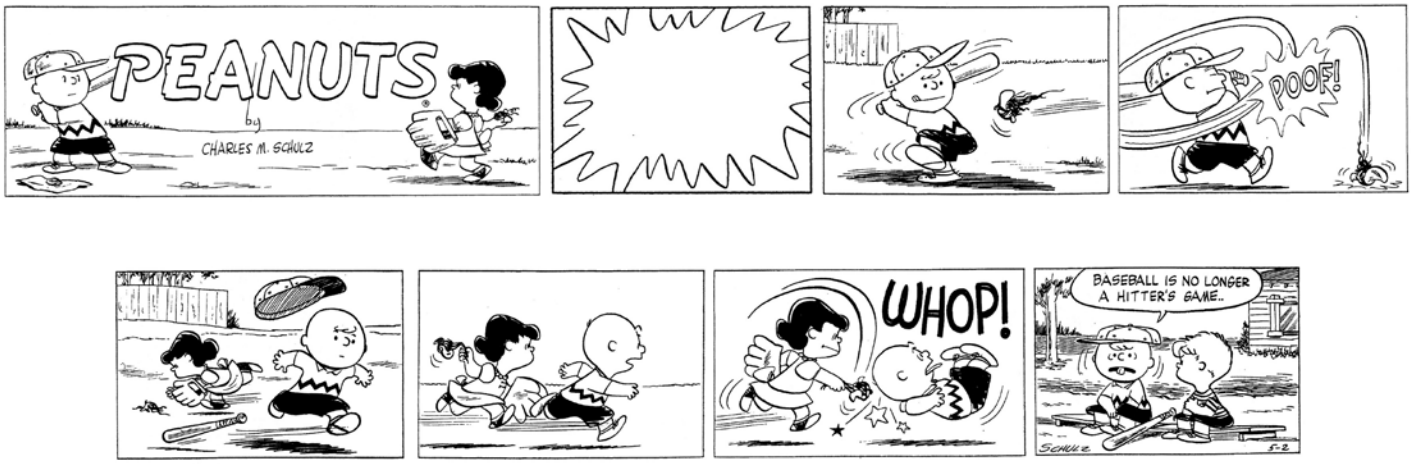
In order to better apply our analysis to this sequence, we will often change the page layout to a linear sequence. This is not a fully required step, since VNG applies to the *content* of the images, not to their physical arrangement (which would be their "external compositional structure"—see Cohn (2013a)). One could alternatively number each panel in this original strip, and then label a linear sequence of just those numbers too. Using a linear sequence makes things easier to see though, so we'll use that method.

Step 1: Identify categories - As stated before, our first step is to identify the narrative categories. We can start by using our intuitions, based on the semantics of each panel.

1.1. We should start by finding the Peaks. Let's do this first by asking which panels might show completed actions or "climactic" events. I've highlighted several of these actions within various panels of the sequence (the "morphological cues" relevant for the narrative structures), which appear in panels 2, 4, and 7. We can treat this as a hypothesis for which panels are Peaks.

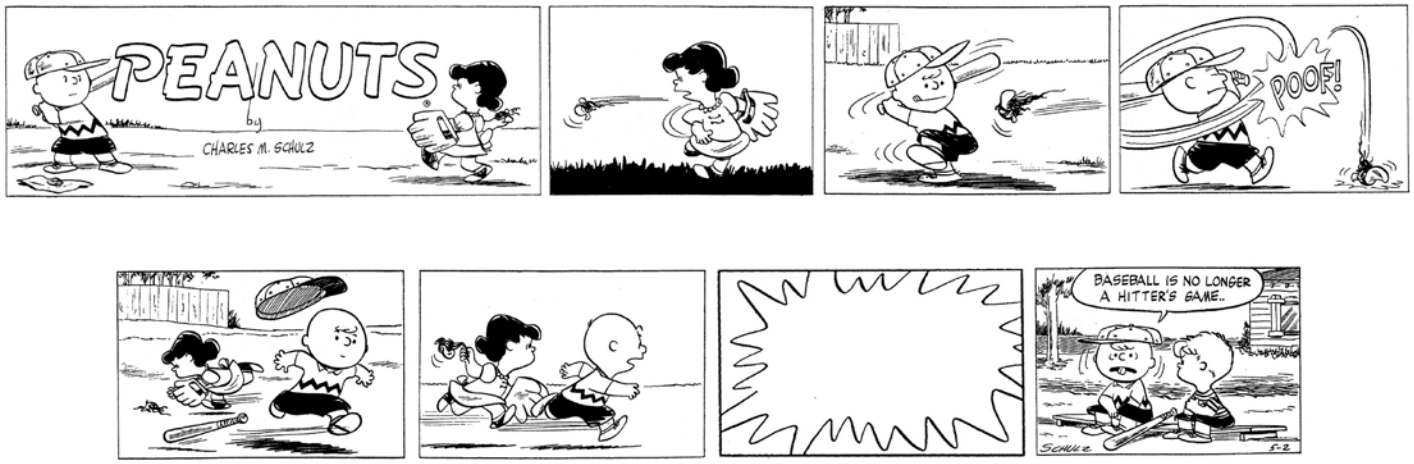


We can now see if our assumptions are correct by doing a few diagnostic tests. First let's try an action star substitution. Replacing an action star for each of our hypothesized Peaks renders the sequences fairly understandable. Here's the first one:



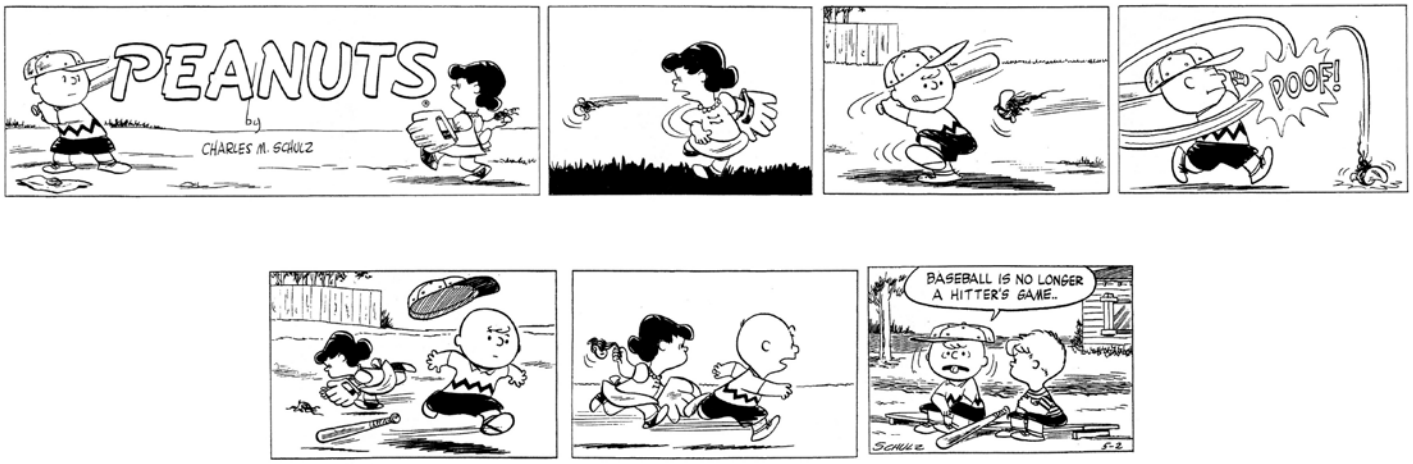
That seems decent at least, though there's maybe a little ambiguity. There may be good reason for that, which we'll go into later on. Here's the second one:

I think this one works much better. We actually had a cue that it might work, since the original panel uses an "impact star" to show where the ball hits the bat, and the action star is basically a blown up version of this. And here's the third one:



This one again seems pretty good. The action star here again replaces an impact. So, our findings for the action star substitution tests are that we have two Peaks that replace well (panels 4 and 7) and one that works so-so (panel 2). Just for contrast, here's what happens when we try to swap out the the action star for a panel that we ***didn't*** hypothesize as being a Peak:

Notice that this sequence might seem harder to understand. That gives us a clue that this panel is not a Peak, because it fails the "action star substitution" diagnostic. We now have one piece of support that these panels are Peaks. Let's do another diagnostic just to make sure. Here, let's try a deletion test. The sequence should be fairly bad if Peaks are deleted. I'm going to just delete one of them, and I'll let you imagine what it would be like to delete the others (you can just hold up your fingers over the sequence to block out other panels):



Here, I've deleted panel 7, the penultimate panel. The resulting sequence is a little strange, and seems to end fairly abruptly. Notice that there might seem like a lack of a real "climax" here. That sense is the lack of the Peak. For a long sequence like this, we can do a final test on the Peaks, by trying to paraphrase the sequence using ***only*** the hypothesized Peak panels:

This sequence seems pretty understandable, and provides a more compact version of essentially the same narrative. Compare this to a paraphrase of panels that are not hypothesized as being Peaks:

This sequence seems much less able to summarize the original strip, especially in comparison to the prior paraphrase. This is a strong additional clue that the panels in the first paraphrase are Peaks.

1.2 Now that we have our most important panels identified (Peaks), let's turn to identifying the next most informative: Initials. Again, we can first use our intuitions, since Initials are canonically preparatory actions. This gives us these highlighted panels:

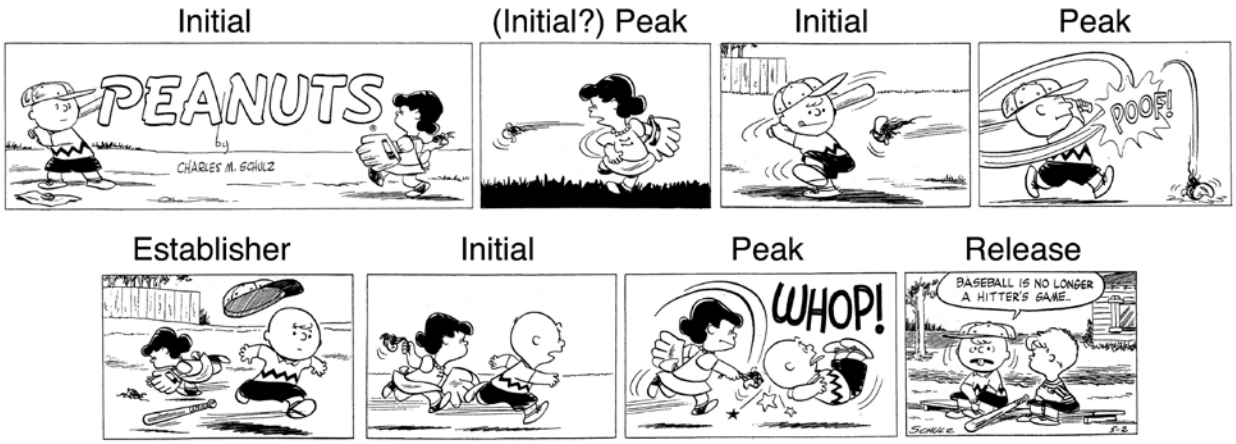
Conveniently, most of these panels show up prior to our Peak panels, so that's a good hint that they are Initials. We know this because Initials often precede Peaks in the canonical narrative arc. Notice that the second panel, which we already said might be a Peak, also has a highlight of the ball. This is the case because this information provides the "source" (starting point) of a path—another semantic feature of Initials. Can this panel be both a Peak *and* an Initial? Is this why the action star substitution was a little less good? We're going to leave these both as hypotheses right now, and come back to it later.

We should now do a test to see if these are Initial panels. Again, a deletion test might help. Deletion of an Initial should make a sequence somewhat harder to understand, but it should be better than deleting a Peak. For brevity, I'll let you apply these tests on your own.

1.3. The next step would be to identify the other categories: Establishers, Prolongations, and Releases. An Establisher would typically set up the relations between the characters, while a Release would provide an aftermath or resolution to the sequence. These should be a little less important if deleted. We only have two panels left to be analyzed (panels 5 and 8), and both seem to be deletable.

Panel 5 contextually precedes an Initial but follows a Peak. But, its events seem to start (ahem…*establish*) a new situation, which means it seems more like an Establisher for the Initial than a Release for the prior Peak. Also, the final panel follows a Peak, like we'd expect for a Release, and it can also pass the "Jeez, what a jerk!" test. Try replacing that dialogue for Charlie Brown's in the final panel: It works pretty good! That's a clue that it is a Release.

We now have assigned categories to all the panels in the sequence. Our analysis looks like this:

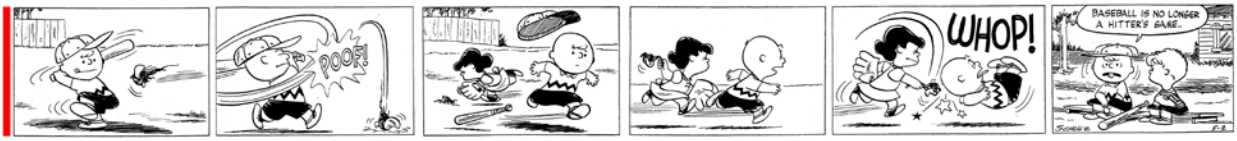


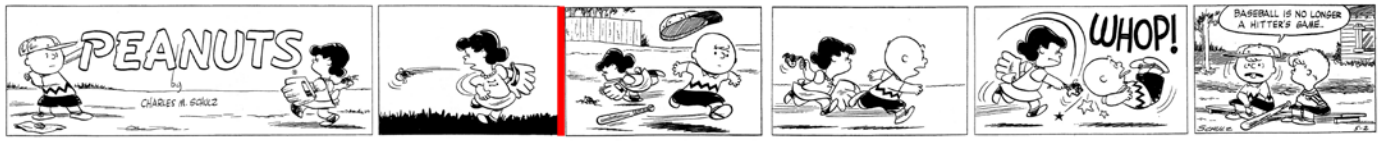
Step 2: Identify the constituents – Now that we have our surface categories, we can try to identify which panels group together in constituents. A first clue comes from our categories: We know that the canonical narrative arc goes *Establisher-Initial-Peak-Release*, so segments that retain this pattern should go together. This groups together panels 1 & 2, and 3 & 4 (both "Initial-Peak" segments) and the final four panels, which maintain a whole narrative arc.

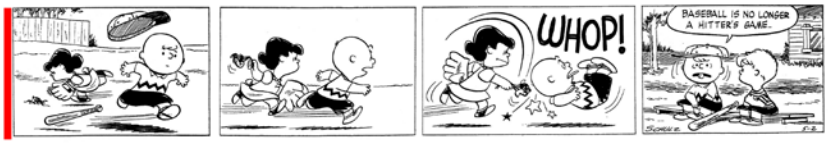
This is further supported by the semantics that divide these hypothesized segments. Between panels 2 and 3, the characters change (from Lucy to Charlie) and between panels 4 and 5, they change in actions (Charlie hitting vs. running) and in characters (Lucy is added back in). These changes often align with the breaks between constituents, and thus give us a clue about the groupings.

With these hypotheses, let's do a few diagnostics, starting with a deletion test. It should be better for us to delete whole constituents than it would to delete across the boundary between them. Let's try this by deleting all of our hypothesized whole constituents:

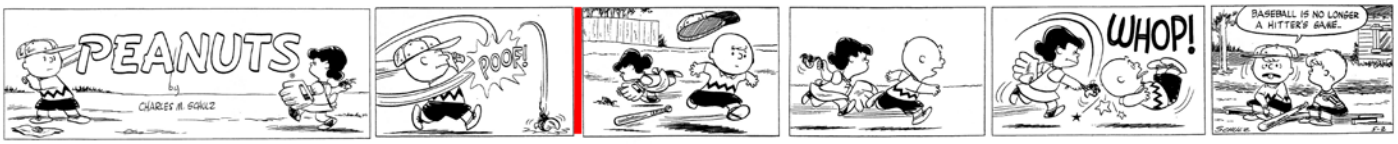
a)

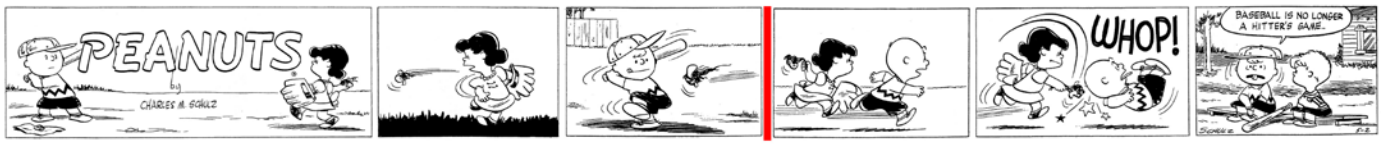

b)


c)


d)


I've drawn red lines here to show where the constituents were deleted. Sequence (a) deletes the whole final constituent. Sequence (b) deletes only the first one, (c) deletes the middle one, and (d) deletes both of these. In each of these cases, the sequence stays fairly comprehensible. My interpretation would say that the worst among these is (c), where the lack of Charlie hitting the ball leaves a lot to be inferred. Compare this to sequences where the deletions cross over the constituent boundaries. Here, I've deleted two panels on either side of the break between hypothesized constituents:

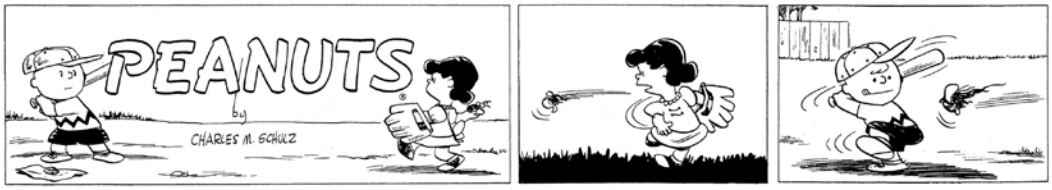
e)


f)


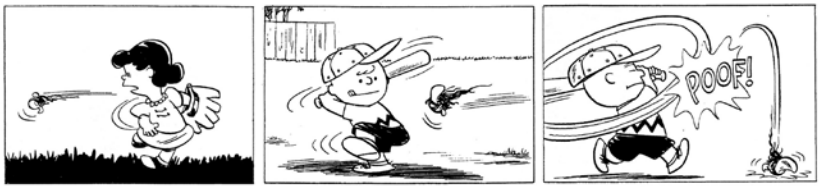
These sequences in (e) and (f) should feel a bit worse than the ones in (a-d). Personally, I think sequence (f) is a bit less coherent than (e) also. This might come into play a little later, and is connected to why (c) above may be a little less good than the other deletions in (a-d).

Let's now try another test by using the sliding window. Here, I've selected a sliding window of three panels long, where each three-panel chunk throughout the sequence is selected. Here they are:

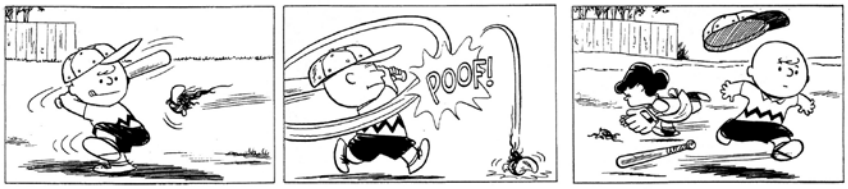
g)



h)

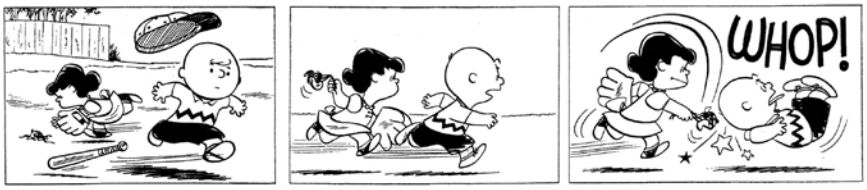


i)



j)

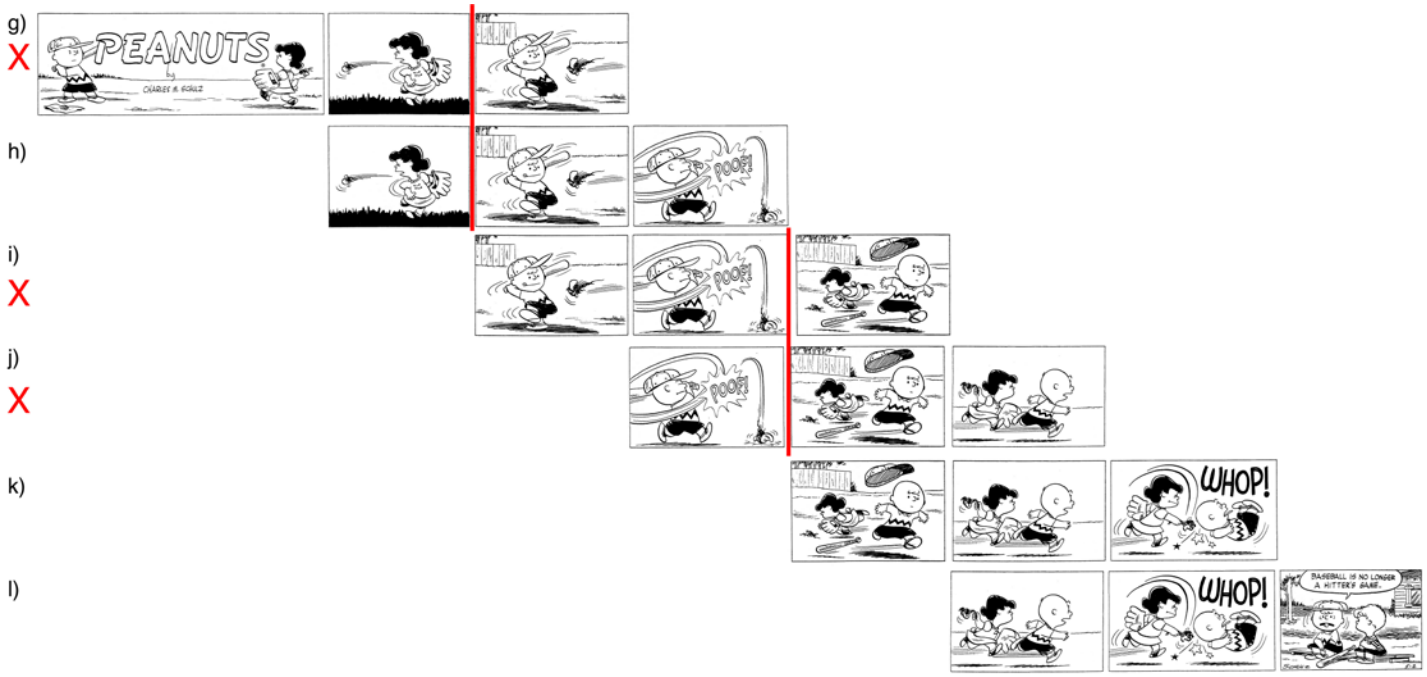
k)



l)

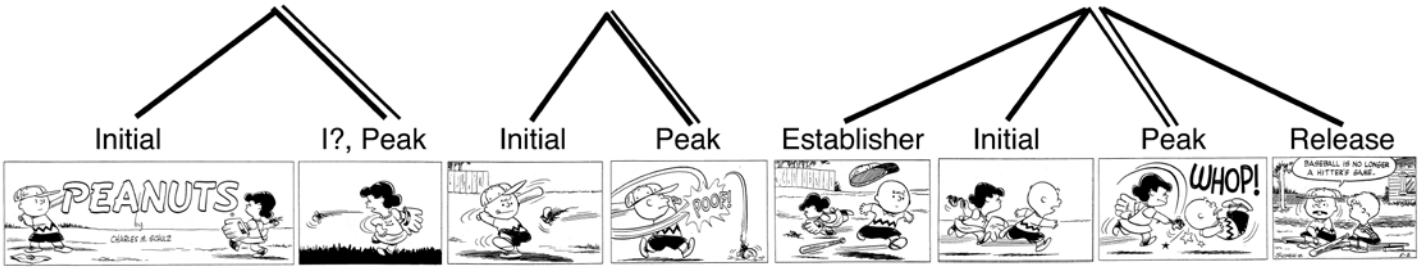
Here, we want to treat each segment as if it was a whole, isolated sequence. We can then assess the comprehensibility of each sequence. To me, (g) seems a little weird on its own, like it's leaving something hanging. I get the same feeling from (i) and (j)—all of them feel like something is left unresolved (and (j) feels like it starts a bit suddenly). The other sequences—(h), (k), and (l)—feel better, like more of a whole coherent message unto each one. However, (h) and (k) lack a resolution, and (l) starts a bit suddenly. They don't feel like anything substantial is missing though.

This leaves us with these assessments that line up like this:



Here, I've spaced out the segments so that they line up all the panels in the sequence. I've marked the ones that are a little "weird" with an "X", and I've also put red lines to show where our hypothesized boundaries between constituents are. Notice that all of the ones that were deemed a little "weird" have a constituent break running through the middle of them. The only exception is (h), where the constituent break divides the first two panels, but this sequence was not overly bad. This again relates to our analysis of (c) and (e) in the deleted constituents above, which we'll tackle next.

Altogether, this analysis gives us three major groupings. Here are our groupings, with double lines indicating the Peaks, which are the "head" of each grouping (as we tested with our paraphrasing):



Now we might want to ask: what are the relationships between these groupings, and are there any higher-level groupings? We essentially have three options of groupings (with each number being a constituent):

1) [1 – 2 – 3]
2) [[1 – 2] – 3]

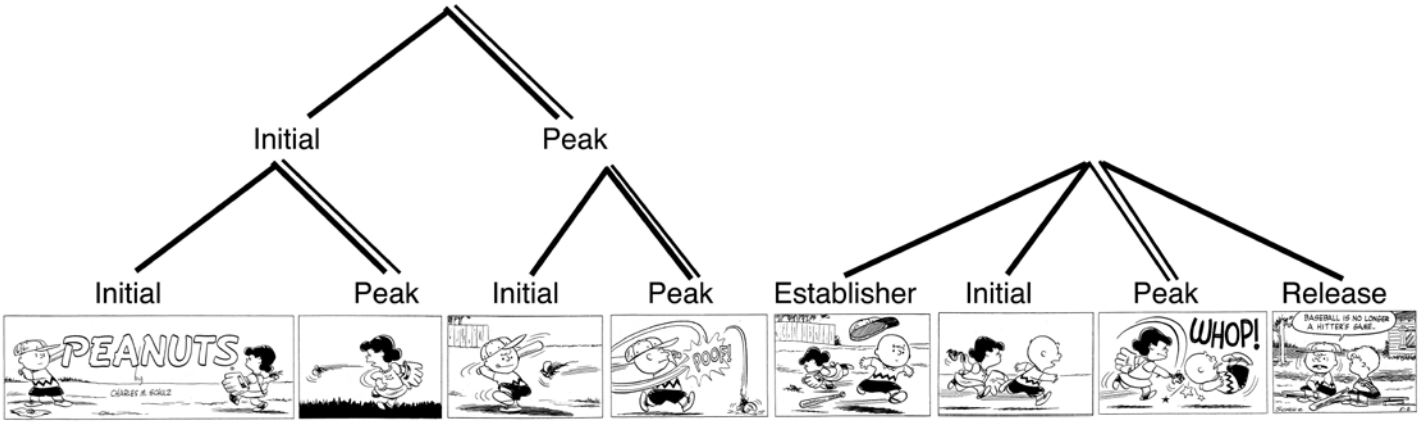
3) [1 – [2 – 3]]

The most straightforward option would be the first, with each constituent standing alone and playing a role in a larger narrative arc. However, there have been a few pieces of evidence that might suggest against this. First, we had some in-between intuitions in deletion tests (c) and (e) and the sliding window in (h). Second, we had the dual categories on panel 2 (Initial and Peak?). Let's consider these points in depth.

First, we saw in the deletion test (c) that deleting the middle constituent didn't make as much sense as deleting the other ones. This implies that the second constituent (panels 3&4) is perhaps more important as a constituent than the first constituent. We also saw that deleting across the boundaries of this constituent was a little better than deleting across the subsequent constituent boundaries. Here, we deleted panel 4 (a Peak) and 5 (an Establisher). If this constituent is more important, then deletion of its Peak (panel 4) should indeed make it harder to understand, and leaves the constituent hanging with an Initial (panel 3). This is different than deleting across the first boundary (omitting panels 2 and 3), which keeps this motivating Peak, which now can just fuse with the Initial in the first panel to form another coherent constituent.

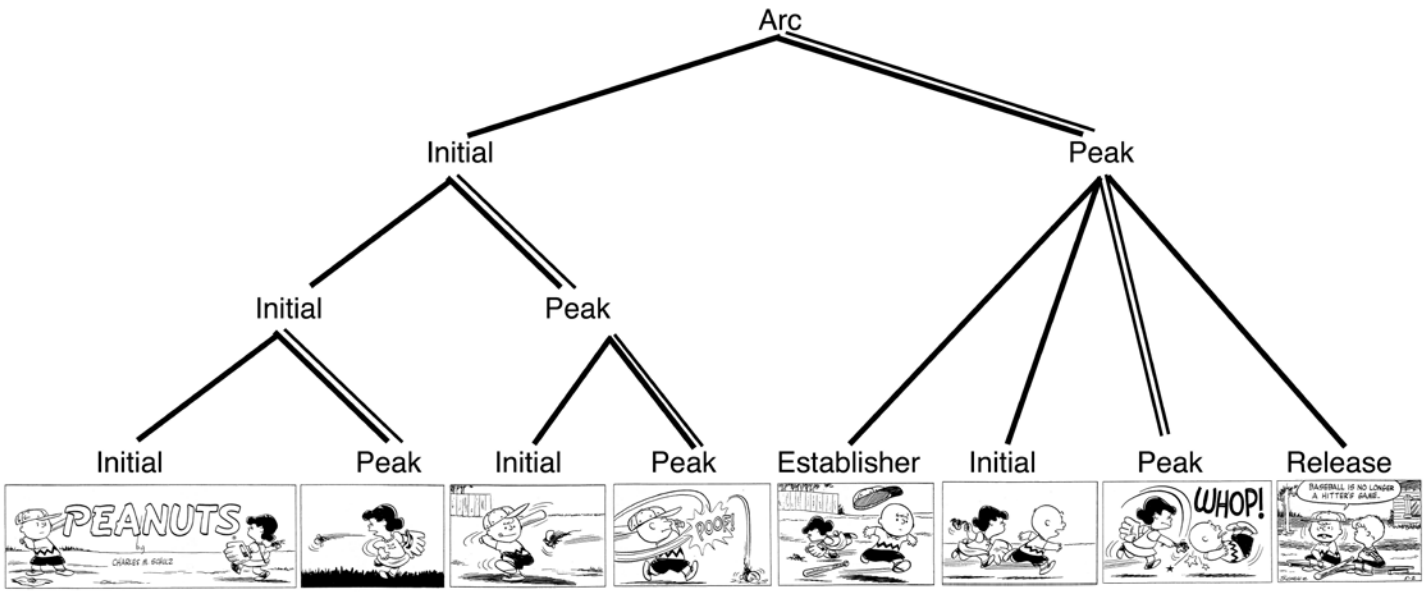
Finally, let's consider our earlier observation that panel 2 has features of both a Peak and an Initial. We know that the panel plays a role as a Peak compared to its prior Initial, since that forms a coherent *Initial-Peak* constituent. But, the extra semantic features may mean that this whole grouping plays a role as an Initial.

So, all of this may point to the first and second constituents connecting to each other. The second panel plays a role as a Peak in relation to the prior Initial, but the semantic features related to a source of a path also relate to an Initial. This information is only relevant as an Initial for *subsequent* information, such as in the next constituent. The first two groupings may form an even larger constituent, with the first grouping playing a role as an Initial (motivated by the semantic features in the second panel), and the second grouping playing a role as a Peak:



At this point we're almost done. We just need to figure out the overall relationship of this larger grouping to the subsequent grouping. There are now just two of our options left: we can either link the final constituent into the same grouping as the Initial and Peak constituents (option #1) or we can create another, larger constituent that links together the remaining structures (option #2).

We can go back to our original deletions for a clue: deletion of the final Peak should seem more impactful than deleting the middle Peak, a clue that this final Peak is the "main climax" of the sequence. This might tell us that the first grouping is another Initial in relation to the final four panels, which are the primary Peak (option #2). If we were to connect this final constituent to the existing structure, it would have to play the role of a Release. This is because a Release is the only possible category that can follow a Peak within this higher-level structure, which already has an *Initial-Peak* ordering. Because the final sequence seems to be the "main climax" and not a resolution, it appears that option #2 makes more sense:



There we have it! The whole sequence is now analyzed, derived from the diagnostic tests in combination with our intuitive judgments. It's worth making a final note: The Release panel at the very end is technically ambiguous here, since it is preceded by a Peak locally (within the constituent) and also at a higher level (the Peak constituent). It could hypothetically attach to either the Peak constituent or the Arc, to follow either one of these Peaks. This ambiguity is supported by the fact that it could also be included in a paraphrase with only the Peak panels (motivating each of the top-most constituents), and in the grouping of only the final constituent (as in (d) from the deletion test). Such ambiguity is intrinsic to the grammatical system. This ambiguity could be resolved though. If we inserted another panel before the final one (say, Charlie walking to the bench), this would create a new constituent, with this grouping playing the Release role that connects to the Arc, not within the Peak constituent.

Final remarks

Hopefully this tutorial has been helpful for you to understand how Visual Narrative Grammar is implemented, and hopefully also to understand some of its underlying logic. It is not merely a matter of looking at an image sequence, assigning categories, and drawing lines between them. Rather, there is a systematic process that uses explicit diagnostic tests at each stage. Like any skill, this type of analysis requires practice. Over time, it is possible to more

quickly and easily assess the properties of a sequence, and the application of diagnostic tests can be done in your head (assuming you have the fluency to do so).

Finally, though it may have seemed like a trek to complete it, the sequence that we analyzed here is actually quite simple. Yet, much more complexity arises in different types of visual narratives, which use various complex modifiers and constructional patterns (Cohn, 2015b). Further publications about Visual Narrative Grammar will detail these components along with the necessary diagnostic tests to analyze them.

Appendix: Diagnostic tests

Individual categories

Below are descriptions of how diagnostic tests are expected to behave for each particular narrative category, in order of the importance of the category to the narrative arc (Cohn, 2014):

Peaks – Peaks are the most important category of a narrative sequence, and the rest of the sequence most often "hangs" around the content in the Peak.

- ***Deletion –*** A sequence should be rendered harder to understand by the deletion of the Peak. Its deletion should create the need for a great deal of inference.
- ***Paraphrasing –*** Because a sequence "hangs off" of the Peaks, deletion of all non-Peak categories can often provide a truncated "paraphrase" of the sequence.
- ***Reordering –*** Peaks do not fall in complementary distribution with other categories. Thus, moving a Peak to other positions within a sequence should make that sequence harder to understand.
- ***Substitution –*** Peaks are the most capable of being substituted by "suppletive panels" (Cohn, 2013b), the most informative being an action star (Cohn & Wittenberg, 2015). If a panel can be effectively replaced by an action star and retain the sense of narrative (though the semantics may become less informative), the substituted panel is likely to be a Peak. If the substitution of an action star for a panel creates a less coherent sequence, it is likely that panel is *not* a Peak.

Initials – Initials are the second most informative category for a narrative sequence, and thus also have fairly restrictive usage.

- ***Deletion –*** A sequence should be rendered harder to understand by the deletion of the Initial. Its deletion should create a sense of a sudden jump into a Peak.
- ***Reordering –*** Initials do not fall in complementary distribution with other categories. Thus, moving an Initial to other positions within a sequence should make that sequence harder to understand.

Releases – Releases are also fairly informative, but often less semantically necessary than Peaks or Initials.

- ***Deletion –*** A sequence can stay fairly understandable by the deletion of the Release, but it may feel like it has ended suddenly with no narrative "resolution."
- ***Reordering –*** Releases can often use the same information as Establishers and sometimes Prolongations. Thus, reversing a Release with an Establisher, or moving a Release to the start of a sequence may render a sequence that is still comprehensible.

- ***Modification –*** Releases pragmatically offer a "wrap up" of a narrative sequence. Thus, if one can add a speech balloon that reads "Jeez, what a jerk!" to a panel, it may be a Release.

Establishers – Establishers are not very informative to a sequence, functioning usually to set up information without acting upon it.

- ***Deletion –*** A sequence can stay fairly understandable by the deletion of the Establisher. Its absence will not likely be noticed, though the actions of the sequence will begin suddenly in any subsequent Initial or Peak.
- ***Reordering –*** Establishers can often use the same information as Releases and sometimes Prolongations. Thus, reversing an Establisher with a Release, or moving an Establisher to end the end of a sequence may render a sequence that is still comprehensible.

Prolongations – Prolongations are not very informative to a sequence, functioning usually to delay a Peak with an additional medial narrative state (often the trajectory of a path).

- ***Deletion –*** A sequence can stay fairly understandable by the deletion of a Prolongation. Its absence will not likely be noticed.
- ***Reordering –*** Prolongations can sometimes use the same information as Releases and Establishers. Thus, putting a Prolongation panel at the start or end of a sequence may render a sequence that is still comprehensible.
- ***Framing –*** Because Prolongations often depict a path, they frame information that might be incorporated into a motion line in a prior panel. If the information in a panel can be incorporated into a prior Initial, that panel may be a Prolongation. (Note: the reverse is also true: a Prolongation can be created by extracting path information from an Initial into its own panel).

Constituents

Constituents are panels that form a cohesive grouping into a broader structure. The logic behind the diagnostic tests for constituents are thus formulated to test this cohesive nature by violating it in different ways. Again, similar methods are used. These diagnostics apply to sequences that have multiple constituents; a sequence with only a single narrative "phase" would not require these tests.

Deletion – Because whole constituents create a larger unit within a broader structure, we should be able to delete an entire constituent and still have a relatively coherent structure. However, omission of panels that span across the boundary between constituents should render a less comprehensible sequence (barring category specific deletion test: for example, if the Release of a first constituent was deleted and the Establisher of a second constituent was deleted, a sequence may still be coherent. This would arise not from the deletion test "failing" for constituents, but because they succeeded for the tests applied to those specific categories, as described above).

Thus, if a number of panels are deleted that allows for a sequence to still be understandable, it is possible that those panels form a constituent. If a number of panels

are deleted that render a sequence less understandable, it is possible that those panels span across the boundary between multiple constituents.

Reordering **–** Because constituents form a whole grouping, we would expect that units within that grouping have a more principled connection than those outside of that grouping. Thus, we might expect reordering within a constituent to render a sequence as more understandable than reorderings that cross the boundaries between constituents. Note though, any reorderings may interact with constraints on within-constituent distributions (reordering an Establisher from one constituent to be a Release in another constituent may work, because Establishers and Releases are in complementary distribution).

It may also be possible to reorder whole constituents. If you can move an entire group of panels to another place in the sequence (typically reordered with another whole grouping), then it may be a constituent. If you reorder groups of panels that do not span an entire constituent, or cross constituent boundaries, the sequence should be rendered harder to understand.

Sliding window – Because the constituents form a whole grouping, selection of that grouping should be able to stand alone as a unit. However, selection of elements that cross boundaries (portions of one grouping and portions of another) may render a sequence less understandable. A "sliding window" analysis thus uses a particular "window" of viewing that is applied across a whole sequence. For example, if a 6-panel strip is analyzed using a 3-unit window, the first analysis is on panels 1-2-3, then 2-3-4, then 3-4-5, and 4-5-6. Windowed sequences will be more comprehensible if they span a whole constituent or within a constituent than if they cross constituent boundaries. The size of the window can be adjusted based on the length of a sequence (usually with a minimum of 3 units long).

References

Cheng, L. L.-S., & Corver, N. (2013). *Diagnosing syntax*: Oxford University Press.

Cohn, N. (2013a). Navigating comics: An empirical and theoretical approach to strategies of reading comic page layouts. *Frontiers in Psychology—Cognitive Science, 4*, 1-15. doi:10.3389/fpsyg.2013.00186

Cohn, N. (2013b). *The visual language of comics: Introduction to the structure and cognition of sequential images*. London, UK: Bloomsbury.

Cohn, N. (2013c). Visual narrative structure. *Cognitive Science, 37*(3), 413-452. doi:10.1111/cogs.12016

Cohn, N. (2014). You're a good structure, Charlie Brown: The distribution of narrative categories in comic strips. *Cognitive Science, 38*(7), 1317-1359. doi:10.1111/cogs.12116

Cohn, N. (2015a). A multimodal parallel architecture: A cognitive framework for multimodal interactions. *Cognition, 146*, 304-323. doi:10.1016/j.cognition.2015.10.007

Cohn, N. (2015b). Narrative conjunction's junction function: The interface of narrative grammar and semantics in sequential images. *Journal of Pragmatics, 88*, 105-132. doi:10.1016/j.pragma.2015.09.001

Cohn, N., & Wittenberg, E. (2015). Action starring narratives and events: Structure and inference in visual narrative comprehension. *Journal of Cognitive Psychology, 27*(7), 812-828. doi:10.1080/20445911.2015.1051535