Research

Analysis of Motions in Comic Book Cover Art: Using Pictorial Metaphors

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Abstract

Motion can be depicted using literal pictorial devices (representing features present in the real world) and metaphorical pictorial devices (representing features that do not occur in the real world). How are literal and metaphorical pictorial devices used in comic book cover art? We analyzed the pictorial devices used to depict the motion running in 400 Silver Age (1956–1971) and Bronze Age (c. 1970–1985) superhero comic book covers (Frankenhoff & Thompson, 2012). Literal devices (such as arm and leg positions) were used additively; that is, artists preferred to use many literal devices. On the other hand, metaphorical devices (such as action lines) were not used additively; artists preferred to use only one metaphorical device. We propose the Literal Additive Metaphorical One-And-Done (LA-MOAD) theory to account for the use of literal and metaphorical devices in comic book cover art. The differential use of literal and metaphorical devices by comic book artists may be unique to comic book cover art, or it may reflect a basic function of our visual system.

Keywords: aesthetics, metaphorical pictures, motion perception, picture perception, psychology of art


Comic book covers often depict characters performing all sorts of motions, such as jumping, falling, swinging, flying, and running. This depiction of motion is possible even though pictures are a static medium (Carello, Rosenblum, & Grosofsky 1986; Cutting 2002; McCloud 1993; see Figure 1). How pictures in general can depict motion has been the subject of much research (e.g., Carello, et al. 1986; Cutting 2002; DeLoache, Pierroutsakos, Uttal, Rosengren, & Gottlieb 1998; Mori 1995; Shirai 2014; see Dobrez 2013 for a review). Here, we present a study of how a sample of Silver Age (1956–1971) and Bronze Age (c. 1970–1985) comic book artists depict motion (Frankenhoff & Thompson, 2012).

Figure 1

Quicksilver is depicted as running using the literal pictorial devices of posture, orientation, and ground plane, and the metaphorical device of action lines. This is an example of a comic book artist using multiple literal pictorial devices with a single metaphorical device. Buscema, J (p), and Palmer, I (i). The Warlord and the Witch! The Avengers #75 Apr. 1970 Marvel Worldwide Inc. © Marvel Comics.
For our analysis of how artists depict motion in comic book covers, we examined specific features of a picture, called **pictorial devices** (Visual Arts: Glossary n.d.). We will focus on five specific pictorial devices that are often used when depicting motion: (1) posture (arm and leg positions), (2) orientation (body lean), (3) the ground plane, (4) action lines (lines that indicate past paths of motion), and (5) multiple images (images that indicate past states of motion) (Carello, et al. 1986, see Figure 2). Carello et al. (1986) showed that pictorial devices contain information that allows motion to be perceived in a static picture. We will investigate how comic book artists combine these pictorial devices to produce depictions of motion.

### Literal vs. Metaphorical Pictorial Devices

Before beginning our analysis of how comic book cover artists in our sample combine pictorial devices to depict motion, we must distinguish between two categories of pictorial devices: literal and metaphorical. Literal pictorial devices represent features that are present in the real world (Kennedy, Green, & Vervaeke 1993: 244–250). For depictions of motion, literal devices represent things that actually occur when the motion is performed in the real world. For depictions of human motion, literal devices include posture (positioning of the arms and legs), orientation (slant of the body), and the ground plane (position of the body with respect to the ground; Carello et al. 1986, see Figures 1 and 2). In contrast, metaphorical pictorial devices represent features that are not present in the real world (Kennedy, et al. 1993: 244–250). For depictions of motion, metaphorical devices represent things that do not actually occur when the motion is performed in the real world. For depictions of human motion, metaphorical devices include action lines (lines extending perpendicular/parallel in the opposite direction of the motion, see Figures 1 and 2) and multiple images (extra images that indicate previous states of the motion, see Figure 2; Carello, et al. 1986).

Here we present a study that attempts to determine how the comic book cover artists in the sample use literal and metaphorical devices to depict motion. Specifically, we look at 400 superhero comic book covers from the Silver and Bronze Ages and measure the frequency with which different combinations of literal and metaphorical pictorial devices are used by comic book cover artists to depict the motion *running*.

### Methods

We selected 400 superhero comic book covers for analysis in our study (see Table 1). The following criteria were used in selecting the sample of comic book covers for analysis. Comic book covers from issues from the Silver and Bronze Ages were selected because: (1) by then, artists had enough time to experiment with and develop strategies for depicting motion in comics (as opposed to comic books from earlier time periods) and (2) many of the top comic book artists of all time worked during these two ages (see Table 2).

<table>
<thead>
<tr>
<th>Table 1</th>
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<tbody>
<tr>
<td>Comic Book Covers Selected for Analysis.</td>
</tr>
<tr>
<td>Title</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>The Avengers</td>
</tr>
<tr>
<td>Captain America</td>
</tr>
<tr>
<td>The Invincible Iron Man</td>
</tr>
<tr>
<td>The Mighty Thor</td>
</tr>
</tbody>
</table>

Table 2
Comic Book Cover Artists in the Analysis.
The specific titles were chosen based on the popularity of their characters in the Silver and Bronze Ages, as well as their current familiarity to both comic book readers and the general public (all five titles have been recently adapted into major motion pictures that each grossed between $370,000,000–$1,519,000,000 worldwide, Box Office Mojo, n.d.).

Finally, the 100 consecutive issues for each title were chosen so that: (1) a variety of artists would be sampled and (2) the issues began as early as possible in the Silver Age. For example, the 100 issue run of *The Amazing Spider-Man* began with issue #39 rather than issue #1 due to Steve Ditko being the only cover artist for issues #1–38.

Finally, we selected 100 covers of *The Mighty Thor* to develop and refine the criteria used to determine (1) if running
was depicted on the cover and (2) what pictorial devices were used. The 400 covers from *The Amazing Spider-Man*, *The Avengers*, *Captain America*, and *The Invincible Iron Man* were then analyzed using these criteria.

There are 21 unique artists whose work is included in the analysis, including established names such as Jack Kirby, Neal Adams, Gil Kane, Barry Windsor-Smith, John Romita Sr., Jim Steranko, and John Buscema. Table 2 lists all the included authors as well as the number of their covers that were analyzed for the study.

1 Results

1.1 Pictorial Device Combinations

In order to analyze how the comic book cover artists used pictorial devices to depict running in the covers studied, the five pictorial devices were organized into two separate categories: literal devices (posture, orientation, and ground plane) and metaphorical devices (action lines and multiple images). Then, for each possible combination of literal and metaphorical pictorial devices (see Table 3) the frequency that they were used to depict running was recorded.

### Table 3

Possible Combinations and Designations of Pictorial Devices.

<table>
<thead>
<tr>
<th># of Literal</th>
<th># of Metaphorical</th>
<th>Designation</th>
<th>Example</th>
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<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>L</td>
<td>Posture</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>LL</td>
<td>Posture with Orientation</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>LLL</td>
<td>Posture with Orientation and Ground Plane</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>M</td>
<td>Action Lines</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>MM</td>
<td>Action Lines with Multiple Images</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>LM</td>
<td>Posture with Action Lines</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>LMM</td>
<td>Posture with Action Lines and Multiple Images</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>LLM</td>
<td>Posture with Orientation and Action Lines</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>LLMM</td>
<td>Posture with Orientation, Action Lines and Multiple Images</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>LLLM</td>
<td>Posture with Orientation and Ground Plane, and Action Lines</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>LLLMM</td>
<td>Posture with Orientation and Ground Plane, and Action Lines and Multiples</td>
</tr>
</tbody>
</table>

Across the 400 covers, there were 75 total depictions of running. Figure 3 shows the frequency with which each combination of pictorial devices was used in these 75 depictions.

1.2 Poisson Analysis Rationale

Figure 3

Frequency with which comic book artists used each combination of pictorial devices to depict running in the 400 analyzed comic book covers. The dotted line indicates the cutoff frequency as determined by the cumulative Poisson distribution. Combinations of pictorial devices that were used at a frequency above this line were preferred by artists. Combinations whose frequency is below this line were non-preferred.
Named after French mathematician, geometer, and physicist Siméon Denis Poisson, the Poisson distribution expresses the probability of a given number of events occurring in a fixed interval of time and/or space if these events occur with a known average rate and independently of the time since the last event (Haigh 1967). Here we use the Poisson distribution to analyze the frequency with which the different pictorial combinations were used in the 75 depictions. Because there were 75 depictions of running in the 400 comic book covers, and there are 11 possible combinations of pictorial devices (see Table 3), the average expected frequency for any pictorial device combination is 6.8. In other words, if the selection of pictorial devices by the comic book artists was random, then each combination should have been used approximately 6–7 times (out of the 75 depictions of running). For our analysis, a pictorial device combination was considered preferred by artists if it was used at (i.e., not significantly different from) or above (i.e., significantly greater than) the average amount (6–7 times). On the other hand, a pictorial device combination was considered to be non-preferred if it was used below (i.e., significantly less than) the average amount.

In order to determine if a combination of pictorial devices was preferred or non-preferred, a cumulative Poisson distribution was used. An $\alpha < 0.05$ was used for this analysis. Using the cumulative Poisson distribution, a cutoff frequency was identified that divided the frequencies into preferred and non-preferred ranges (see Figure 3). The frequency region for preferred combinations was 3 and above. That is, if a pictorial device combination was used 3 or more times in the 75 depictions of running, then that combination was preferred by the artists. Conversely, the frequency region for non-preferred combinations was 2 and below. That is, if a pictorial device combination was used 2 or fewer times in the 75 depictions of running, then that combination was not preferred by the artists (see Figure 3).

1.3 Poisson Analysis Results
The Poisson analysis revealed the following (see Figure 3). First, single devices (both literal and metaphorical) were not preferred by comic book artists. Additionally, non-preferred combinations of pictorial devices also included: (1) a single literal device with a single metaphorical device, (2) multiple metaphorical devices, (3) a single literal device with multiple metaphorical devices, and (4) multiple literal devices with multiple metaphorical devices. Conversely, preferred combinations of pictorial devices included: (1) multiple literal devices (see Figure 3 and 4) and (2) multiple literal devices with a single metaphorical device (see Figures 1 and 3).

2 Discussion
2.1 Summary
The pictorial device combinations preferred by comic book cover artists were: (1) multiple literal devices and (2) multiple literal devices with a single metaphorical device. This suggests that multiple literal devices contain enough information to effectively depict the motion of running. Comic book artists use multiple literal devices because the contribution of each literal device seems to have an accumulative effect on the depiction of running. Further, comic book artists also often add a single metaphorical device to multiple literal devices. This suggests that a single metaphorical device also adds to the information provided by literal devices.

Surprisingly, none of the pictorial device combinations that contained multiple metaphorical devices were preferred. That is, comic book cover artists rarely used both action lines and multiple images together. This suggests that, while a single metaphorical device adds information (as suggested by the preferred use of multiple literal devices with a single metaphorical device), adding additional metaphorical devices does not contribute any additional information and does not increase the effectiveness of the depiction.
Finally, and not surprisingly, the results revealed that the comic book cover artists studied do not prefer using single pictorial devices. Single pictorial devices may not contain enough information on their own to effectively depict the motion of running.

2.2 Literal Additive Metaphorical One-And-Done (LA-MOAD) Theory
The results suggest that literal pictorial devices on the covers operate additively, with more devices increasing the effectiveness of a depiction of running. A single metaphorical device will also add to the information in the depiction. However, metaphorical devices interact with each other in a non-additive, ‘one-and-done’ manner. That is, after one metaphorical device adds its information to the depiction, any additional metaphorical devices do not contribute additional information (i.e., the accumulation of information from metaphorical devices is ‘done’). In other words, one metaphorical device increases the effectiveness of a depiction, but any additional metaphorical devices do not. These different ways that comic book artists use literal and metaphoric devices suggest that these two categories of devices are processed by viewers in fundamentally different ways. We will call this newly proposed theory of the differential processing of literal vs. metaphorical devices the Literal Additive Metaphorical One-And-Done (LA-MOAD) theory.

We propose that the LA-MOAD theory can be thought of as a formal statement of what comic book artists have discovered through experience. After years of experimenting with countless depictions of motion, successful comic book artists may have uncovered artistic strategies for the effective depiction of motion. The success of these artists indicates that these artistic strategies are, indeed, effective. Their effectiveness, in turn, suggests that these strategies may parallel how our visual system processes information in a comic book picture. That is, our suggested visual system operates in a manner where the information provided by literal devices is processed additively. The information from metaphorical devices, however, is not processed additively. In other words, while a single metaphorical device provides information to the visual system, additional metaphorical devices do not. This would suggest a fundamental difference in the way that our visual system processes literal and metaphorical devices. As such, the LA-MOAD theory is also a theory of how our visual system processes literal and metaphorical devices to comprehend comic book pictures.

2.3 Exceptions
One could argue that even though multiple metaphorical devices are not used often, they are used sometimes (albeit very sparingly, see Figure 3). This may indicate that using multiple metaphorical devices can be effective, but that they are only used for depictions of extreme motion. For example, multiple metaphorical devices have been used to depict motions that occur at enormous speed (see Figure 5). This may be due to how metaphorical devices are processed. It may be the case that multiple metaphorical devices do not make a motion more recognizable, but do contribute to perceived characteristics of the motion (e.g., super speed). However, this may also be due to conventions used in depiction. For example, influential comic book artist Carmine Infantino published a famous guide for drawing the Flash (Infantino, 1963). In it, he used the metaphorical devices of action lines and multiple images to depict the Flash running at extremely high speeds. Any aspiring comic book artist following this instruction might likewise use these metaphoric devices together to depict high speed running. This would be the case even if the artistic strategy is not particularly effective (e.g., it is simply an art style). Further research is needed to investigate these two possibilities.

Figure 5
Quicksilver is depicted as running using the literal pictorial devices of posture, and orientation, and the metaphorical devices of action lines and multiple images. This is a rare example of a comic book artist using multiple literal pictorial devices with multiple metaphorical devices. The use of multiple metaphorical devices might be limited to depictions of extreme motion (e.g., super speed). Romita, J (p, i). The Speedster and the Spider. The Amazing Spider-Man #71 Apr. 1969 Marvel Worldwide Inc. Cover. ©Marvel Comics.

Competing Interests
The authors declare that they have no competing interests.

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Box Office Mojo (). Available at: http://www.boxofficemojo.com/ [Last accessed 22 February 2016].


Buscema, S (p); Giacoia, F (i) . (1972). The Falcon Fights Alone In: Captain America and the Falcon #75. Oct 1972Marvel Worldwide Inc. [Marvel Comics]: Cover.


Infantino, C (w, p, i) . (1963). How I Draw the Flash In: Giant Flash Annual #1. National Comics Publications [DC Comics]. (2)


In Pictorial Metaphor in Advertising, Charles Forceville argues that metaphor can also occur in pictures. By using insights taken from a range of linguistic, artistic, and cognitive perspectives, for example, interaction and relevance theory, Forceville shows not only how metaphor can occur in pictures, but also provides a framework within which these ‘pictorial’ metaphors can be analysed. The theoretical insights are applied to thirty advertisements and billboards of British, French, German, and Dutch origin. Chapter 6, a key chapter of the book, combines Black’s interaction theory with the insights of Sperber and Wilson to analyse pictorial phenomena in some thirty advertisements and billboards in terms of pictorial metaphor. Creating an attractive comic book cover is necessary to draw people into your comics and capture their interest. The best design for your cover art will incorporate elements of composition, psychology, and technique. You’ll need the artwork to be clean, balanced, true to the content of your story, and also alluring. You may have noticed that the paper used in comic book covers is heavier and of different quality than paper you might use in your home printer. These different kinds of paper allow the illustrations to be communicated on the page more clearly on the page and while holding up to wear and tear. The three main kinds of finish you’ll need to decide between are:[2] [3].