



Visual storytelling in Calvin and Hobbes

A corpus analysis on Calvin and Hobbes by Bill Watterson

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### **Abstract**

This study examines the visual storytelling in *Calvin and Hobbes* by Bill Watterson. It is one of the first studies that examines one specific strip from one author across time, since most studies look at multiple strips over time. Those studies use empirical methods rather than a corpus analysis of one particular strip. All the panels from *Calvin and Hobbes* were coded for all the areas of analysis, which were attentional framing, filmic shots, semantic changes and multimodality.

The results showed an increase in wordless panels, accompanied by a decrease in the total number of words per panel. This suggests that the strip is leaning more towards the visual modality across time, while the results for semantic weight did not show a statistical difference across time. The results show a significant effect and an interaction effect for filmic shot type across time. Far shots were used more than close shots, and there was an increase in medium shots, while the close up shots were decreasing. Finally, an effect of attentional framing was found. Across time, there was a decrease of macro panels and an increase of mono panels.

*Keywords:* visual language, Calvin and Hobbes, semantic weight, grammatical structure, multimodality, strips, attentional framing, filmic shots

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### Introduction

Humans are multimodal beings. They are capable of understanding and producing multimodal messages, so their communication is also multimodal (McCloud, 1993; Yannicopoulou, 2004; Cohn, 2016). This means that they can understand the connection between image and text and they can convey a shared meaning out of those two modes of communication. This skill is essential when trying to understand comics, which are also multimodal. They use both text and image through which the reader should construct a meaning. In some cases, the whole meaning of the strip can only be understood through the interconnectedness of text and image. The reader needs multimodal reading skills for this (Schwartz & Rubinstein-Ávila, 2006). Many studies have researched comic strips using empirical methods, but no previous research has conducted a corpus analysis of multimodality on one particular strip. In this study, we will look at the multimodality and visual storytelling in *Calvin and Hobbes* by Bill Watterson over time.

### Visual language

From a young age on, humans are capable of understanding visual language cues, sometimes even before they are able to read conventional texts (Yannicopoulou, 2004). This is important, because more and more schoolbooks are becoming multimodal (van Leeuwen, 1992). This increase in multimodal texts means that there is no longer just text in a book. Visual aspects also play a role in the understanding of the complete message (Yannicopoulou, 2004). Illustrations, photos, diagrams, maps and even comic strips are increasingly used in modern schoolbooks (van Leeuwen, 1992). There are two modes of communication used in such multimodal texts: language as writing and language as image (Kress, 2000). The fact that humans are multimodal provides us with the skills to understand both modes of communication apart from each other, but also connected to each other as one.

In the visual mode of communication, Cohn (2013) argues that there is a whole visual language that should be understood when, for example, reading comics. Cohn (2013) explains visual language as something similar to spoken or sign languages. While a spoken language consists of structured sequential sounds and a sign language consists of structured sequential body movements, visual language is built up through structured sequential images (Cohn, 2013). Just as a spoken or a sign language, a visual language has a visual vocabulary (van Middelaar, 2017). This vocabulary can differ cross-culturally. There are different visual languages, like American Visual Language (AVL) and Japanese Visual Language (JVL). The former is usually used in the typical

American superhero comics and the latter is more often used in the Japanese manga style (Cohn, 2013).

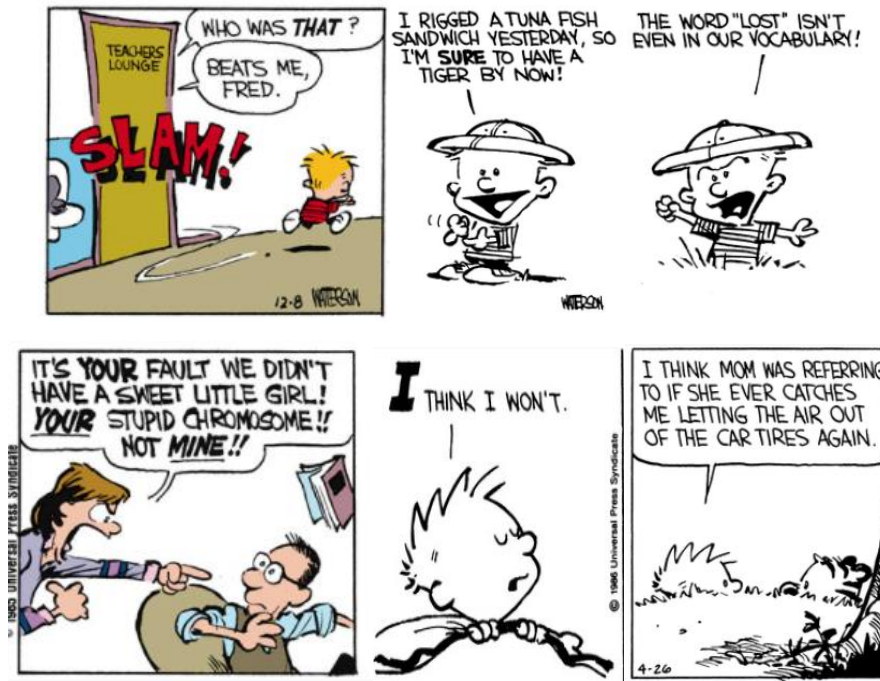
Many studies have focused on both AVL and JVL and the differences between them. For example, previous empirical studies suggest that American comic book pages have changed over time (Cohn, 2013; Pederson & Cohn, 2016). Another popular research area has been the narrative storytelling in comic strips. This is about the framing of the panels of the strip. This framing is an important part of the narrative structure between sequential images (Cohn, Taylor & Pederson, 2017; Dierick, 2017). The narrative structure is important in visual storytelling, because it draws the attention of the readers to the parts of the strip that are important (Cohn, 2013).

### **Attentional and narrative structure**

An important part of the way a strip is presented to the reader is the narrative structure. It determines the way an entity is depicted to the reader. An entity can be either active or inactive. Active entities interact with the story and are relevant for the story. Inactive entities do not interact with the story. They can be deleted and the reader would still understand the main message of the story (Cohn, 2013). There can be one entity or multiple entities that serve as attention units.

There are four types of panels when talking about attention units (Cohn, 2013). The first type is the macro panel. This type of panel depicts multiple active entities. The second type of panel is a mono panel, which depicts a single active entity. A micro panel depicts a part of an active entity, like a part of the head or the body. There is also an amorphic panel, which depicts no active entity at all. In this case, the background is often shown with no active entities in it (Cohn, 2013).

Something that is linked to the framing of these entities is the filmic shot that is used to show the entity in the panel. Six types of filmic shots can be distinguished. A long shot shows the subject and the surroundings of the subject. A full shot focuses more on the subject and less on the surroundings. A medium shot shows the subject from the waist up. A medium close shot shows the subject from the chest up. A close up shot shows the shoulders and the head of the subject. In an extreme close up shot, the reader can see a part of the subject, but always less than the whole head. In Figure 1, all the types of filmic shots are presented.



**Figure 1.** First row from left to right: long shot, full shot, medium shot. Second row from left to right: medium close shot, close up shot, extreme close up shot. These panels are from *Calvin and Hobbes* by Bill Watterson.

The results of previous research about attention units are contradictory. Cohn (2011) indicated that American comics show far more macro panels (60%) than mono panels (35%). Only 5% of the panels were micro panels (Cohn, 2011). In this study, no amorphic panels were taken into account. In a study that was performed one year later (Cohn, Taylor-Weiner, & Grossman, 2012), amorphic panels were taken into account. The results of this study showed that American comics were presented mostly in macro and mono panels, but not so much in micro and amorphic panels. So, in the first study (Cohn, 2011), the results show much more macro than mono panels, while in the second study (Cohn et al. 2012), there is almost an equal number of macro and mono panels. However, Cohn et al. (2017) conducted a third study and found that in all eight decades of American superhero comics, macro panels were used more than mono panels. In this study, micro panels and amorphic panels were also present, but much fewer than the macro and mono panels.

When combining the framing of attention units to the type of filmic shot that was used, Cohn (2013) mentions that there is a connection between the two. In macro panels, long shots are used most of the time. With this framing type, the artist can show more information in the panel.

For mono panels, there are multiple sorts of filmic shots that are used the most (Cohn, 2013). This can be a full shot, where the whole subject is in the panel, but not so much of the surroundings. Another option is a medium shot, where the subject is framed from the waist up. A medium close shot frames the subject from the chest up. The shot that is most often used in a mono panel, but shows the least of the subject is a close up shot, where the subject is framed from the shoulders up (Cohn, 2013). In micro panels, the shot that is used most is the extreme close up shot, where only a part of the subject can be seen.

Other research has shown that the far shots, like the long and medium shots, occur far more often in American comics than the close shots (close shot and close up) do (Neff, 1977 in: Cohn et al. 2012). However, the data from Cohn et al. (2017), suggest that over time the close shots increased in number, because so did micro panels which often use close ups. This is what also happened with filmic shots in movies (Cutting, 2014). Cutting (2014) analyzed filmic shots in movies and he found that there was an increasing number of close-up shots used in movies over time. It might be the case that this is the same in comic strips.

A viewpoint that has not been discussed so far is the subjective viewpoint. A panel with a *subjective viewpoint* is a panel where you see the world through the eyes of someone of the strip. In Figure 2, an example of a panel with a subjective viewpoint is presented. Cohn (2011) found in his research that American strips do not have so many panels with a subjective viewpoint as the Japanese strips do.



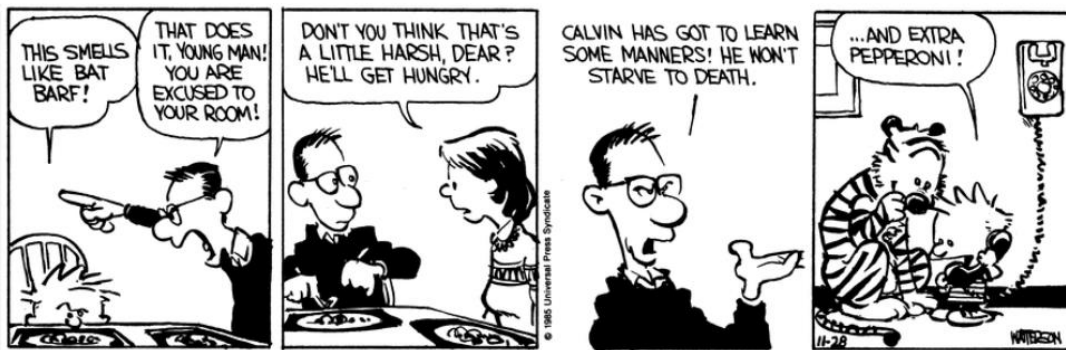
**Figure 2.** A panel with a subjective viewpoint. The panel is from *Calvin and Hobbes* by Bill Watterson.

### Semantic changes

Another interesting aspect of visual storytelling are the semantic changes between the panels in strips. McCloud (1993) performed research on the semantic changes in American,



European and Japanese comics. He distinguished six sorts of panel transitions. Cohn et al. (2017) changed this distinction into three types of panel transitions. They changed McCloud's distinction in panel transitions to better capture generalizations. This new distinction that Cohn et al. (2017) made consists of three types of panel transitions. The first type of panel transition is a character change. In the first panel of Figure 3, Calvin and his dad are shown. The next panel shows both Calvin's parents, but not himself. This is a partial character change. One of the characters stays the same, while another changes. Panel 3 of Figure 3 shows Calvin's dad, and panel 4 shows Calvin and Hobbes. This is a full character change, because all the characters in the panel are different.



**Figure 3.** Panel 2 and 3 show a partial character change and panel 4 shows a full character change. The strip is from *Calvin and Hobbes* by Bill Watterson.

The second panel transition is a spatial location change (McCloud, 1993). The location can stay the same between panels, like in the first three panels of Figure 4. Panel 4 from Figure 4 takes place at another location than the first three panels, so there is a full spatial location change between panel 3 and 4 in Figure 4. There is also a partial location change. This can be seen in the last panel of Figure 3. Calvin and Hobbes are still in the same house as the dad in panel 3, but in another room. This is a partial location change.



**Figure 4.** Panel 4 shows a full location change. The strip is from *Calvin and Hobbes* by Bill Watterson.

The third sort of panel transition is time change (McCloud, 1993). It is possible that two panels in a strip are happening at the same time. In that case, there is no time change between the panels. This is what happens in panel 3 and 4 of Figure 3. Calvin and Hobbes are ordering a pizza while Calvin's parents are downstairs talking about what just happened. In Figure 4, however, there is a time change between all the panels, because they are having a conversation with each other.

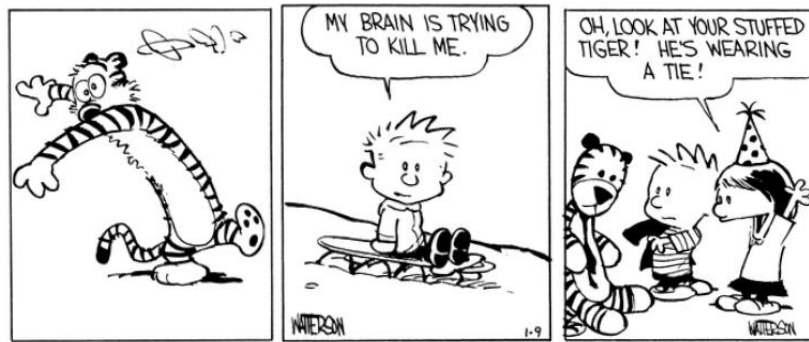
The results of the study McCloud (1993) conducted show that in American comics, all three types of semantic changes occur at about the same rate. The change that was used the most was the time change, followed by the character change. Spatial location changes were the least common transition, but were still used multiple times. A more recent study (Cohn et al., 2017) about multimodality and semantic relations in eighty decades of American superhero comics suggests that time changes occurred far more than character changes. Character changes occurred more than spatial location changes.

### Multimodality

As stated before, more and more books are becoming multimodal, with text and image instead of just text (van Leeuwen, 1992). Comic strips are also multimodal, which means that the reader should be able to understand the image as well as the text. Research has been conducted in this area. Cohn (2016) explains that multimodal panels can vary in two ways. They have a semantic weight and a grammatical construction. When talking about the semantic weight, we mean the textual or image part. When a panel has more textual weight, it is a "verbal-"panel. When the panel has more visual weight, it is a "visual-"panel. In some panels, readers need both image and text to understand what is happening in the panel. In that case, the panel is a "co-"panel.

The second part of multimodal panels consists of the grammatical construction. When a panel used one modality (text or image), it is an “-autonomous” panel. When a panel uses both modalities, the question that remains is: “Which modality has grammar?”. A panel that used text and image when they both have a grammar is an “-assertive” panel. When both modalities are used in the panel but only one of the modalities has a grammar, the panel is a “-dominant” panel.

When a modality uses grammar, the presence of a structured sequential modality is necessary. In verbal language, there must be a structural sequence of words (Cohn, 2013). Sentences like “hmpf, oh” do not have a grammar, since there is no structural sequence of words. Sentences like in the second and third panel of Figure 5 do have a grammar, since there is a structural sequence of words. In visual language, a grammar is present when the visual language is built up through structured sequential images (Cohn, 2013). In Figure 4, the visual language does have a grammar, since it shows that Calvin and his father are on the phone and it shows mood changes. It is built up through structured sequential images. When, for example, Calvin and Hobbes are walking through the forest, just talking about something, the visual language does not have a grammar. In this case, there are no structured sequential images.



**Figure 5.** The panels from left to right: visual-autonomous, verbal-dominant, co-assertive. The panels are from *Calvin and Hobbes* by Bill Watterson.

Cohn et al. (2017) performed a corpus study across eight decades of American superhero comics. They looked at the change in multimodality and narrative structure of comics across these eight decades. The results of this study showed that there was an increase over time in panels that had the visual aspect as the more important one. Also, the presence of panels without text increased over time. They even found that over time, less and less text was being used in the comics, since the overall number of words per panel decreased over time (Cohn et al., 2017).

This study looked at eight decades of American superhero comic books, but no study looked at multimodality in one particular strip. The study that Cohn et al. (2017) performed was about multiple comic books, while in this study, we will look at one strip by analyzing *Calvin and Hobbes*.

### **Calvin and Hobbes**

As can be seen, research about comics has been conducted in various areas. However, there is no knowledge about a study that analyzed one comic strip as a case study over time. That is why in this study, all the strips from *Calvin and Hobbes* by Bill Watterson will be analyzed. This strip was chosen because it had a time span of roughly ten years (November 1985-December 1995) and the comic strip was very influential. *Calvin and Hobbes* became one of the most popular comic strips in the US (Mahony, 2000). It appeared in more than 2400 papers and multiple ‘Calvin and Hobbes books’ were published. The strip is very humorous, and it uses aggression and exaggeration to come across as funny to the reader (Mahony, 2000). The strip became so popular that the creator Bill Watterson could take two nine-month breaks in which he received full payment while the paper had to print old strips that he created (Mahony, 2000).

### **Hypotheses**

In this study, we will look at the different aspects of narrative structure and multimodality in *Calvin and Hobbes* by Bill Watterson. In the light of previous research, several predictions for the outcomes of this study have been formulated. Cohn (2011) found that in American comics, macro panels were the most used panels, followed by mono panels. A year later, Cohn et al. (2012) discovered that mono and macro panels occurred at the same rate in American comics. In this more recent study, amorphic panels were also taken into account. Five years later, Cohn et al. (2017) found that macro panels were used more often than mono panels, and that micro and amorphic panels were used the least. When these studies are combined with the data presented in Cohn et al. (2017) and the study of Cutting (2014), the following predictions can be made.

H1: In *Calvin and Hobbes*, macro panels will occur the most, followed by mono panels. Micro and amorphic panels will occur the least.

H2: More close shots (close up shot, extreme close up shot) are used over time in the panels of *Calvin and Hobbes*.

Cohn et al. (2017) conducted research in which they looked at multimodality in eight decades of American superhero comics. They found that in all these decades the temporal change between panels occurred the most, and that location change occurred the least. Since this study looked at comics over a time span, it might not be applicable to *Calvin and Hobbes*, which is a strip with a time span of ten years.

However, McCloud (1993) researched European, Japanese and American comic strips in the light of semantic changes. The results of his study showed that in American comics, temporal changes occurred the most. The semantic change that occurred the least was a location change. This study looked at comics over a smaller time span, so it might be more applicable to the time span of *Calvin and Hobbes*.

Also, Calvin and Hobbes strips are much shorter than American comics. Because of this, we believe that the number of semantic changes in *Calvin and Hobbes* will be lower than in American comics. Since the strip uses many monologues, we believe there will be a high amount of panels that use a time change, but this cannot be predicted for location or character changes.

However, the changes that do occur might be the same as in the American comics that were used in previous studies (McCloud, 1993; Cohn et al., 2017). So, based on this difference between previous studies and this study about *Calvin and Hobbes* and based on the results of these two studies (McCloud, 1993; Cohn et al., 2017) the following hypotheses were constructed.

H3: In *Calvin and Hobbes*, more than half of the panels will show no location change.

H4: In *Calvin and Hobbes*, there will be more temporal changes than character changes and location changes, but still more character changes than location changes.

Cohn et al. (2017) conducted a very broad research about the change of multimodality and narrative structure across decades of American superhero comics. They found that over time, the visual part of the superhero strips became more important than the textual part. This could also be seen in the increase of panels that did not have any text. Overall, panels also seemed to have less words over time.

This study looked at comics in a time span of eighty years. Since *Calvin and Hobbes* has a time span of only ten years, not all the results of Cohn et al. (2017) might be applicable to *Calvin and Hobbes*. However, *Calvin and Hobbes* was published from 1985 to 1995. The material that

Cohn et al. (2017) used were comics from 1940 to 2010. So, *Calvin and Hobbes* was published in the second half of the material that Cohn et al. (2017) used. This might mean that the results that Cohn et al. (2017) found are applicable to *Calvin and Hobbes*.

However, there is some information about Calvin and Hobbes that can be found in the books that Bill Watterson himself wrote about the comic strips. In this books, he writes about what inspired him to create certain comic strips and about why he made certain choices. In one of the books, he writes as follows:

*“The best comics have funny writing and funny drawings, but sometimes the strength of one can make up for the weakness of the other. Great writing will save boring artwork better than great drawings will save boring ideas, but comics are a visual medium, and a funny picture can pull more weight than most people think. Whenever deadlines force me to go with a mediocre idea, I go for broke on the illustration.”* (Watterson, 1995, p. 32).

So, when deadlines force Bill Watterson to ‘hand in’ a comic strip, he focusses on the visual aspects rather than the textual aspects of the strip. Moreover, he also mentioned something about the Sunday strips in his book: *“With the larger Sunday strip, I find I can often tell a story with greater nuance by eliminating the dialogue altogether.”* (Watterson, 1995, p. 197). Based on all this information combined, the next hypotheses were constructed.

H5: *Calvin and Hobbes* will lean more towards the visual aspect than the textual aspect.

H6: There will be a slight decrease in the number of words that is used in the panels in *Calvin and Hobbes*.

H7: Over time, there will be an increase in the number of wordless panels. Especially in the Sunday strips of *Calvin and Hobbes*.

## Methods

### Materials

The strips that are analyzed are all the strips from *Calvin and Hobbes* by Bill Watterson. In the time period from November 1985 until December 1995, this comic strip appeared in the

newspapers on a daily basis. This means that in total 3696 daily comic strips were published in this time period, and those strips consisted of 14.711 panels in total. In general, the daily strips were four panels long and the Sunday strips consisted of about 8-12 panels. In most cases, the daily strips were in black and white, and the Sunday strips were in color.

Each individual panel was examined by the criteria that are described in the areas of analysis. The coding was performed by three undergraduate bachelor students. In Table 1, the distribution of the strips between the three coders is presented. The coders coded about the same amount of strips, and because of the distribution, they coded strips in the beginning, middle, and ending period of *Calvin and Hobbes*. Some months were not coded, since Bill Watterson took a sabbatical and already existing strips were reprinted in those months of his absence.

Table 1. *Distribution of the Calvin and Hobbes strips between the three coders.*

Date of the strips	Coder 1	Coder 2	Coder 3
Nov. 1985 – Dec. 1986	X	X	X
Jan. 1987 – Dec. 1987	X		
Jan. 1988 – Dec. 1988		X	
Jan. 1989 – Dec. 1989			X
Jan. 1990 – Jun. 1990		X	
Jul. 1990 – Dec. 1990			X
Jan 1991 – May 1991	X		
Feb. 1992 – Mar. 1992	X		
Apr. 1992 – Sept 1992		X	
Oct. 1992 – Mar. 1993	X		
Apr. 1993 – Mar. 1994			X
Apr. 1994		X	
Jan. 1995 – Jun. 1995		X	
Jul. 1995 – Dec. 1995	X		

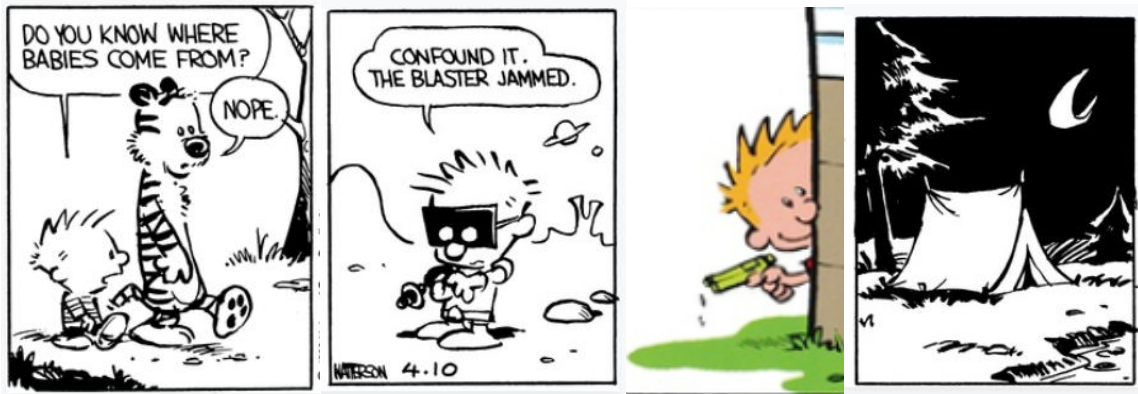
### Areas of analysis

In this study, the visual storytelling and multimodality in *Calvin and Hobbes* were analyzed. Visual storytelling is like language, but in visual representation by drawing. People say they speak in a certain language, but they never say they draw in a certain language (Cohn, 2013). However, differences in drawing styles in comics have been found in cross-cultural research (Cohn, 2013). This previous research about visual storytelling examined the different ways to represent the visual language that is drawn in a panel. All the panels from *Calvin and Hobbes* were

examined thoroughly based on these areas of analysis. Short explanations and examples of all parts of the areas of analysis can be found in Appendix I.

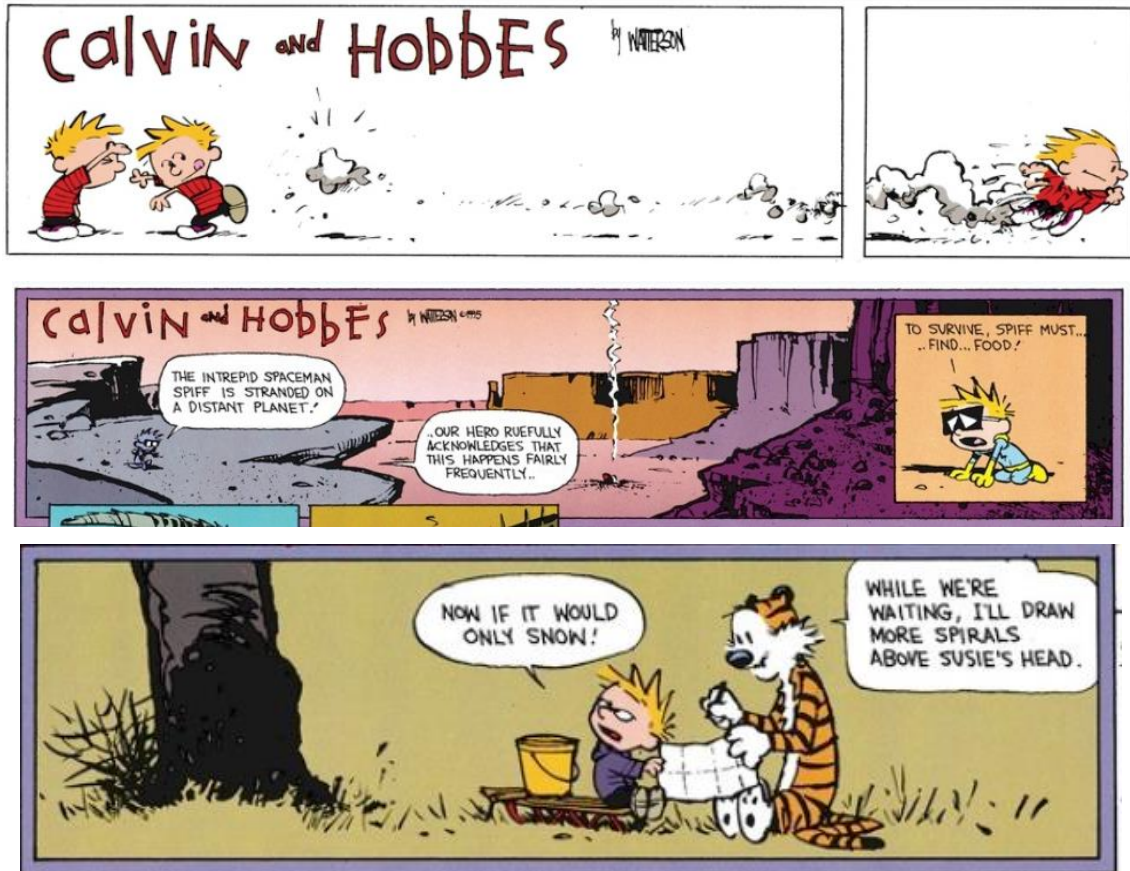
### *Attentional category*

One choice an artist has to make while drawing a comic is how the panel is framed as an attention unit. Is the attention on one acting entity, or on multiple acting entities? Are there even acting entities at all in the panel? Each panel was coded for this area. A panel could be a macro panel with multiple active entities, a mono panel with one active entity, a micro panel with a part of an active entity or an amorphic panel with no active entities. In Figure 6, examples of the four types of panels are presented.



**Figure 6.** From left to right: macro panel, mono panel, micro panel, amorphic panel. These panels are from *Calvin and Hobbes* by Bill Watterson.





**Figure 7.** First row: divisional panels. Second row: dominant panel with inset panel. Third row: base framing panel. These panels are from *Calvin and Hobbes* by Bill Watterson.

### *Framing type*

Panels can also be distinguished based on the framing of the panel itself. Base framing panels are basic panels, where the content in the panel does not interact with the content of other panels (Dierick, 2017). All the panels in Figure 6 are base framing panels. Another sort of panel is a divisional panel. This means that something that could have been in one panel is split up in two panels (Dierick, 2017). The last two types of panels are inset panels and dominant panels. These types of panels are interconnected, because something important in the main panel (the dominant panel) is highlighted by creating a smaller panel (the inset panel) inside the main panel (Cohn, 2013). Figure 7 shows all four kinds of framing types for panels.

### *Filmic shot*

We also analyzed the type of “filmic shot” that is used in a panel. Seven types of filmic shots can be distinguished. A long shot shows the subject and the size of the subject compared to

its surroundings (Cohn, 2013). A full shot still shows the whole subject, but not so much of the surroundings. A medium shot frames the subject from the waist up. A medium close shot frames the subject from the chest up. A close up shot frames the shoulders and the head of the subject. In an extreme close up shot, a piece of the subject is shown, but it is always less than the whole head. Sometimes, the artist chooses to let the reader see the world in the strip from the viewpoint of a character. This is called a subjective viewpoint (Cohn, 2013).

### *Semantic changes*

When analyzing visual storytelling in comics, there can be semantic changes between panels. Cohn et al. (2017) distinguished three different kinds of semantic changes that can occur between panels. A character change when the characters differ completely from the previous panel. In this case, there is a full character change. This was coded with the value of 1. When some characters stay the same and some differ, there is a partial character change. This was coded with the value of 0.5. When the characters stayed the same across panels, this was coded with the value of 0.

Another sort semantic change that can occur in comics is a spatial location change (Cohn et al. 2017). A full spatial location change is used when the panels differ completely from location, like in different buildings. This was coded with the value of 1. A partial spatial location change occurs when for example two people in consecutive panels are in the same house, but in a different room. This was coded with the value of 0.5. When the location stayed the same across panels, this was coded with the value of 0.

The last type of semantic change that should be analyzed in visual storytelling in comics is a time change (Cohn et al. 2017). When there is no time change between panels, the panels occur at the same time. This was coded with the value of 0. When there is a time change, the actions in the panels do not happen at the same time, but there is time between them. This was coded with the value of 1. When there were no cues to indicate whether there was a time change between panels or not, the panel was coded as having no change in time (0).

### *Multimodality*

The last area of analysis concerns the multimodality of the comic strip. For each panel, the number of words was notated. After this, for each panel should be decided whether it was mainly visual, verbal or both (Cohn, 2016; Cohn et al. 2017). This has to do with the entity that is the most present in the panel: image or text. When both text and image were needed to understand the panel,

it was coded as *co-*. When the panel could be understood with just the text, it was coded as *verbal-* and when the panel was understandable with just the images, it was coded as *visual-*. The second part of coding the panels consisted of the grammar that the used entities in the panel had. When there was only one entity (text or image) present, the panel was coded as *autonomous*. When there were two entities present, but only one of them did have a grammar, the panel was coded as *dominant*. When both the entities were present and both of them had a grammar, the panel was coded as *assertive*.

## Data Analysis

### *Interrater reliability test*

Three undergraduate bachelor students each coded the first year of strips, which contained 409 comic strips (November 18, 1985 – December 31, 1986). They examined each separate panel from the comic strips for each area of analysis. To see whether their coding style was compatible, an interrater reliability test was performed. Table 2 shows the reliability scores for each area of analysis. The scores ranged from poor reliability (.486 for time change) to excellent reliability (.997 for word count). For every coefficient lower than .750 (all ‘moderate’ and ‘poor’ reliability scores), the coders discussed their disagreements and came to an agreement about all of them. This was done, so the future coding would be more consistent and in line with each other.

Table 2. *Intercoder reliability of the areas of analysis between the three coders in the first year of comic strips from Calvin and Hobbes.*

Area of analysis	Intraclass Correlation Coefficient
Attentional framing	.911
Framing	.500
Filmic shot	.756
Character change	.558
Spatial location change	.647
Time change	.486
Multimodality	.624
Word count	.997

### *Statistical tests*

After the coding was finished, statistical tests were performed to analyze the data. First, for all the areas of analysis, the scores were averaged per year. These averaged scores were used to analyze the data. An analysis of variance was conducted with a repeated measures ANOVA to

compare the areas of analysis across years. Attentional framing, framing, filmic shot, character change, time change, spatial location change, and multimodality were within-group factors, and the years were the co-variate. After this, polynomial contrasts were analyzed to see the linear trend in a particular area across years. To test the fifth hypothesis, a one-sample T-Test was used to analyze the data.

### Results

Table 3. *F and R<sup>2</sup> values for linear polynomial trends of the areas of analysis across years.*

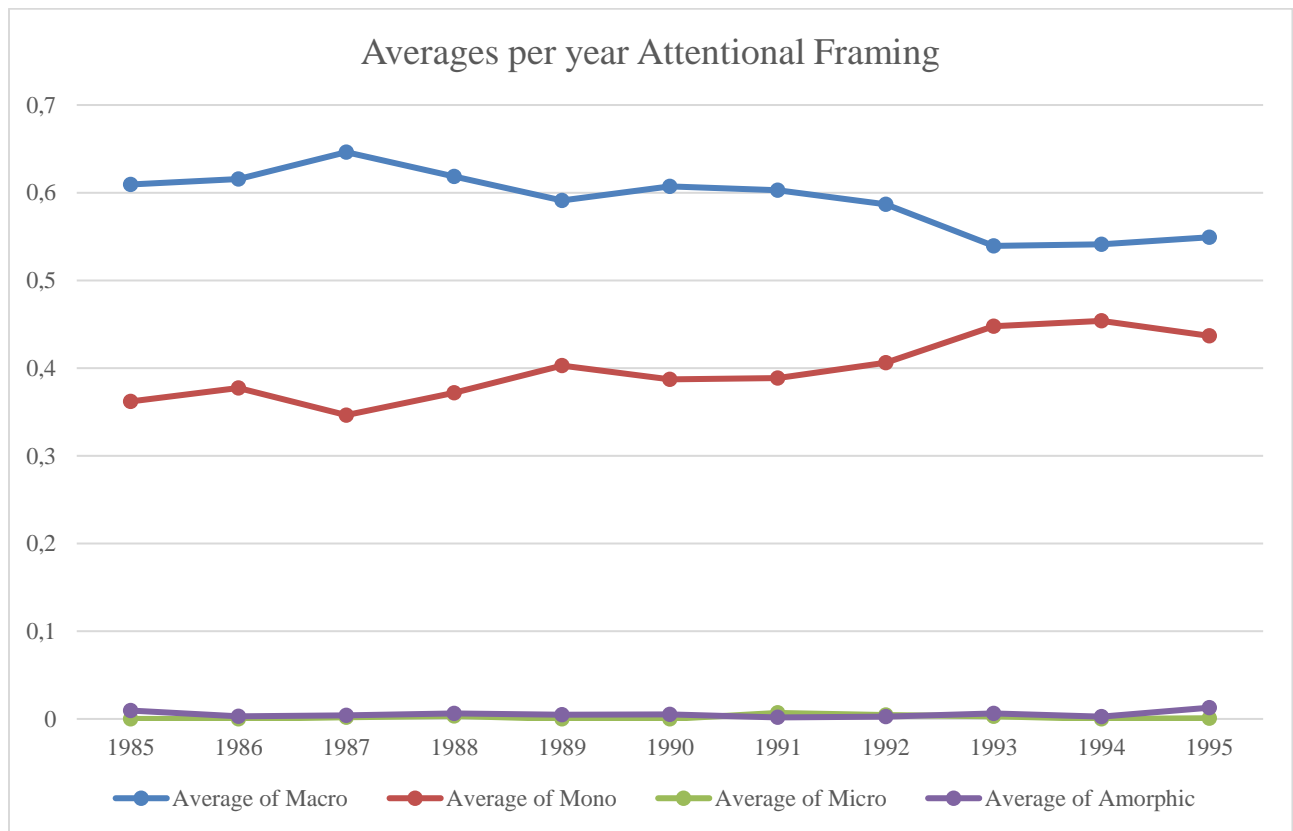
Areas of analysis	Linear trend	
	F-Value	R <sup>2</sup>
<i>Attentional framing</i>		
Macro	22.217***	.712
Mono	33.201***	.887
Micro	.410	.044
Amorphic	.093	.010
<i>Filmic shot</i>		
Long	.021	.002
Full	2.103	.189
Medium	5.154*	.369
Medium close	4.383^	.328
Close up	10.641**	.542
Extreme close up	.177	.019
<i>Semantic changes</i>		
Character change	1.011	.101
Spatial location change	1.032	.103
Time change	1.048	.104
<i>Multimodality</i>		
Co	.004	.953
Vis	144.040***	.941
Verb	.939	.095
Autonomous	77.125***	.896
Dominant	.586	.061
Assertive	.075	.008
Wordcount	.185	.020

\*\*\*  $p \leq .001$ , \*\*  $p \leq .01$ , \*  $p \leq .05$ , ^  $p \leq .1$

### Attentional framing

The first analysis focused on the type of attentional framing that was used in the strips across publication date. Mauchly's test indicated a violation of sphericity, so there was a Greenhouse-Geisser correction,  $\chi^2(5) = 36.119$ ,  $p < .001$ . Overall, there was an effect of attentional framing type,  $F(1,098, 9,886) = 22.764$ ,  $p < .001$ , but no interaction was found between attentional framing type and publication date,  $F(1, 9) = 3.183$ ,  $p = .261$ . This suggested that the attentional framing types differed statistically significant from each other over time, but the relations between them did not change over time. This can also be seen in Figure 8.

Macro panels occurred the most, followed by mono panels. Amorphic panels and micro panels occurred the least. Regression analyses (Table 1) showed no consistent change in frequency for micro and amorphic framing. However, for macro framing ( $p = .001$ ) and for mono framing ( $p < .001$ ), such a consistent change in frequency was found across time. The trends suggested a decrease in macro framing and an increase in mono framing.

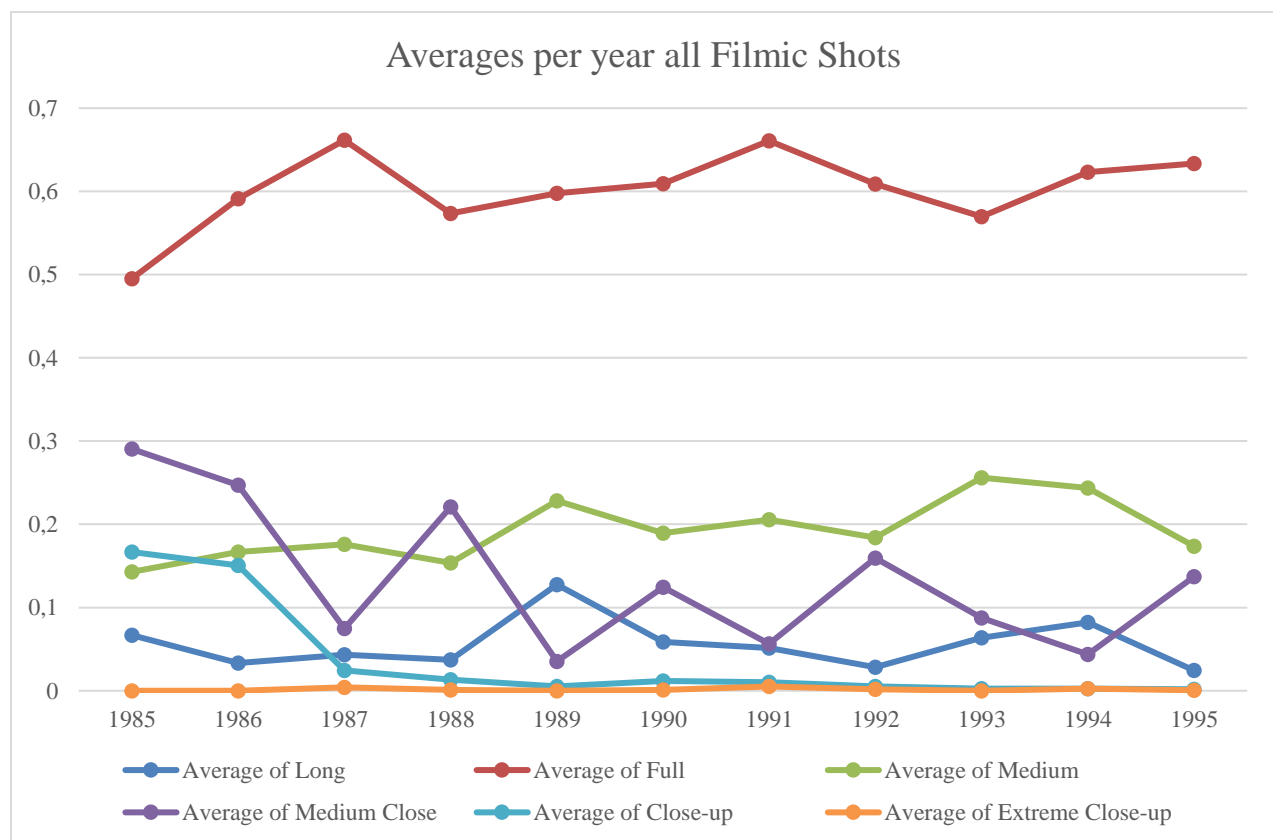


**Figure 8.** The averages per year of attentional framing.

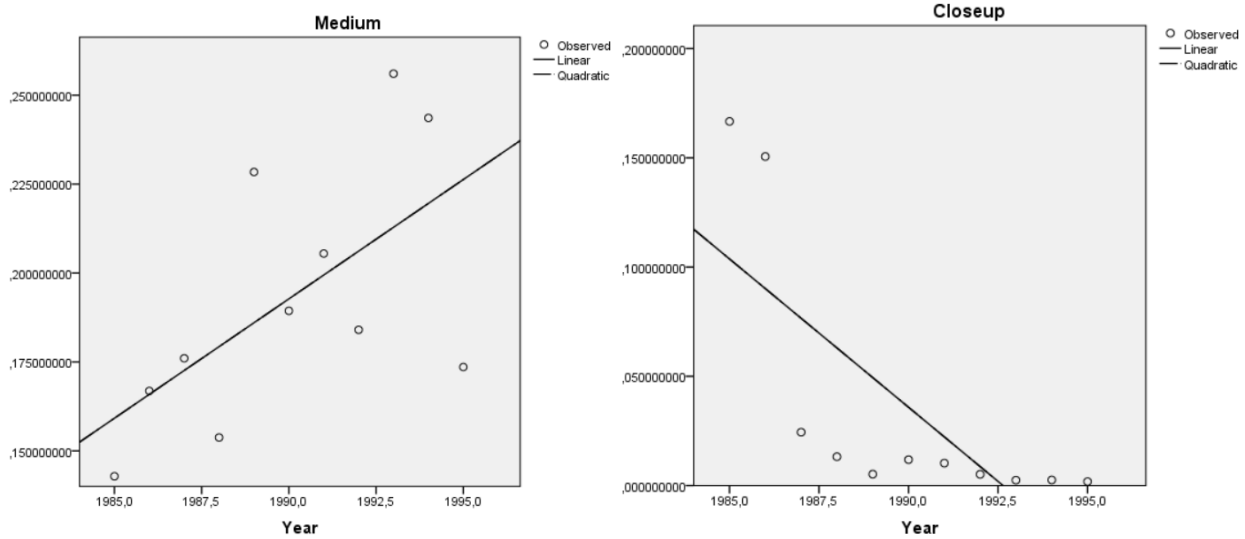
### Filmic shots

The second analysis focused on the type of filmic shot that was used in the strips across publication date. Mauchly's test indicated a violation of sphericity,  $\chi^2(14) = 49.782, p < .001$ , so a Greenhouse-Geisser correction was used in the analysis. Overall, an effect of filmic shot type was found,  $F(1,796, 16,162) = 4.484, p < .01$ . Also, an interaction effect was found between filmic shot type and publication date,  $F(1, 9) = 8.543, p < .05$ . These findings suggested that filmic shot types differed from each other, and that the relations between them changed over time. This can also be seen in Figure 9. Full shots occurred the most, followed by medium shots, medium close shots, long shots, close up shots, and extreme close up shots.

Regression analyses showed that long shots, full shots, medium close shots, and extreme close up shots did not show a consistent change across time. However, medium close shots ( $p = .066$ ) did show a decrease in number over time. Medium shots ( $p < .05$ ) showed a consistent increase in frequency across time, while close up shots ( $p = .01$ ) showed a decrease in frequency across time (Figure 10).



**Figure 9.** The averages per year of filmic shot type.

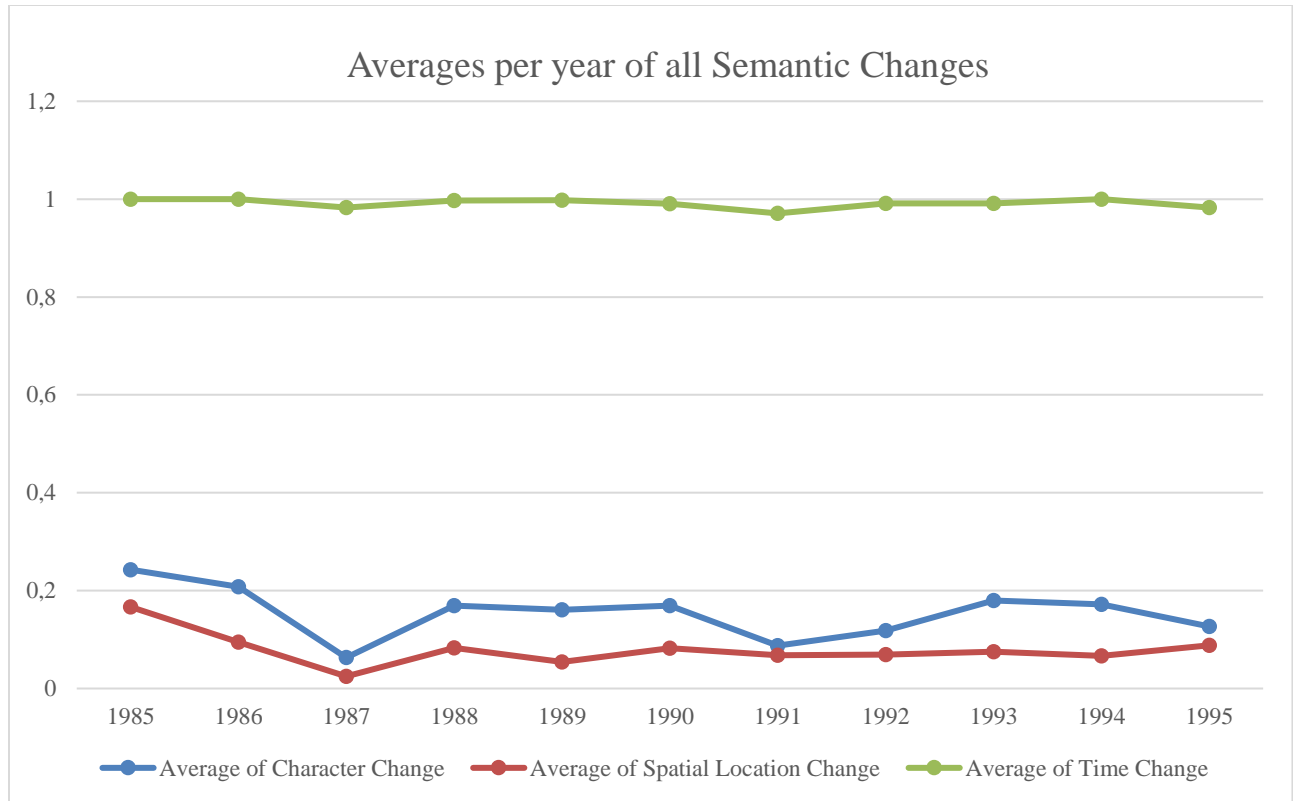


**Figure 10.** The regression analysis outcome: an increase in medium shots (left) and a decrease in close up shots (right).

### Semantic changes

The third analysis focused on the types of semantic changes that were used in the strips over time. Mauchly's test indicated no violation of sphericity,  $\chi^2(2) = 2,150$ ,  $p = .341$ , so no correction was used in the analysis. The difference between the type of semantic change was statistically significant,  $F(2, 20) = 4102,23$ ,  $p < .001$ . This significant difference was found for all the three types of semantic changes (all  $ps < .001$ ). Time changes were used the most, followed by character changes, and location changes occurred the least. This can be seen in Figure 11.

A one-sample t-test was conducted to determine whether the number of spatial location changes occurred in less than half of the total number of panels. This was indeed the case,  $t(9) = -40.285$ ,  $p < .05$ .



**Figure 11.** The averages per year of semantic changes.

### Multimodality

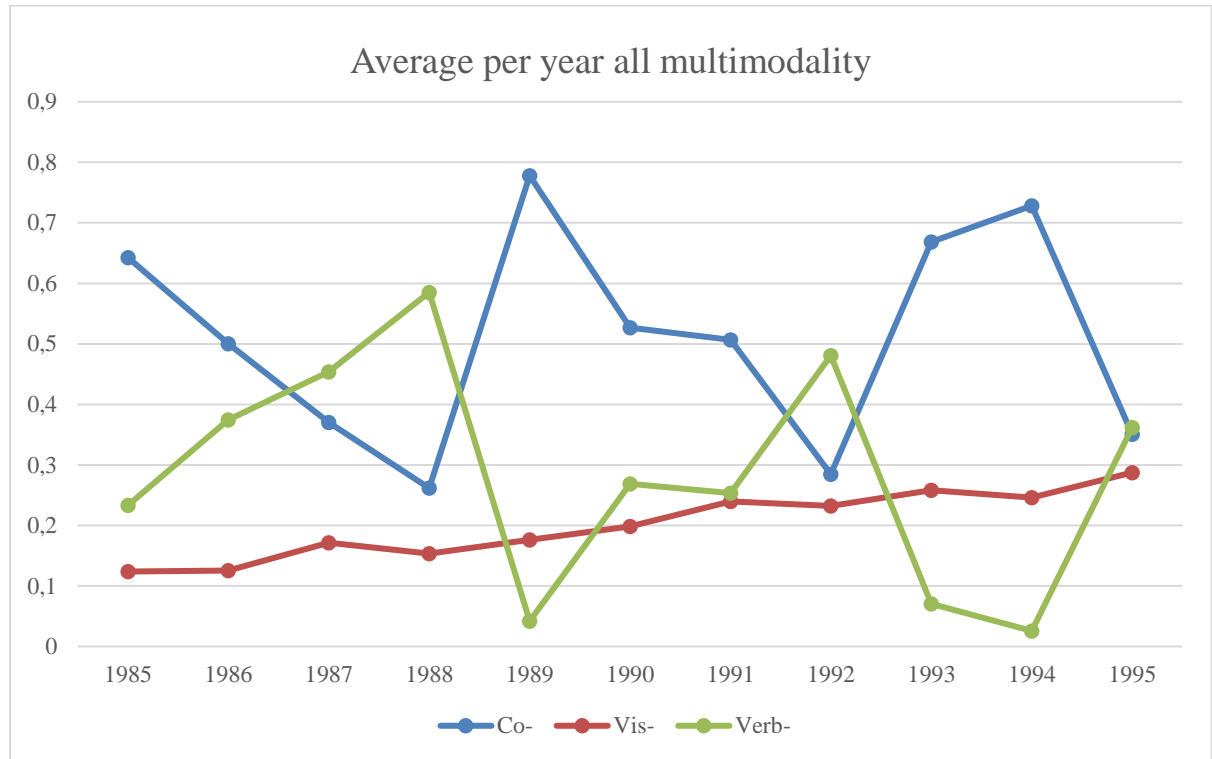
The last analysis focused on the multimodality in the strips. It consisted of three parts: the semantical weight (co-, verbal-, or visual-), the grammatical interactions (autonomous, dominant, or assertive), and the word count. All three parts were analyzed and taken into account in this analysis.

First, the analysis focused on the semantic weight that was used in the strips over time. Mauchly's test indicated a violation of sphericity,  $\chi^2(2) = 32.551, p < .001$ , so a Greenhouse-Geisser correction was applied to the analysis. No difference overall was found between the modality carrying semantic weight,  $F(1.009, 9.078) = .876, p = .374$ , nor was there an interaction between semantic weight and publication year,  $F(1.009, 9.078) = .874, p = .375$ . This suggested that the types semantic weight did not differ from each other, and that they also did not differ from each other across time.

As shown in Figure 12, despite some shifting across time, co-panels occurred the most, followed by verb-panels, and vis-panels. The regression analysis showed no significant trendline



for co-panels, and verb-panels showed no consistent change in frequency across time, while vis-panels did ( $p < .001$ ). The number of vis-panels increased across time.



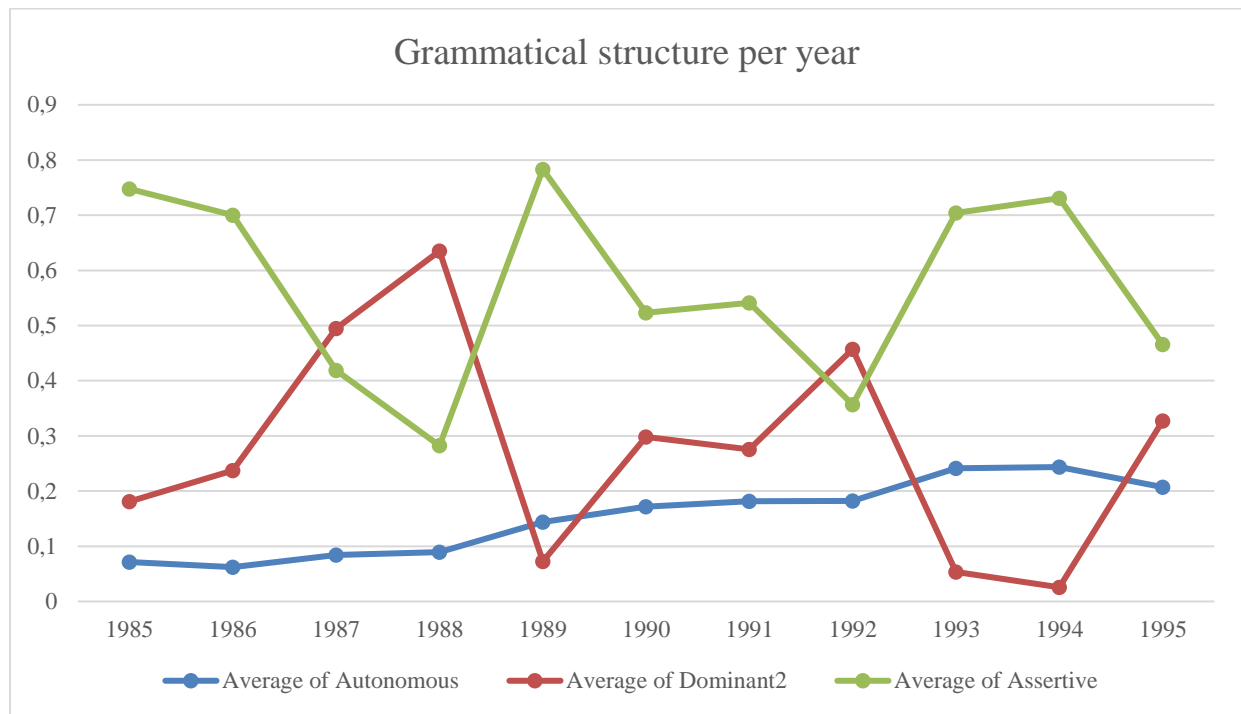
**Figure 12.** The averages per year of multimodality.

The next part of the analysis focused on the grammatical structure of the panels across time. Assertive panels occurred the most, followed by dominant panels, and autonomous panels (Figure 13). The regression analysis showed no consistent change in frequency across time for dominant panels and assertive panels. However, an increase in the number of autonomous panels was found ( $p < .001$ ).

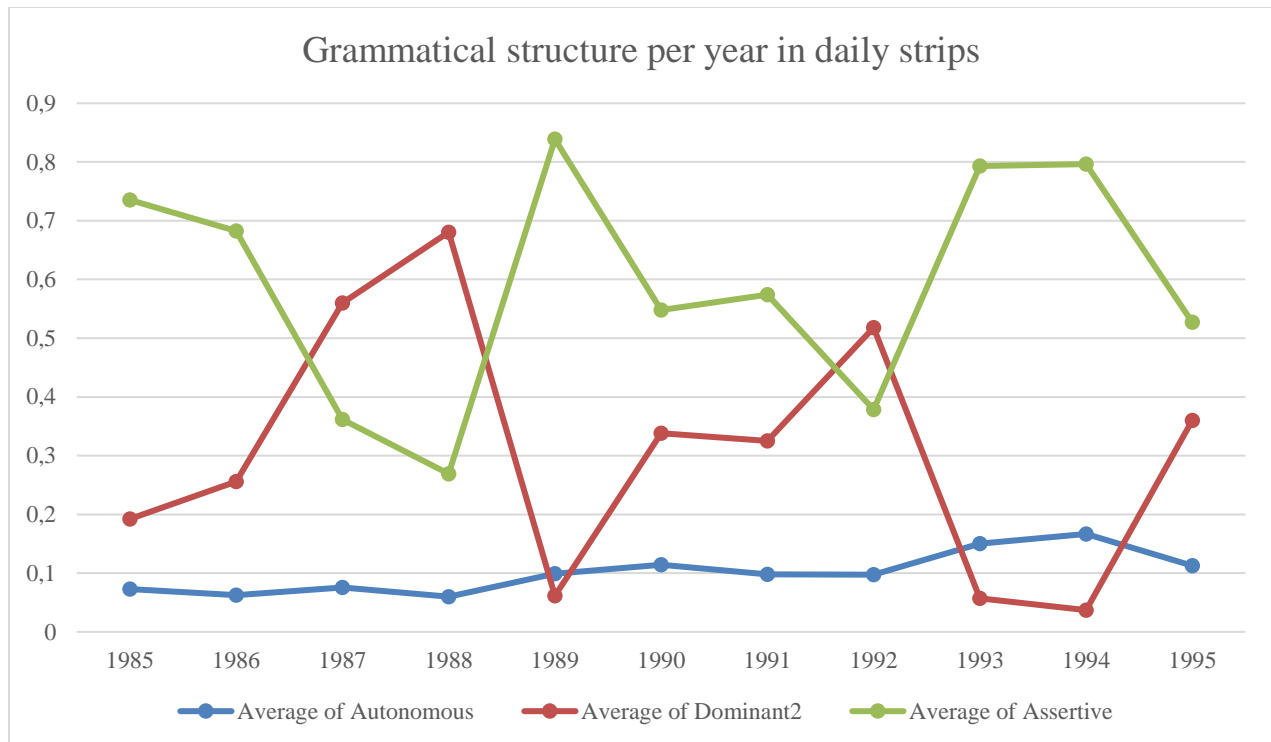
A further analysis looked at the differences between daily strips and Sunday strips. In daily strips, assertive panels occurred the most, followed by dominant panels, and autonomous panels (Figure 14). Dominant panels and assertive panels did not show a consistent change in frequency across time, but autonomous panels did show a consistent change. They increased in frequency across time in the daily strips,  $F(1, 9) = 16.780$ ,  $p < .01$  (Figure 18).

In Sunday strips, assertive panels occurred the most, followed by autonomous panels, and dominant panels (Figure 15). Dominant panels in Sunday strips showed no consistent change in

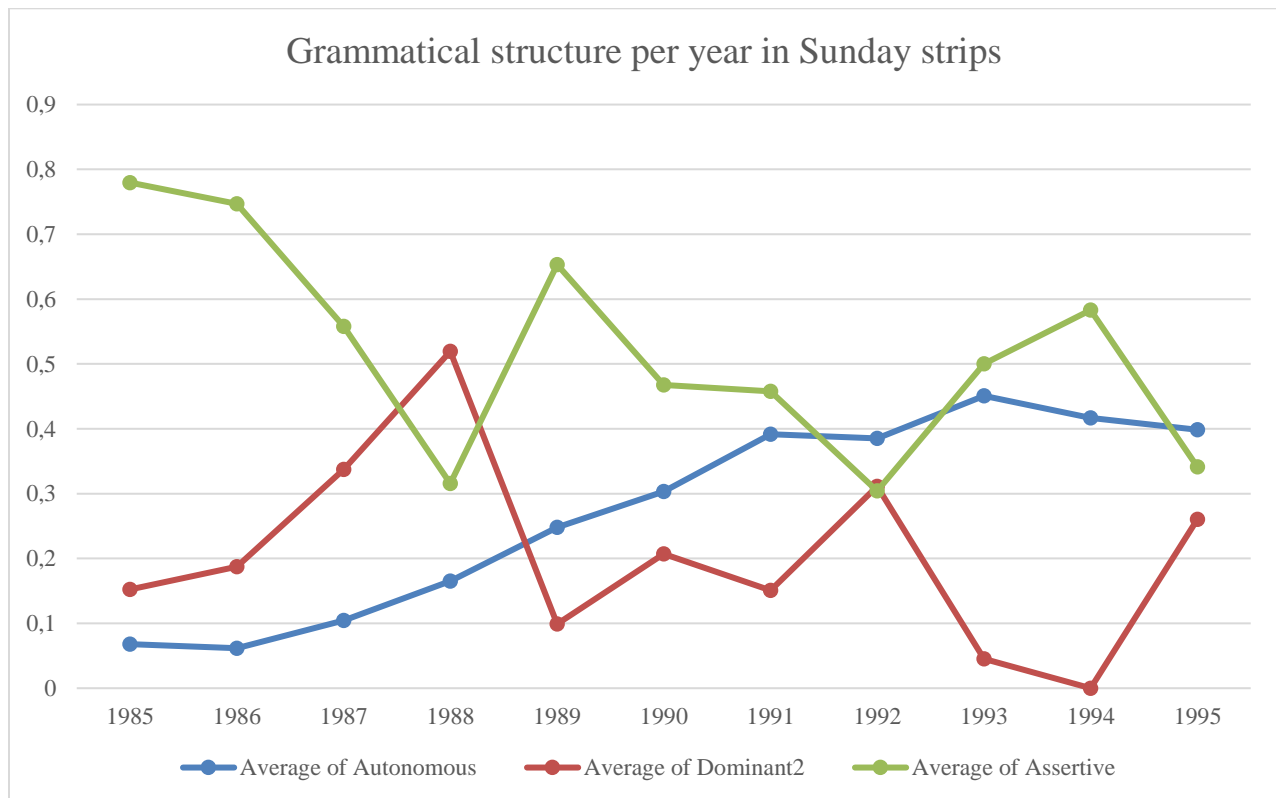
frequency over time, but the number of assertive panels seemed to decrease across time ( $p = .053$ ). Autonomous panels increased in frequency over time,  $F(1, 9) = 80.278$ ,  $p < .001$ .



**Figure 13.** The averages per year of grammatical structure.

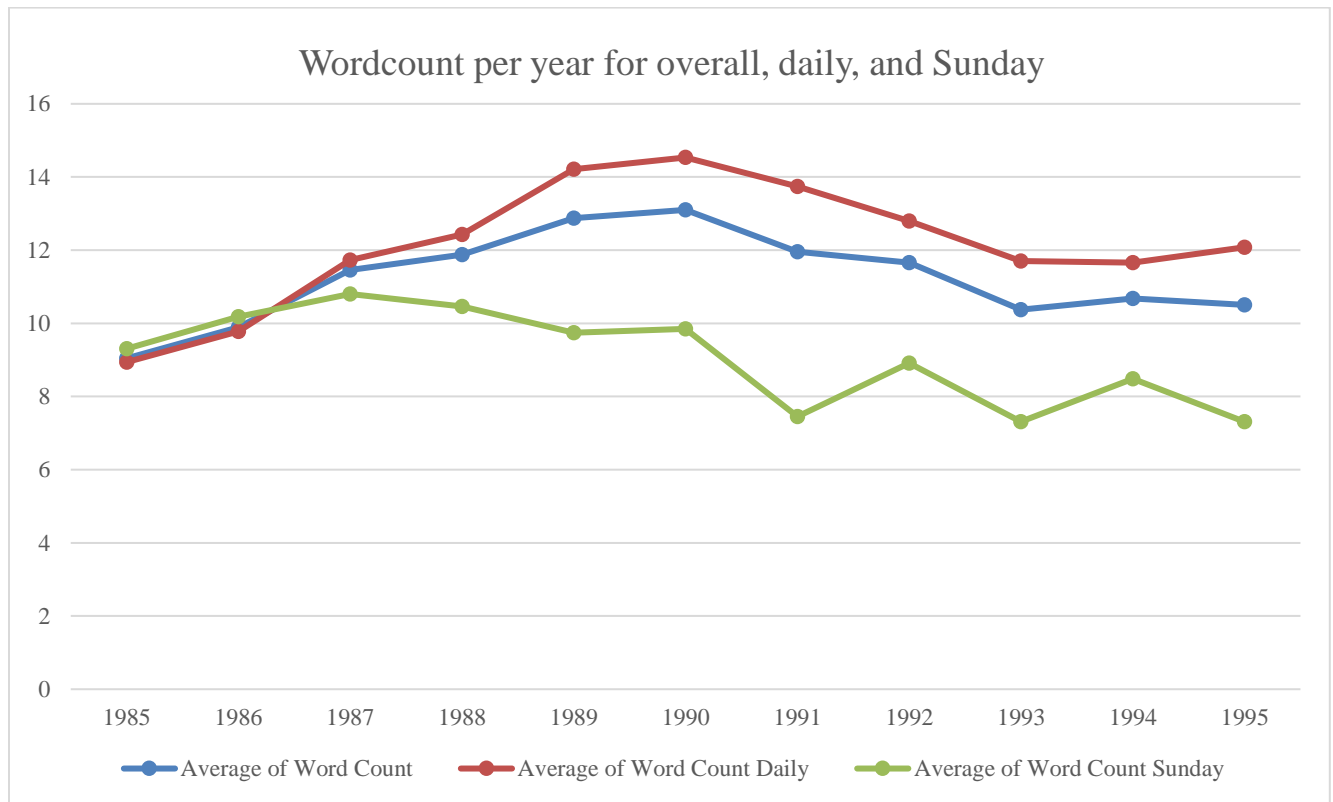


**Figure 14.** The averages of grammatical structure per year for daily strips.



**Figure 15.** The averages of grammatical structure per year for Sunday strips.

The last part of the analysis focused on the wordcount in panels across time. Overall, the average number of words per panel was 11.220 ( $SD = 1.246$ ). The number of words showed no consistent change across time. In this analysis, we also split the data in daily strips and Sunday strips. The average number of words per panel in daily strips was 12.147 ( $SD = 1.718$ ). The number of words in daily panels also showed no consistent change across time. The average number of words per panel in Sunday strips was 9.074 ( $SD = 1.283$ ). A decrease in the number of words per panel in the Sunday strips was found,  $F(1, 9) = 12.843$ ,  $p < .01$  (Figure 16).



**Figure 16.** The averages of wordcount per year for the overall strips, the daily strips, and the Sunday strips.

### Discussion

This study looked at the visual storytelling in ten years of *Calvin and Hobbes* strips by Bill Watterson. It focused on the attention structure, the narrative structure, semantic changes, and multimodality. Overall, we found that there is an increase in the number of autonomous panels across time in all the strips, even Sunday strips and daily strips. We can say that these autonomous panels are all likely to be panels with a visual semantic weight, because there are very little to no

verb-autonomous panels in *Calvin and Hobbes*. In the Sunday strips, this increase in visual panels that are wordless are accompanied by a decrease in the number of words across time. This suggests that the strips are leaning more towards the visual modality than the verbal modality across time. This result, among with other results, shows that there are differences throughout the years in the strip Calvin and Hobbes.

### **Attentional framing**

One of the results that also supports that there are differences across time, is that macro panels decreased in number across time, and mono panels increased in number across time. Macro panels occurred the most, followed by mono panels. Micro and amorphic panels do occur sometimes, but not often. No interaction was found between type of attentional framing and publication year, which suggests that these differences between the types of attentional framing do not change across years. So, in each year of publication, macro panels occurred the most in *Calvin and Hobbes*, followed closely by mono panels. These results support the first hypothesis.

These results are in line with previous research. Cohn (2011) found that macro panels occurred far more often than mono panels, but later studies (Cohn et al., 2012; Cohn et al., 2017), argued that there was almost an equal number of macro panels and mono panels, while there were very few micro and amorphic panels. As can be seen in Figure 8, in the beginning years of *Calvin and Hobbes*, there were far more macro panels than mono panels, which is in line with the findings of Cohn (2011). However, in the ending years, the difference between macro and mono panels was getting smaller and smaller, to the point where the number of macro and mono panels was almost equal (Cohn et al., 2012; Cohn et al., 2017).

### **Filmic shot**

What is interesting to look at is the combination of attentional framing and filmic shots. Cohn (2013) argued that in macro panels, long shots are used the most. In mono panels, full, medium and medium close shots were used the most. Since our results indicate a decrease in macro panels, and an increase in mono panels, a decrease in long shots, and an increase in full, medium, and close shots would be expected (Cohn, 2013). However, only an increase in medium shots was found. This might mean that in the mono panels, more medium shots are used across time.

We expected that more close shots would be used over time. The results showed that there was a difference between the types of filmic shots across time, and that those differences changed over time. Besides the increase in medium shots, a decrease in close up shots was found. Therefore,

the results do not support the second hypothesis. The results even suggest that far shots are used more often than close shots, since full, medium, medium close, and long shots are used more often than close up and extreme close up shots. The number of close shots in *Calvin and Hobbes* was very low. This might be because Bill Watterson chose to show more of the surroundings, which makes it easier by using a far shot. If this is the case, the surroundings in the strip might have an influence on the meaning of the strip.

### **Semantic changes**

Previous research showed mixed results about semantic changes in strips. McCloud (1993) found that the three types of semantic changes occurred at about the same rate, with time change occurring the most, followed by character change, and spatial location change. Cohn et al. (2017) argued that time changes occurred far more often than character changes, and that character changes were used more than spatial location changes. Our results are in line with the results that the study from Cohn et al. (2017) provided. The semantic changes in *Calvin and Hobbes* differed from each other across time. Time change was used the most by far, followed by character changes. Spatial location changes occurred the least in *Calvin and Hobbes*. These findings support the fourth hypothesis that predicted this outcome. Due to the findings of Cohn et al. (2017), we expected that in more than half of the panels, no spatial location change would occur. The results indicate that this was indeed the case, and so they support the third hypothesis.

### **Multimodality**

#### *Semantic weight*

The main focus of this study was on the multimodality of *Calvin and Hobbes*. First, we looked at the semantic weight in the panels. The results suggest that the frequency of co-, vis-, and verb- panels did not differ from each other and that this did not change over time. However, across time, there was an increase in visual weighted panels. This was in line with the results of a previous study that Cohn et al. (2017) conducted. They found that in eight decades of American superhero comic strips, the number of visual weighted panels increased.

The fifth hypotheses stated that Calvin and Hobbes would lean more towards the visual aspect than the verbal aspect, but this was not supported by the results of the study. Co-panels occurred the most, followed by verb-panels. Vis-panels were used the least, even though they increased in number across time. This is something that might be explained by something Bill Watterson wrote himself:

*“The best comics have funny writing and funny drawings, but sometimes the strength of one can make up for the weakness of the other. Great writing will save boring artwork better than great drawings will save boring ideas, but comics are a visual medium, and a funny picture can pull more weight than most people think. Whenever deadlines force me to go with a mediocre idea, I go for broke on the illustration.”* (Watterson, 1995, p. 32).

This shows that Bill Watterson believes that the best panels are co-panels, since they consist of both funny writings and funny drawings. Co-panels were used the most in *Calvin and Hobbes*. Verb-panels will save weak drawings, which suggests that he believes those panels to be the next best panels, but when he is forced to finish strips, he focusses more on the visual aspect of the strip. This might mean that the deadlines got stricter when the strip got older, but we can not say this with certainty. The only thing that we can interpret from the results is that there was an increase in the number of vis-panels across time. This is in line with the results from the study that Cohn et al. (2017) conducted. They found that the visual semantic weight became more important in American superhero strips across decades.

#### *Grammatical structure*

An increase in visual weighted panels might also mean that the strip as a whole became more visual without the help of words. The results support the seventh hypothesis that there would be an increase in the number of wordless panels, and especially in Sunday strips. However, also the overall strips and the dailies showed an increase in wordless panels. For the Sunday strips, Bill Watterson explained his choice to use more panels without any words: *“With the larger Sunday strip, I find I can often tell a story with greater nuance by eliminating the dialogue altogether.”* (Watterson, 1995, p. 197).

In the overall and daily strips, assertive panels were used the most, followed by dominant panels, and lastly autonomous panels. The Sunday strips were mostly filled with assertive panels, but those were followed by autonomous panels, and dominant panels occurred the least in Sunday strips. So, especially in the Sunday strips, the number of autonomous panels increased. This increase of autonomous panels that do not use words, is again in line with the findings of the study

that Cohn et al. (2017) conducted. In decades of American superhero comics, the number of wordless panels also increased across time.

### *Wordcount*

The last part of the results covered the wordcount. The sixth hypothesis predicted that there would be a slight decrease in the number of words that was used in the panels of *Calvin and Hobbes*. This assumption was based on the results of the study that Cohn et al. (2017) conducted, because they found that the number of words decreased across decades in American superhero comics. Overall, the number of words did not differ across time. Also in daily strips, the number of words per panel did not differ across time. However, in the Sunday strips, the number of words decreased across time. So, the hypothesis was only supported by the results of the Sunday strips, and not the overall and daily results.

What is interesting is that the average number of words in Calvin and Hobbes was 11.220. Calvin and Hobbes was published between 1985 and 1995, and when looking at the average number of words from the 1980s-1990s in the American superhero comic study from Cohn et al. (2017), we can see that the average number of words per panel was roughly between the 26 and 15 in this period (with a decrease in time). This suggests that Calvin and Hobbes does not use much words, compared to American superhero comics that were published around the same time. This is an indication that Bill Watterson used less words to transfer the meaning to his readers.

What has to be discussed is that all the visual storytelling changes that are made in the *Calvin and Hobbes*, are probably unconscious and happened gradually. Bill Watterson explained what he thought was the reason that some strips were more successful than others: “*I think the permanence of familiar strips and the lack of change within strips accounts for much of their popularity.*” (Watterson, 1995, p. 7). By saying this, he probably does not know that he makes changes in his strip across time.

### **Future research**

This study already brought something new to the research field, namely a corpus analysis that focused on one strip across time. There are, however, much more strips that could be examined over time in a corpus analysis. It is interesting to look at single strips across time in different Visual Languages. That way, for example American Visual Language and Japanese Visual Language can be compared across time with an analysis of single strips in several decades.



Another interesting field of research might be strips in schoolbooks. Van Leeuwen (1992) argued that nowadays, multimodal messages of communication are used more often in for example schoolbooks. In some of the cases, this are comic strips that explain something in the schoolbook. For future research, it might be interesting to look at those strips that are used in schoolbooks and analyze those in the way that has been done with *Calvin and Hobbes* in this study. It would be interesting to look at different subjects and what kind of strips are used in the schoolbooks and how they changed over the years, or even how they differ between subjects.

Overall, this study showed a lot of results that the study that Cohn et al. (2017) conducted, also showed. First, there were similarities in attentional framing, because the number of mono panels in *Calvin and Hobbes* increased, which made these panels almost occur as frequent as macro panels, while amorphic panels and micro panels occurred sporadically. Second, in the American superhero comics (Cohn et al., 2017) as well as in *Calvin and Hobbes*, time changes occurred the most, followed by character changes and spatial location changes. Lastly, *Calvin and Hobbes* is leaning more to the visual side across time, because of an increase in visual panels, an increase in wordless panels, and a decrease in words in the Sunday panels. The American superhero comics also leaned more to the visual side across time.

Cohn et al. (2017) examined decades of American superhero comics, that were drawn in American Visual Language. Since the strips from *Calvin and Hobbes* show so many similarities in change over time, it suggests that these strips share at least some characteristics of the American Visual Language, at least in the visual storytelling of the strips.

A lot of research can be done in the field of multimodality and strips, and this particular research can be an example for future research that examines one particular strip across time. Not just multimodality is interesting to look at in one strip across time, but page layout and visual language are also interesting components that can make or break a strip.

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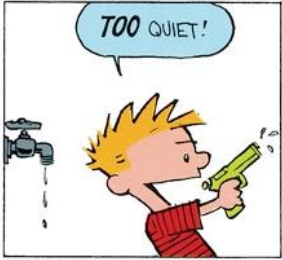



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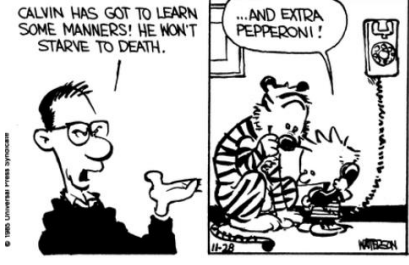
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## Appendix I

Type	Definition	Example
<b>Macro</b>	Panel with multiple acting entities	 A black and white comic panel showing Calvin and Hobbes sitting on the floor. Calvin is holding a rotary telephone receiver to his ear, and Hobbes is holding the base. A speech bubble from Calvin says "...AND EXTRA PEPPERONI!". The date "11-28" and the signature "WATSON" are visible at the bottom.
<b>Mono</b>	Panel with a single acting entity (can also be a group acting as one entity)	 A black and white comic panel showing Calvin sitting in a small wooden treehouse or nest built in a tree. He is wearing a pointed hat and looking out.
<b>Micro</b>	Panel with less than one entity	 A color comic panel showing Calvin peeking from behind a vertical wall. He has spiky blonde hair and is holding a green object, possibly a toy gun. A green puddle is on the ground.
<b>Amorphic</b>	Panel with no active entities (environmental information only)	 A black and white comic panel showing a white tent pitched in a dark forest at night. A crescent moon is visible in the sky. There are some leaves or branches in the foreground.

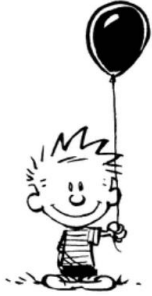


<b>Base Framing</b>	Basic framing	
<b>Divisional</b>	Single image broken up into multiple panels	
<b>Inset</b>	Panel within another panel	
<b>Dominant</b>	Panel with another panel in it (Note: always record dominant before the inset)	
<b>Long</b>	Frames the whole body of the subject in relation to the surroundings	
<b>Full</b>	Frames the whole body of the subject from head to toe	

<p><b>Medium</b></p>	<p>Frames the subject from the waist up</p>	<p>WHEN YOU DISCOVER SOMETHING, YOU'RE ALLOWED TO NAME IT AND PUT UP A SIGN.</p> 
<p><b>Med Close</b></p>	<p>Frames a subject's head and cuts off around mid-chest</p>	<p>TOO QUIET!</p> 
<p><b>Close up</b></p>	<p>Frames the shoulders and head of the subject</p>	<p>CALVIN, I'M SURE THERE ARE NO MONSTERS IN YOUR DRESSER. GO TO SLEEP.</p> 
<p><b>Extreme CU</b></p>	<p>Frames a piece of the subject (less than the whole head)</p>	<p>I THINK MOM WAS REFERRING TO IF SHE EVER CATCHES ME LETTING THE AIR OUT OF THE CAR TIRES AGAIN.</p> 
<p><b>Subj</b></p>	<p>Viewpoint in the panel is taken by someone in the story</p>	

<p><b>Characters</b></p>	<p>0: all the same characters appear between successive panels</p> <p>.5: some characters stay constant between panels, while other change, either added or omitted (panel 2 and 3)</p> <p>1: all the characters change between panels (panel 4)</p>	
<p><b>Spatial location</b></p>	<p>0: the panel depicts the same location as the previous panel</p> <p>.5: partial change in location, such as moving within rooms in a house (panel 3 and 4)</p> <p>1: location changes from one place to another place (panel 1 and 2)</p>	 
<p><b>Time change</b></p>	<p>0: no apparent change in time occurs between panels (panel 1 and 2)</p> <p>1: the time in one panel directly follows that of the previous panel (panel 3 and 4)</p>	

		
Co-	Both the visual and verbal modality share in the weight of meaning	
Vis-	The visual modality controls the meaning	
Verb-	The verbal modality controls the meaning	



<b>Autonomous</b>	Only one modality is used in the panel	
<b>Dominant</b>	Only one modality has grammar	
<b>Assertive</b>	Multiple modalities have grammar	
<b>Word Count</b>	How many words are used in the panel? (in this panel: 22)	