

## **Comprehending Colour: An Approach to Reading and Understanding Colour in Comics**

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# Comprehending Colour: An Approach to Reading and Understanding Colour in Comics

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*Abstract: While comics studies has become increasingly popular in recent years, the aspect of colour is often neglected or only addressed superficially. In this paper, we attempt to combine existing comics theory with experimentation and seek to answer the question of how colour influences readers' comprehension of a particular page of Gene Luen Yang's American Born Chinese (2006). We do this by pairing a literature review with an eye-tracking experiment as well as a questionnaire. We conclude that while an interdisciplinary approach to comics seems preferable, our experiment is most useful in demonstrating the difficulties of such an approach.*

*Key terms: comics, colour, eye-tracker, interdisciplinary, comprehension.*

## Introduction

Colour carries meaning, whether described linguistically in novels, short stories, and poetry, or presented visually in films, television, and comics. While often briefly mentioned, however, it is a topic that has been given little undivided attention in comics scholarship. In his article "From Black & White to Color and Back: What Does It Mean (Not) to Use Color?" (2011), Jan Baetens notes that many "comics scholars ... are literary scholars ... who bring their previous knowledge, concepts, preferences, and tastes to their new field" (113) and therefore often lack

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the toolkit required to tackle this issue in full. As such, a multidisciplinary approach appears necessary in seeking to uncover the effect that the inclusion – or exclusion – of colour may have on readers' interpretation of specific pages in comics. In order to expand our "toolkits" for approaching comics, we will use an eye-tracker in combination with the techniques we are accustomed to in literary studies. Hoping that the two techniques will mutually inform one another, we explore the physical act of reading through linguistic experimentation and pay particular attention to the narrative aspects of comics.

An eye-tracker is an ideal way of gathering experimental data as it allows us to precisely record where on the page the readers' eyes are drawn to. Knowing that we wanted to place an emphasis on colour in comics, we eventually settled on combining the eye-tracker with a page from Gene Luen Yang's *American Born Chinese* (2006). This comic seems suited to this purpose as it uses visual stereotypes to illustrate perceived differences between Chinese and American heritage – the latter of which is not only incorrectly, but also problematically, cast as being white, European heritage – and how the two can form a mixed Chinese-American culture. The presentation of these stereotypes works well for this study, because they are predominantly based on colour. We chose a panel where protagonist Jin Wang physically transitions from a "Chinese" boy with black hair, yellow-toned skin, and black eyes into an "American" boy, complete with blonde hair, peach-toned skin, and grey eyes (see Figure 1). Though these stereotypical depictions also vary through eye-shape and hairstyle – the "American" eyes are rounder than the "Chinese" ones and the "American" hair appears to be deliberately styled whereas the "Chinese" hair looks more natural – they are very much colour dependent: the stereotype heavily relies on eye-, skin-, and hair colour to communicate the action of the transformation within the panel. Because of this reliance on colour, we decided to use this panel to investigate if and how the use of colour in comics impacts meaning-making by readers.

To gain an appreciation of the participants' comprehension of the selected panel, we supplemented our eye-tracking data with a questionnaire containing interpretation questions, the results of which we aim to relate to existing theory. As will become clear below, the combination of relevant comics theory and experimentation proved to be a challenging task, but we are using the attempt to emphasise the necessity for research into the role of colour in comics. The combined results of our literature review, questionnaire, and eye-tracker data suggests that colour does impact readers' ability to make meaning when perceiving and interpreting comics, even if the approach had demonstrable flaws – though these may be eradicated through future research.



Figure I: Colour version of test page from *American Born Chinese*



Figure II: Greyscale version of test page from *American Born Chinese*

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### Literature review

There are many approaches to comics. Whereas some scholars choose to focus on the action of reading and the readers' spatial understanding of comics, others predominantly concern themselves with the medium's affective qualities and the interpretations these yield. Some set out to evaluate whether text or image should be prioritised while others focus on metaphors. And yet others, such as ourselves, seek to make a comment on the influence of colour on reading and interpretation in comics. The aim of this literature review is therefore not only to foreground existing colour theory in comics – of which there is very little – but also to bring to the fore other prevalent insights that can be related to our discussion of colour in *American Born Chinese* (2006).

In *Understanding Comics: The Invisible Art* (1994), comics artist Scott McCloud suggests that comics are “juxtaposed pictorial and other images in deliberate sequence, intended to convey information and/or produce an aesthetic response in the viewer” (20). While this definition is far too broad in that films, picture books, and info graphics fit within its parameters, McCloud's emphasis on readers' roles in interacting with and interpreting images is useful here. In his chapter “The Vocabulary of Comics,” he addresses the notions of the iconic and the

symbolic and seeks to explain how they contribute to the readers' ability to understand and navigate the story world. Although McCloud's categories of the "iconic" and the "symbolic" appear similar to Charles Peirce's semiotic triad of the iconic, the indexical, and the symbolic elements of sign-vehicles, his understanding of how they work is not the same. According to McCloud, when readers see any visual representation of a known object (the iconic) – whether a letter, pencil, house, sun, or human face – they intuitively connect it to their conceptual image of the real-life versions of these objects, which is the symbolic aspect (26-28). Repetition of familiar icons across several panels or an entire page is then translated into action or narrative. Adding to this, McCloud introduces the idea of *closure* (not to be conflated or confused with Noël Carroll's concept of narrative closure, which focuses primarily on readers' experiences of stories as complete) as the practice of "observing the parts but perceiving the whole" (63). Translating icons into mental concepts is one type of closure, as is, on a larger scale, the ability of a viewer to look at the layout of a comics page and understand that, even though the images are presented in individual panels, they are connected. It is this practice, McCloud claims, that enables readers of comics to form coherent narratives from sequential art.

As indicated by McCloud's attention to the operation of sequential images as crucial to meaning-making, there has been a tendency in comics studies to focus on the narrative nature of comics as different from that of other media. In point of fact, literary scholar Hillary Chute ("Comics as Literature? Reading Graphic Narrative" 2008) holds that because comics often implement both text and images, negotiating meaning means "not only fill[ing] in the gaps between panels but also work[ing] with the often disjunctive back-and-forth of *reading* and *looking* for meaning" (452). In creating a distinction between reading and looking and assigning them to text and image respectively, Chute downplays the readability of images by asserting that the "great demand [placed] on [readers'] cognitive skills" (460) comes from joining the instantaneous act of looking at images with the time-consuming process of reading text. While her argument emphasizes the importance of both visual and verbal interpretative skills for meaning-making for readers of comics, it is nevertheless problematic in its overly simplistic assumptions about how texts and images are interpreted, a point we will return to in the discussion.

While the medium's interplay of text and image cannot be denied, some theorists, like philosophy scholar Henry John Pratt ("Narrative in Comics" 2009), believe comics should be approached as literature due to the assumption that comics owe much of their spatial and temporal meaning-making to literary aspects

(110). Pratt argues that speech balloons, for example, give readers an indication of how long a conversation lasts, regardless of their spatial arrangement, by transforming the purely visual experience of reading into the linguistic representations of speech, whose time readers can estimate based on personal experience. That is, in Pratt's view, because readers are familiar with dialogue and can translate it into their own experience of a conversation, visuality is given a real-life temporality in readers' minds. But, Pratt concedes, visual style also plays a role in helping readers to understand what is going on in comics: "character design, inking, and colour choices (if applicable), serve important storytelling purposes [inasmuch as] [t]hey allow the artist to create a mood, give the emotional context of a scene or story, increase or decrease the drama of a moment, and so on" (110).

In disagreement not only with Pratt's favouring of the linguistic, but also with Chute on meaning-making, is Thierry Groensteen (*The System of Comics* 2007), who asserts that "those who recognise in the verbal an equal status, in the economy of comics, to the image, begin from the principle that writing is the vehicle of storytelling in general" (Groensteen 8). When readers flip through comics, he argues, the initial impression will be one of image rather than text. Thus, he concludes, "[t]he necessary, if not sufficient, condition required to speak of comics is that the images will be multiple and correlated in some fashion" (19). That is, readers' expectations when approaching comics will always be related to the sequentiality of the images rather than anticipation of the linguistic narrative. Furthermore, Groensteen's system is one that focuses on spatiality and topicality; it is about the relation of elements in comics, with special preference given to spatial arrangements, which remain visual, rather than linguistic, features. Therefore, according to Groensteen, the visual aspect of comics should be key in any approach pertaining to the medium.

As cultural theorist Jan Baetens notes, much academic interest in comics scholarship has come from literary scholars, resulting in a "culturally constructed opposition between comic books and graphic novels" (Baetens 112), where comics are considered low brow and "graphic novels" are upheld as high culture. Along these lines, Baetens suggests that comics critics have been rendered "color blind" because of ideological and methodological obstacles within the field (112-13). Historically, printing comics in colour has presented a number of obstacles, including economic considerations and variations in saturation as well as other aspects of printing quality in mass production. In opting for colour, artists and publishers took a risk regarding the quality of the finished product, which, Baetens explains, led to an ideological labelling of multichromatic comics as "low brow" or less serious. On the other hand, comics artists with "artistic ambition" often chose

the cheaper and safer option of monochrome in order to have their printed works be as true to the original as possible (Baetens 113). Opting for the safety and lower cost, monochromatic comics became a trend that is still ongoing. Alison Bechdel's *Fun Home* (2006), Art Spiegelman's *Maus* (1980), and Will Eisner's *A Contract with God and Other Tenement Stories* (1978) – all of which are monochromatic “graphic novels” – have been considered as more serious both in terms of content and academic relevance than the “typical” comic book, and, as such, have contributed to a trend of works being produced in monochrome achieving a sense of artistic relevance. Methodologically, Baetens argues, comics scholars face a different challenge in the study of colour that has little to do with the creation of comics and more to do with the creation of a field of scholarship. Because the field is still relatively new and most of its scholars are trained in different disciplines, there is little previous “‘medium-specific’ theory” to rely on and so the methods with which comics are approached are largely limited to whichever field the scholar is working within (Baetens 113). As comics scholarship owes so much of its theory to literary studies, where the focus is on text and narrative, Baetens concedes that it “is only normal that color was not selected as a priority item” (Baetens 113).

Using the example of the Tintin comics, Baetens makes a corrective suggestion, namely that “[c]olor must help the reader[s] better understand a fictional world whose coherence and continuity can never be taken for granted in a medium whose basic publishing structure is the instalment unit” (117). As readers often have to wait between each issue of Tintin, they need an easy way to recognise recurring characters and settings, particularly as each instalment is the start of a new narrative arch unlike in the serialised novels that were popular in the nineteenth century. Figures are often represented in the same colour scheme (they may wear the same clothes or have a distinctive hair colour), so that when the colours appear without a clear figure, they still connote that character or object. In this way, colour aids readers in following the story even when colour is used as a shorthand for the character or object it is most frequently associated with. Thus, as the panels progress, “a light blue spot ‘means’ Tintin, a dark blue spot ‘means’ Haddock” and so on (Baetens 117). This idea of colour as a contributing factor in the interpretation of comics aligns with communications scholar Randy Duncan’s (“Toward a Theory of Comic Book Communication” 2000) assertion that “[s]ince everything in comics, including character, is reduced to surface[,] the use of stereotypes, a recognizable generalization of a type, is prevalent” (5). Despite Duncan’s assertion, it is important to note that not all comics rely on stereotypes nor is it the only medium to use stereotypes in this way. However, when stereotypes are used in the way Duncan suggests, they can be likened to caricature.

Psychological research from Robert Mauro and Michael Kubovy ("Caricature and Face Recognition" 1992) suggests that reducing features to their stereotypical form makes caricatured faces more recognisable; they state "[t]he exaggeration [...] in a caricature may enhance recognition because it emphasizes the features of the face that are encoded [in memory]" (433). Caricatures reduce faces to their most prominent features, which are so encoded in viewers' memory that they are still recognisable.

Caricatures reduce faces down to their most prominent features to be easily recognisable. To establish characteristics such as race, gender, or class, comics artists often rely on a visual shorthand that their audience will recognise, which includes generalisations based on "physique, hair, posture, clothing, and other artefacts, and especially facial features" (Duncan 5). Keeping Baetens in mind, we suggest that colour should be added to this list as it is a point of reduction (especially that of skin tone, and eye- and hair colour) for racial stereotypes.

Baetens is not the only scholar to have noted the difficulties discipline-specificity poses for comics studies. In "Visual Language Theory and the Scientific Study of Comics" (2018), Neil Cohn states that "comics are drawn in a visual language (often in combination with a written language)" that utilises the three primary components of any language, "meaning, modality, and grammar" (305). He explains that, like any other medium that uses any kind of language, comics do so in various ways and play with conventions depending on their "sociocultural ideas, including their cultural context, genres, and possibly the different visual languages they use" (Cohn, "Visual" 306). Though these categories are broad and highly generalized, Cohn holds that this is what divides comics scholars: those from the humanities tend to focus on the sociocultural context while those from the cognitive sciences pay more attention to the workings of visual language and interaction between visual and written language ("Visual" 306). In the cognitive sciences, theoretical modelling, corpus studies, and experimentation all constitute different angles from which visual languages can be explored, but, Cohn warns, "certain pitfalls face research confined to one methodology alone" (Cohn, "Visual" 306). He suggests that theory may benefit from support in the form of quantitative experimentation. On the other hand, he notes, "both experimentation and corpus studies in the absence of theory may produce ad hoc analyses of fairly superficial constructs," and having the means for empirical testing "does not guarantee insight without a theoretical framework to guide what is being tested" (Cohn, "Visual" 306). He therefore argues that a well-rounded approach to investigating visual languages requires a combination of methodologies.



Since many of the works discussed above have been linked primarily to theoretical approaches in comics scholarship, we will briefly demonstrate in this paragraph how experimentation – specifically, eye-tracking and the results it has yielded – has been implemented in comics research and the study of colour, respectively. In a study intended to highlight artistic intention in comics, Jain et al. (“Inferring Artistic Intention in Comic Art through Viewer Gaze” 2012), paradoxically, used an eye-tracker to track their participants’ eye movements on selected pages from the comics *Watchmen* and *Ironman: Extremis*, photographs from an online database of photo essays, pictures taken at a given interval by a robot moving through a campus, and randomly selected amateur snapshots (3). From measuring the variation between fixation points – viewing points given special attention by the eye as it glides over the image – the group concluded that the movement patterns for comics were more consistent than for the other categories, and therefore that “artistic intent is encoded in the eye movements of viewers looking at comic art, and that it can be inferred from the recorded gaze data” (6). That is, they argue, the way the elements of comics work together guides the eye more successfully than the various types of photographs used in this experiment because they were deliberately put there by the comics artist. While the connection to artistic intent is unconvincing in our eyes, this experiment is noteworthy because it is one of few to employ an eye-tracker in attempting to explore the medium of comics in overt distinction to other images. However, it may be worth calling into question the objects for comparison in such an experiment, as it seems intuitive that images deliberately ordered in sequence would be more effective in leading the viewer’s eyes across a comic page than would be the case for a single image that is not staged to convey a sequence of any kind. Another eye-tracking experiment carried out by Holmqvist et al. (“Reading or Scanning? A Study of Newspaper and Net Paper Reading” 2003) found that the presence of colour in newspapers and net papers increased the number of fixations (659), points where the eye pauses or focuses, and that “readers devote more time to photo groupings when they are in colour” (660). This suggests a difference in the ways people view images and layouts in colour and greyscale for other mediums that we argue could be explored further in comics.

As we aimed to demonstrate above, the attitudes to the use of colour vary in comics studies. The attention of scholars within the field ranges from discussions of the individual constituents of comics – both in terms of text and image, but also in terms of the iconic, layout, and the importance of colour – to analyses of narrative and mental processes. There is no single way of looking at and working with comics as a medium. While scholars have studied comics through either purely

theoretical methods or quantitative ones, we chose to combine the two approaches. We are working towards such an approach by combining experimentation rooted in linguistics with a qualitative analysis based on a questionnaire of readers' responses to the suggestion of narrative events in a single page of *American Born Chinese*. Our assumption is that the neglected aspect of colour, which is often only touched on by comics scholars, will have an effect on readers' interpretation of comics, and that this effect will be quantifiable with the help of an eye-tracker.

### **Methodology**

The experimental part of this study was designed to determine if colour impacts readers' ability to interpret a comic's preferred meaning, which in this case is the interpretation of an action taken out of context of the rest of the story. The experiment provides two main data sets: the eye-tracker data of comics readings and information provided by the participants after their viewings in the form of a questionnaire. A relatively small cohort of 31 participants was used to gather this data; they were a mixed gender group who ranged from age 18 to 25 and were all first-year students of the Bachelor's programme Literature and Society: English at Vrije Universiteit Amsterdam. Each participant was asked to read a single page of Gene Luen Yang's *American Born Chinese* whilst being monitored by an eye-tracker and EyeLink Data Viewer software. Half the cohort was presented with the original page from the comic (Figure I) and the other half was presented with a greyscale version of the same page (Figure II).

This page was selected to determine whether the presence of colour impacts the way readers perceive and interpret the panel. Using a single page of the comic decontextualises the panel from the narrative and requires the readers to assess what is happening based only on this panel. The eye-tracker data indicates the path the readers' eyes followed, what they fixated on, and the amount of time they spent on various elements of the spread. The sections of most interest to this study are: (1) the face of the boy as he transforms from "Chinese" to "American" (Figure III), (2) the Chinese characters in the upper right quadrant of the panel (Figure IV), (3) the text balloon (Figure V), and (4) the face of the Chinese woman in the upper left quadrant of the panel (Figure VI). The combination of these interest areas was chosen to determine if colour impacts perception of the panel and/or overall meaning-making.

After the reading was completed, participants answered a questionnaire which covered: (1) their basic personal information, such as native language and experience with English (six participants were native English speakers and all spoke

English with at least a C1 level proficiency), (2) their experience with comics in general (all but two of the cohort had experience reading comics prior to testing) and this comic in particular (only one participant had previously read *American Born Chinese*), and (3) their comprehension of the comic, which was tested with prompts for self-evaluation as well as more targeted questions asking about specific aspects of the spread, with emphasis on the four interest areas mentioned above.

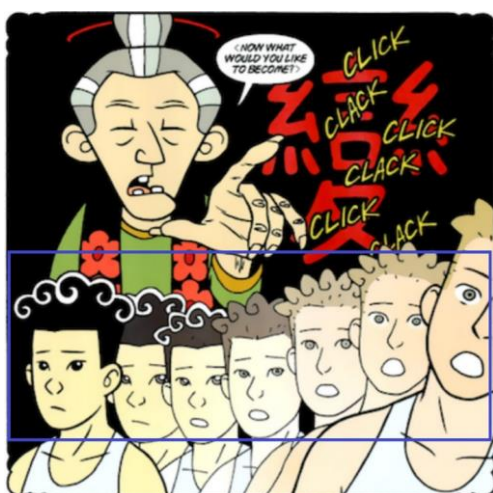


Figure III: The Faces within the Transition



Figure IV: Background Chinese Characters

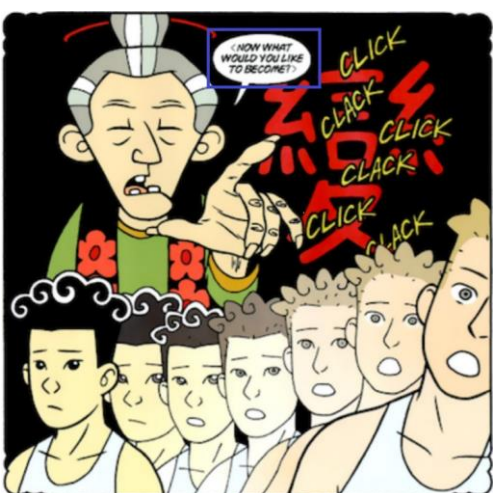


Figure V: Text Balloon



Figure VI: Chinese Woman's Face

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## Results

### Results of the eye-tracker experiment

The EyeLink Data Viewer software collects a plethora of different types of data; for this study, we have decided to focus on (1) the number of fixations for each reading and (2) the duration, or dwell time, of each reading. To allow for effective statistical analysis on the data, outliers were removed, leaving us with a total of 28 participants (15 in the colour group and 13 in the greyscale group). The data was then tested for normality (Appendix A) and the homogeneity of variance (Appendix B). Next, a t-test for equality of means was used to determine if there was any difference in the number of fixations or dwell time for both the entire reading (Appendix C) and for each individual interest area (Appendix D).

It appears that colour does not impact the number of fixations or the dwell time for the text balloon (Figure V), as the t-test indicates no significant difference between the colour group and the greyscale group. Similarly, there is no significant difference between the two groups for the area containing the Chinese woman's face (Figure VI) nor for the area containing the red Chinese characters (Figure IV). The only interest area to yield a difference between the colour and greyscale groups is the transition of faces from "Chinese" to "American" (Figure III). For this area, both the number of fixations and total dwell time were higher for the group that read the page in colour. As expected with this difference, the number of fixations and dwell time were higher for the full panel as well. In the full panel, the mean number of fixations per participant for the colour group is about 26 whilst the mean for the greyscale group is about 21 and, on average, the colour group spent about 750 milliseconds (approximately 2%) longer reading the whole panel than the greyscale group.

### Results of the questionnaire

Out of the 31 participants in total, 16 read the colour version and 15 read the greyscale version. According to the interest area-focused questionnaire that they completed after reading, all participants felt that they understood the text balloon. Only 4 participants altogether noticed the Chinese characters, 2 from the colour group and 2 from the greyscale group. When asked if they could remember the gender of the Chinese person in the upper left quadrant, 8 members of the colour group and 4 members of the greyscale group identified her as female. 6 members of the colour group recognised the transition of the boy from "Chinese" to "American" whilst none of the greyscale group did. However, it should be noted that 2 members of the greyscale group did notice some form of transition; one

thought it was a single person transitioning from one gender to another, the other thought it was a line of people ordered by ethnicity. Of these interest areas, only the transition seems to suggest that colour has any impact on meaning-making.

### Conclusion

For the most part, our results from the eye-tracker do not indicate that colour impacts the way in which people read comics, as there was little significant difference between the two groups. However, the results for the transition do suggest that the colour may account for a slight variation in the time and focus people dedicate to certain images in comics. In contrast, the questionnaire has proven more fruitful. As the transition was only understood by those reading the panel in colour, it suggests that, though colour does not significantly impact how readers' eyes move over the page, it may impact how they make meaning.

### **Discussion**

In our literature review, we discussed what seemed to be implicated by Chute's distinction between looking as connected to images and reading as connected to text: that images are instantaneously interpreted whereas text needs thorough reading. Our experiment involving *American Born Chinese* suggests that this notion is untrue. Both text and image on the page point towards a transformation, with the speech balloon reading "Now what would you like to become?" and the bottom part of the page showing the transformation from "Chinese" into "American." Everywhere else in *American Born Chinese*, images in sequence are delimited by a clear, white grid, so the absence of similar white lines between events on this page makes everything look like one image, which according to Chute should be instantly interpretable.

The eye-tracking data showed no significant difference in how the two test groups approached the speech balloon: everyone looked at it before moving to the transformation below, and the dwell time and number of fixations were too similar to indicate a difference. However, the participants who were able to successfully decode the transformation all belonged to the colour group. This could indicate that colour was the deciding factor in enabling them to interpret the action in the page without the aid of the context of the story.

Duncan's assertion that comics involve a high degree of stereotyping could help to explain why only participants in the colour group seemed to fully recognise the transformation. Perhaps, as we suggested earlier, colour should be added to Duncan's list of visual cues that help this stereotyping, in addition to "physique, hair, posture, clothing, and other artefacts, and especially facial features" (5). In

*American Born Chinese*, the racial stereotyping is highly colour-coded. As aforementioned, the “Chinese” boy is connoted by black hair, black eyes, and yellow skin, whereas the “American” boy is characterised by pale hair and eyes, and more pink-toned skin. In particular, the difference in skin tone as well as the slight transparency of the transition images of the boy – between the “Chinese” version of the boy and the “American” version – are much subtler in the greyscale version than in the colour version, which may explain why one of the greyscale participants thought it was a line of people organised by ethnicity. If the lack of colour is the primary reason why the greyscale group did not interpret the bottom of the page as a transformation, perhaps the absence of colour interrupted the stereotyping that the page was relying on in order for the meaning to be conveyed successfully. As such, colour would be a significant contributor to meaning-making in this instance.

If anything, our findings regarding colour in comics demonstrate the difficulty of developing theories that apply to an entire medium – there will almost always be exceptions. In *Understanding Comics* – more specifically in the chapter “A Word about Color” – McCloud claims that the use of flat colour, the type of colouring used in *American Born Chinese*, makes readers “more aware of the physical form of objects than in black and white” (189) by drawing attention to the individual objects rather than to the overall action. If this were to hold true for our experiment, the results should have shown that the greyscale group, who were supposed to have a better overview of the action in the panel rather than the details, interpreted the transformation as it was intended. However, our results suggest that rather than distracting from the depicted action, colour helped the participants to make meaning in this case. McCloud’s theory, therefore, directly counters our experimental findings. We are taking this as an indication that, at the very least, experimentation and theory could and should benefit from entering into dialogue with one another, as such a dialogue may be beneficial in terms of corrective and nuanced outcomes.

In light of Cohn’s (“Navigating Comics: An Empirical and Theoretical Approach to Strategies of Reading Comic Page Layouts” 2013) observation that comics readers prefer the “directional ordering for depiction of temporal relationships” that corresponds to their reading orientation (in this case, left to right) (2), we are surprised to find that the majority of the participants in this experiment did not understand the transformation at the bottom of the page, which occurs from left to right. The interruption of stereotyping in the greyscale version we suggested above is one potential reason, but it does not account for those participants in the colour group who also did not perceive a transformation.

Perhaps it is a question of simply not interpreting it as an action but as a static image since the regular grid-pattern is also broken and the action is presented in what appears to be a single panel. Cohn has established that “the omission of motion lines reduces the comprehensibility of depicted actions” (“Visual” 308), so we might also speculate as to whether the answer lies partly in the absence of the traditional shorthand, motion lines, that signify movement or action in comics, and could have been used to indicate that the image depicts one person going through a transformation rather than, for example, several people of varying ethnicities standing in a line. In this case, colour differences may to some extent have been sufficient to stand in for motion lines, thus aiding the colour group’s participants in their attempts to make meaning of the page (almost 40% of the colour group recognised the transition from “Chinese” to “American” whereas none of the greyscale group did). The greyscale group’s difficulty in interpreting the transition despite its directional ordering shows that the process of interpreting action in comics is neither instantaneous, as suggested by Chute and discussed above, nor fully dependent on reading direction.

There are many ways the experimental part of this study could be improved, the first of which is by expanding the sample group itself. Our group was small and comprised of first-year Bachelor students of Literature and Society: English at Vrije Universiteit Amsterdam. Increasing the sample size would allow for a more reliable statistical analysis of the eye-tracker results. Literature students may be preconditioned to approach comics in a particular way, so a group from a range of disciplines may be useful in minimising this bias. It may also be prudent to use a cohort who are all familiar with comics and are used to reading them; using participants familiar with the medium may help to ensure that any verbal or visual metaphors are interpreted as closely to the preferred meaning as possible.

Another way to improve this experiment could be to use more pages from the comic. Though we find this page to be representative of the comic, Groensteen writes that “the comics panel is fragmentary and caught in a system of proliferation; it never makes up the totality of the utterance but can and must be understood as a component in a larger apparatus” (5). Similarly, Cohn recognises that “a sequence’s meaning – and the content that cues it – gets easier to access as one progresses from image to image in a coherent narrative” (“Visual” 314). By isolating a single panel, we may have disrupted the readers’ ability to understand what is happening. It may be more prudent to perform this experiment with a short, self-contained comic, such as a strip comic, to avoid this issue in the future.

It may also be interesting to include a comic that uses colour to convey different perspectives within the comic, such as Paul Hornschemeier’s *Mother*,

*Come Home* (2003). Different styles, cemented with recurring colour palettes, are used to convey who is narrating and whether the sequence is happening in real life or as part of a dream. It would be interesting to see how a greyscale version of *Mother, Come Home* may impact the interpretation of the comic.

When using an eye-tracker, it is important to bear in mind that reading comics is not the same as reading plain text. Comics' readers tend to scan an image as a whole, which means that fixations are not wholly indicative of the reading. Though we have not been able to determine any significant change between the number of fixations for the colour group versus the greyscale group, there may be a difference in the way they scan the page. This warrants further exploration.

As implied by our tentative suggestions above, we have found it difficult to draw any certain conclusions from our approach. Despite our enthusiasm in searching for an interdisciplinary way of addressing colour and meaning-making in comics, we have found it difficult to relate the numerical eye-tracking data to this question and are relying heavily on our interpretation of the participants' subjective questionnaire responses. As we have demonstrated, comics lend themselves to a multitude of approaches that are far from mutually exclusive; rather, the different toolkits stemming from various disciplines have the potential to add depth and complexity to insights in comics studies. But, we concede, combining comics theory and experimentation in a way that yields concrete results in terms of meaning-making and interpretation is difficult and therefore calls for further research.

## Works Cited

- Baetens, Jan. "From Black & White to Color and Back: What Does It Mean (Not) to Use Color?" *College Literature*, vol. 38, no. 3, 2011, pp. 111-28.
- Carroll, Noël. "Narrative Closure." *Philosophical Studies: An International Journal for Philosophy in the Analytic Tradition*, vol. 135, no. 1, 2007, pp. 1-15.
- Chute, Hillary. "Comics as Literature? Reading Graphic Narrative." *PMLA*, vol. 123, no. 2, 2008, pp. 452-65. *Jstor*, [www.jstor.org/stable/25501865](http://www.jstor.org/stable/25501865).
- Cohn, Neil. "Navigating Comics: An Empirical and Theoretical Approach to Strategies of Reading Comic Page Layouts." *Frontiers in Psychology*, vol. 4, 2013, pp. 1-15. Doi: 10.3389/fpsyg.2013.00186.
- . "Visual Language Theory and the Scientific Study of Comics." *Empirical Comics Research: Digital, Multimodal, and Cognitive Methods*. Routledge, 2018, pp. 305-28. *Visual Language Lab*, [www.visuallanguagelab.com/P/2018.ESiC.NC.pdf](http://www.visuallanguagelab.com/P/2018.ESiC.NC.pdf).



- Duncan, Randy. "Toward a Theory of Comic Book Communication." *Academic Forum* 1999-00, no. 17, 2000. Henderson State University. [www.hsu.edu/academicforum/1999-2000/1999-00AFToward%20a%20Theory%20of%20Comic%20Book%20Communication.pdf](http://www.hsu.edu/academicforum/1999-2000/1999-00AFToward%20a%20Theory%20of%20Comic%20Book%20Communication.pdf).
- Groensteen, Thierry. *The System of Comics*. Translated by Bart Beaty and Nick Nguyen, University Press of Mississippi, 2007.
- Holmqvist, et al. "Reading or Scanning? A Study of Newspaper and Net Paper Reading." *The Mind's Eye: Cognitive and Applied Aspects of Eye Movement Research*. Elsevier, 2003, pp. 657-70. *ScienceDirect*, doi: 10.1016/B978-044451020-4/50035-9.
- Jain, Eakta, et al. "Inferring Artistic Intention in Comic Art through Viewer Gaze." *ACM Symposium on Applied Perception (SAP)*, 2012. *Jstor*, [graphics.cs.cmu.edu/projects/comics/ejain\\_sap2012.pdf](http://graphics.cs.cmu.edu/projects/comics/ejain_sap2012.pdf).
- Yang, Gene Luen. *American Born Chinese*. Macmillan, 2006.
- Mauro, Robert, and Michael Kubovy. "Caricature and Face Recognition." *Memory & Cognition*, vol. 20, no. 4, 1992, pp. 433-40.
- McCloud, Scott. *Understanding Comics: The Invisible Art*. Harper Perennial, 1994.
- Pratt, Henry. "Narrative in Comics." *The Journal of Aesthetics and Art Criticism*, vol. 67, no. 1, 2009, pp. 107-17. *Jstor*, [www.jstor.org/stable/40206394](http://www.jstor.org/stable/40206394).

## Appendices

### Appendix A

Table indicating trial data for fixation count (fix) and the dwell time in milliseconds (dur).

	<b>Version</b>	<b>No Participants</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Std. Error Mean</b>
<b>Fix</b>	Colour	15	25.9333	6.89168	1.77942
	Greyscale	13	20.5385	4.94327	1.37102
<b>Dur</b>	Colour	15	6348.267	1674.85797	432.44647
	Greyscale	13	5601.385	1238.42726	343.47792

## Appendix B

Tables of test for normality for the fixation count (fix) and the dwell time (dur) for the whole trial and for individual interest areas.

	Version	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
<b>fix</b>	Colour	0.162	15	.200*	0.936	15	0.335
	Greyscale	0.149	13	.200*	0.962	13	0.777
<b>dur</b>	Colour	0.136	15	.200*	0.973	15	0.899
	Greyscale	0.171	13	.200*	0.905	13	0.157

Interest Area		Version	Kolmogorov-Smirnova			Shapiro-Wilk		
			Statistic	df	Sig.	Statistic	df	Sig.
<b>Chinese Characters</b>	fix	Colour	0.218	15	0.052	0.904	15	0.108
		Greyscale	0.151	13	0.200*	0.924	13	0.287
	dur	Colour	0.204	15	0.094	0.928	15	0.259
		Greyscale	0.125	13	0.200*	0.938	13	0.435
<b>Faces</b>	fix	Colour	0.158	15	0.200*	0.957	15	0.638
		Greyscale	0.168	13	0.200*	0.953	13	0.646
	dur	Colour	0.136	15	0.200*	0.948	15	0.49
		Greyscale	0.125	13	0.200*	0.984	13	0.994

\*This is a lower bound of the true significance

### Appendix C

Tables to indicate the homogeneity of variance for both fixation count (fix) and dwell time (dur) for both the whole trial and for individual interest areas.

		<b>Levene Statistic</b>	<b>df1</b>	<b>df2</b>	<b>Sig.</b>
<b>fix</b>	Based on Mean	1.6690	1	26	0.208
	Based on Median	1.1150	1	26	0.301
	Based on Median and with adjusted df	1.1150	1	23.213	0.302
	Based on trimmed mean	1.5180	1	26	0.229
<b>dur</b>	Based on Mean	0.297	1	26	0.591
	Based on Median	0.282	1	26	0.6
	Based on Median and with adjusted df	0.282	1	20.2530	0.601
	Based on trimmed mean	0.297	1	26	0.59

<b>Interest Areas</b>			<b>Levene Statistic</b>	<b>df1</b>	<b>df2</b>	<b>Sig.</b>
<b>Chinese Characters</b>	fix	Based on Mean	4.126	1	26	0.053
		Based on Median	2.139	1	26	0.156
		Based on Median and with adjusted df	2.139	1	24.2	0.156

		Based on trimmed mean	3.964	1	26	0.057
	dur	Based on Mean	1.136	1	26	0.296
		Based on Median	0.907	1	26	0.35
		Based on Median and with adjusted df	0.907	1	25.894	0.35
		Based on trimmed mean	1.178	1	26	0.288
<b>Faces</b>	fix	Based on Mean	3.714	1	26	0.065
		Based on Median	3.2	1	26	0.085
		Based on Median and with adjusted df	3.2	1	20.185	0.089
		Based on trimmed mean	3.69	1	26	0.066
	dur	Based on Mean	4.336	1	26	0.047
		Based on Median	4.177	1	26	0.051
		Based on Median and with adjusted df	4.177	1	24.706	0.052
		Based on trimmed mean	4.441	1	26	0.045

Appendix D

Table showing t-test for equality of means for both the fixation count (fix) and dwell time (dur) for the interest areas.

<b>Interest Areas</b>					
			Sig. (2-tailed)	Mean Difference	Std. Error Difference
<b>Chinese Characters</b>	fix	Equal variances assumed	0.68	0.44103	1.05752
		Equal variances not assumed	0.674	0.44103	1.03492
	dur	Equal variances assumed	0.982	5.88205	261.02798
		Equal variances not assumed	0.982	5.88205	257.59833
<b>Faces</b>	fix	Equal variances assumed	0.023	2.90769	1.20374
		Equal variances not assumed	0.02	2.90769	1.15744
	dur	Equal variances assumed	0.038	568.6	260.14779
		Equal variances not assumed	0.033	568.6	251.65168