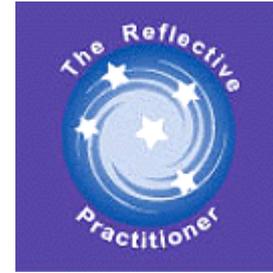


Written text into visual text: An investigation into novice design students' approaches to text interpretation



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Illustration can be described as the clarification of information into a pictorial form. Its most significant generative source is the written word. Thus we see a crossover of domains, from the verbal to the visual. What takes place when written text is interpreted into a visual form? What perspectives do design students have on this? What is their understanding? From an educator's perspective, can changes to the delivery of a design problem given to a group of novice students affect the quality of outcome? Specifically, can extra emphasis on text comprehension strategies and the formal inclusion of analogical reasoning enhance student's design processes and lead to better design solutions? These questions were the basis for a pilot study carried out into the approaches tertiary students took towards the interpretation of written text into illustrations.

Introduction

In illustration, the ability of the designer to see what is important within a piece of written text is crucial to good visual interpretation. Students who pick up on unimportant aspects of a text may well choose them as the focus of an illustration and therefore fail to capture the 'essence' of the writer's words. A good illustration combines the linear narrative structure of the written text with the more immediate visual stimulus of the image, which is not read in a linear manner but in a more holistic fashion. Images themselves when properly designed have hierarchies, with more important visual information appearing before forms of lesser importance. Readers can of course choose to look at a picture in any order they wish, but if the illustrator is conveying a message then they will have designed it to be read in a particular way. Meaning is not actually instantaneous, it takes a few moments for the various visual elements to be read, but it is much more rapidly understood than the meaning inherent in a passage of text.

One of the issues for novice students to overcome in text interpretation is that of being able to discriminate between information of greater or lesser importance. Without being able to accurately comprehend a written text, a student's visual concept can actually amplify a relatively insignificant aspect of it, suggesting a significance which does not reflect a writer's intention. This aspect of novice student approach to designing is less apparent in the more experienced student who has developed greater expertise in interpretation. Nevertheless, it is hoped that this research will ultimately assist novice students to develop expertise earlier.

Helping design students gain expertise is one of the main functions of design education. As Nigel Cross points out "We still need a much better understanding of what constitutes expertise in design, and how we might assist novice students to gain that expertise". (Cross, 2001, p98) Goldschmidt (2001) puts forward the view that design, because of its 'ill-structured' nature is well suited to the application of visual analogy to allow a problem to be analysed from a different perspective. Schön, as early as 1963 was pointing out that concepts can be transferred from one situation to the next. Gentner and Medina (1998) have put forward compelling evidence that similarity-based reasoning is an effective way to look at and solve numerous types of problems. (Cited in Goldschmidt, 2001) The

cognitive mechanism, according to Goldschmidt, 'responsible' for visual analogy is mental visual imagery. As with sketching, analogies allow for clues and unexpected consequences, which might not otherwise be found. Design problems are often described as 'ill structured' in that multiple solutions to a given problem can be found. This compares to the more systematic 'well structured' problem common in science. We are endowed with two cognitive systems of reasoning. One system is associative and similarity based, while the other is symbolic and rule based. They are both independent but interact with each other. (Goldschmidt, 2001, Gentner and Medina, 1998) Text comprehension fits with the rule based system, while analogy sits well with the similarity based system.

Marton and Saljo's seminal work (1976) on student approaches to learning demonstrated that in a task such as reading a written text and articulating an understanding of it, students would approach the task in what is now commonly referred to as either 'surface' or 'deep'. What students thought was required of them would play a role in how they went about the task. Comprehension itself was not the focus of this well known study. Svensson (1977) describes different levels of textual understanding as either 'atomistic' ie where students focus on the parts of the text, or 'holistic' which relates to students who engage in understanding the overall meaning of a text. Van Dijk and Kirsch (1983) developed one of the most influential theories on reading comprehension. Their theory describes the whole reading process, from recognising individual words all the way through to representing the meaning of a whole text. According to their model, the process of comprehension has three phases: a verbatim representation, a semantic representation, and a situational representation.

Maria (1990) provides a constructivist interpretation of how meaning is derived from words. Comprehension is a holistic process where the reader brings (1.) word recognition ability, world knowledge and knowledge of linguistic conventions; (2.) their interpretation of the language used by the writer in constructing the text and (3.) the situation where the text is read. Metacognition, when applied to a reading task requires the ability to distinguish important ideas from unimportant ones. (Nits and Mealey, 1991) Schema theory espouses the view that all new experience is understood through the use of categorical rules or scripts to interpret a new situation. We use these schemas to not only interpret but also predict what may be about to happen. Schemas are unique to individuals and based on life experience. They are also context specific. This explains in part why novices perform less well than experts who have had more exposure and experience of a subject. As a consequence, experts have more developed schemas in a particular domain and are therefore more able to accurately predict and interpret information.

The investigation/methodology

The investigation was a controlled situated study. It took place in the illustration studio, an environment familiar to students. The design brief was similar to briefs normally given to students and much of the design activity requested was comparable to what students would do in a normal learning environment. (Craig, 2001) There were a number of interventions and parameters. Massey University's stringent ethics procedures were adhered to and formally approved by the ethics committee. As the researcher also taught the students, potential participants were approached by the main doctoral supervisor and it was made clear that all future student work would be moderated by another staff person. It was also explained to students that the researcher's role in the investigation was completely separate from his role as lecturer. The research itself was not to be seen as connected to the course work carried out during normal teaching time. Potential participants were informed that their identities would be kept confidential, but that comments made during a recorded interview and design work completed during the task would be documented and made available in research output material. Students were also told that all

material gathered would be stored in locked premises and destroyed once the doctorate was completed. It was also made clear that students who did not wish to take part, would, in no way be disadvantaged as the research had no bearing on taught coursework. Any benefit to participants was to be seen in how they had assisted new research into text interpretation take place.

Twelve students out of a possible pool of twenty five volunteered to take part and they were split into two groups of six. All participants were second year students and their placing was determined by previously assessed grades in design papers. As the second year of a four year degree is officially the first year of specialisation, students are categorised as 'novices'. Gender was mixed and both groups were evenly matched in age and expertise. The task itself required all students to interpret a text extract. Group 1 were asked to interpret the text into a visual image which conveyed the writer's message. Group 2 were also given that task but in addition they had to create a visual analogy and read some information on reading comprehension. These two specific changes; additional text information and application of analogy, allowed for comparisons to be made between the groups. The task itself lasted only thirty minutes. The visual work required from both groups was initial exploratory sketches, commonly referred to as thumbnails. Normally a project would spread over a matter of weeks, but this study sought to look at the early phase of ideation.

A previous study by Atman and Bursic in 1996 examined the effect an introduced text had on a group of engineering students. The intervention did not significantly affect the quality of the design solutions but it was noted that the group of students explored more alternative solutions and went through more design transitions than a second group not supplied with additional explanatory text. (described in Atman and Turns, 2001) No further design studies have been recognised which furthered this line of inquiry.

A university lecturer of English and Media studies was given the role of 'expert' and she was asked to interpret the text. The text chosen is a two paragraph excerpt from an essay written by Sir Arthur Conan Doyle (1907). Titled *Through the Magic Door*, it is an example of expository text. Most of what we read is expository. It is to be found in essays, speeches, instructions, journals, documents, newspapers and magazine articles. According to Williams (2000) it is more difficult to comprehend than narrative (fictional) text as the structures of expository text are varied. Heller (1995) lists seven distinct expository structures; definition, description, process, classification, comparison, analysis and persuasion. The sample text by Doyle is 'persuasive'. Persuasive text is characterised as being about compelling the reader to accept and view a topic from the same viewpoint as the author. (Heller, 1995) The expert described Doyle's argument as being about "the tremendous resource that is available to the human mind in the shape of books, which we seldom utilise. He sees books as having an almost fantastical power with the reader: they can soothe, transport, provide company and sympathy, promote thought and imagination". The expert separated out each paragraph, describing paragraph one as focusing on books transporting us "out of the everyday world, with the author's like magical spirit guides". The second paragraph suggests our appreciation is dull because "we're just too familiar with books - if we really appreciated them, we'd be so enthralled that our engagement with day to day life would come under threat". In summing up the text, the expert said books provide us with a "thrilling magic escape from dull, day to day life". The analogy created by the expert was that books are analogous to flying carpets and time machines. Like magic, they can take us anywhere in time and space.

A semi-structured interview was carried out with each student shortly after the thirty-minute design task. All design work was handed in at the end of the task.

Objectives

- Determine conceptions of the learning task
- Gain insight into student's procedures for comprehension
- Determine comprehension of main ideas in text
- Determine student conceptions as to what expertise is required in text interpretation
- Determine what effect the introduction of additional information had (group 2 only)
- Determine what effect the formal application of analogy had to idea generation (group 2 only)

Conceptions of the learning task

Q. What did the brief require?

Group 1	Student 1	Just to illustrate a piece of text, conceptually maybe. Just getting an idea from it, illustrating an idea.
	Student 2	I think it was trying to show what the, what the author was trying to say.
	Student 3	Sketches to show what was in the text.
	Student 4	It wanted me to describe what the writer meant through the text but using image.
	Student 5	Sort of look at the pattern, to me it felt like it didn't really look at what I was, the ideas I came up with but how I came up with it.
	Student 6	I gave that it was just to create some kind of interesting visual image, like to go with what the writer, the author was trying to get across.
Group 2	Student 7	The purpose of the brief was to create an analogy from reading a piece of text that we were given... follow the procedure and come out at the end of it with an illustration, a conceptual illustration for the text.
	Student 8	To create an analogy regarding the author's opinion on reading books.
	Student 9	As far as I could see it was to create an illustration for maybe a magazine... I think it was to bring the main idea of the text across.
	Student 10	To read a piece of text and creatively interpret it I guess.
	Student 11	It wanted me to analyse a text and define my own comprehension of it down to basically the essence of it...and then to interpret it into an analogy and create the best way to describe the text in visual form.
	Student 12	To read through the given text and illustrate my take on it and from there create an analogy and pulling those two ideas together to create a visual to represent it.

Procedures for comprehension

When asked about their reading strategy, the students in group 1 gave similar answers. Only student number 4 made any mention of two different paragraphs. As to how they went about understanding the text, they all said that they just kept reading it again. None of them mentioned any particular approach, the significance of the different paragraphs or the title. Group 2 approached the comprehension process quite differently. Only one participant (student 9) failed to mention the

significance of the title or the differences between paragraphs. Students in this group spent more time going over the text and making notes than group 1 who noticeably started sketching sooner.

Comprehension of main ideas in text

Q. Sum up the writer's message and perspective in one or two sentences.

Group 1	Student 1	I guess, maybe books are like a key to the portal to escaping reality.
	Student 2	Books are great, books are great because there's such a big resource of them and they're a great tool for escaping.
	Student 3	I tried to define it as the richness in books in terms of knowledge and how that was enlightenment.
	Student 4	Maybe that you can find another world in a book.
	Student 5	I think that the writer was trying to say that your mind can explore in any direction it wants to.
	Student 6	I don't know, I'm still a little confused by this passage.
Group 2	Student 7	Escape into books to get away from the monotony of life.
	Student 8	Reading books can be, or is an escape from reality or monotony.
	Student 9	Books are a container holding someone else's world which we can jump into.
	Student 10	This text was about how humans as a race avoid difficult problems in life by creating forms of escapism through our fantasies that can often be enjoyable. We become ignorant and selfish at times.
	Student 11	Familiarity has blinded us to the full and magical power that is within books. They hold within them worlds of all types to escape to, far better than our own. Each book is a door into the minds of great people long gone. They are so powerful that we could lose ourselves in them, but it is a risk we should take for it is far better than the world we live in.
	Student 12	We take for granted the escape that books provide us from the real world.

The expert summed the text up by saying "The author argues that books provide a thrilling, magic escape from dull day-to day life". Escape is the key term in the passage. Two students from group 1 mention it specifically, while five from group 2 use the word in their summary. The one student from group 2 who didn't refer to escape demonstrated an unresolved conception of the design task and in the interview said that he had disregarded the information of 'how to read text', saying "I went about it my way".

Student conceptions of expertise

Both groups performed equally poorly. When asked about what skills are necessary to interpret text into an illustration, students were not at all sure. A number of them mentioned life experience and understanding the text, but none of them was able to define expertise. Some were very unclear "Interpreting text, I don't know, I'm not so sure". This was a surprising outcome, a universal lack of understanding of the interpretation process. This is perhaps due to the fact that design student's don't normally get asked about their thought processes. Friedman's call for design education is "to

bring tacit knowledge into articulate focus. This creates the ground of shared understanding that builds the field". (Friedman, 2000, p42) The investigation into comprehension strategies and the use of analogy demonstrated that tacit knowledge and implicit learning did take place but students were unable to articulate how it took place. Perhaps design 'thinking' should be encouraged more in design students to facilitate metacognition.

Goel describes successful designing as the application of two types of knowledge, "explicit, articulate, domain-specific knowledge, and inarticulate, domain independent, procedural knowledge". (Goel, 2001, p221). Goel also refers to these two types of knowledge as Type 1 and Type 2. Type 1, declarative knowledge is technical in nature and can be easily articulated, 'the picture is too dark, the figures need more colour'. Type 2, procedural knowledge deals with the processes of designing and is not easily measured or articulated. This partly explains why students find it difficult to explain their design processes. Type 2 knowledge cannot be taught or learned like a formula; it is not knowledge in the conventional sense and yet, without it, designing cannot take place. It is acquired and developed in the design studio, through giving students design problems to solve. (Goel, 2001)

Effect of additional information (Group 2)

Group 2 were given out an information sheet on procedures for reading text. They were provided with the information a few hours before the actual investigation to give them time to read it. Four of the students asked if they could keep the sheet for future use as they found it helpful. The group was formally asked during their interview what effect it had on their approach to the brief. Two said that the additional information had little effect. One said "Not a lot, that's how I read anyway". The other said, "I have to say that after the initial kind of thoughts about it I went about it my way". Of the other four, one said it had made him more aware of his process, another said that he would not have read the paragraphs as separate units "which would have made it slightly more confusing because there's a slight different tone or mood in them". Another student said that it made her think about how the paragraphs were linked and made her think of the overall picture rather than the details. The text allowed another student to find direction and the ability to "define and narrow it down". It was quite clear based on observing this group during the investigation that this group held off from visually conceptualising for longer than group 1 and they wrote more on their idea sheets.

Effect of analogy (Group 2)

Q. What was your analogy?

The first student in this group created the analogy of television. As with books, we can be transported from reality via television. The next student's analogy was heroin, a drug that takes people away from reality. The third student used the analogy of physical exercise, the idea being that exercise creates a mental state that is like escape. She also mentioned the book *The Lion, Witch and the Wardrobe* as analogous to the idea of being automatically transported to another world through the wardrobe. The next student created the analogy of quicksand, linking it to the idea that reality is being like caught in quicksand and we need to escape from it. The final student interviewed created two analogies, the first was television and her second was of fancy dress costumes, the idea being that we can escape day to day reality by dressing up. Only one student was unable to create an analogy.

The effect of analogy on visual concepts

The short time span of the investigation has meant that only initial, rudimentary sketching could take place. Group 2 did incorporate their analogies into their sketches and their ideas were more novel on the whole than those of group 1. Group 2's ideas did seem to go beyond what was in the text and because analogies contain similarities to the original source, they remained in the vicinity of the text's message. One student from this group did produce what the researcher regards as the best ideas. This student used the analogy of television to describe the similar effect television has to books. One of her concepts shows a figure in a room sitting on a chair. In the background are a door and a row of books on a bookshelf. The figure holds in his hand a remote control switch and is pointing it towards the books. In another idea the student has sketched a remote control on top of a book with a bag of popcorn next to it. To use Saussure's semiotic system signified/signifier, what is being signified is escapism within books can be accessed at the press of a button. The signifier is the remote control. The first group also came up with some good concepts although none of them specifically expressed escapism. The usual time span in a project would normally allow students to develop visual hierarchies where the important forms take more precedence over the supporting imagery. On the whole, group 1's concepts seemed to pick up on aspects of the text, eg one student had a group of worlds caught between two bookends. Another student had a row of gravestone's in the shape of books to represent dead authors (see enclosed sketches).

Conclusion

This was a pilot study. It has carried out some important groundwork for a further study with an entire class of students over a full project time span of four weeks. Some aspects of the investigation were quite conclusive. None of the students were able to articulate what expertise is required to interpret words into pictures. That clearly was a mystery to students. The inclusion of a sheet of information on reading strategies did have an effect on how most of group 2 engaged with the text. Group 2 also spent more time writing notes compared to group 1. This is interesting as they were not encouraged to do so. It may be that they went through a more thorough analysis phase than the first group. Atman and Bursic (1996) noted that engineering students went through more design stages and explored more options than another group who had not been given the same information. Only two of the first group specifically mentioned escapism, while five of the second group did so. This concurred with the text 'expert's' interpretation.

Further research to be carried out will focus separately on text comprehension strategies and the role of analogy in concept creation. This pilot study combined the researcher's two areas of interest. It is therefore hard to determine whether it was better approaches to comprehension or the formal application of analogy that led to more novel ideas. It may well have been a combination of the two. It is the goal of the researcher to develop these areas of inquiry and ultimately implement them into future curriculum planning to assist students in developing design expertise. Creativity, it is argued here, cannot be taught, but procedural knowledge can be developed in an explicit manner. Better design procedures can therefore facilitate a more creative output. Ideas generated by students vary in their suitability. Current thinking might seek to explain this as a result of differing levels of creativity. However, this research suggests that different levels of comprehension may have an effect on the quality of ideas generated and that analogical reasoning can assist in developing novel concepts which visually communicate. While there is a theoretical basis for analogical reasoning, (Schön, Gentner and Medina, Goldschmidt) much of the research carried out in the design field has been in the areas of architecture and engineering. Little has been done in the visual communication area of illustration and text conceptualisation. The researcher has spent many years teaching illustration and has previously considered that prior knowledge and a student's unique perspective on the world was sufficient for good interpretation. This research has changed that perception.



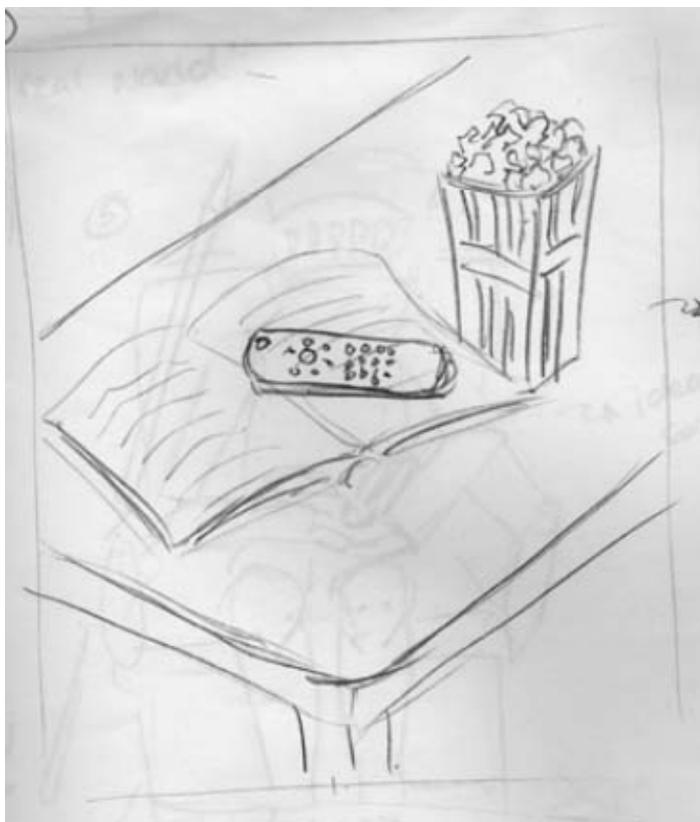
Example 1: Group 1 image. Creates an environment but the sketch doesn't focus on the writer's message.



Example 2: Group 1 image. This sketch visualises a part of the text which mentions dead author



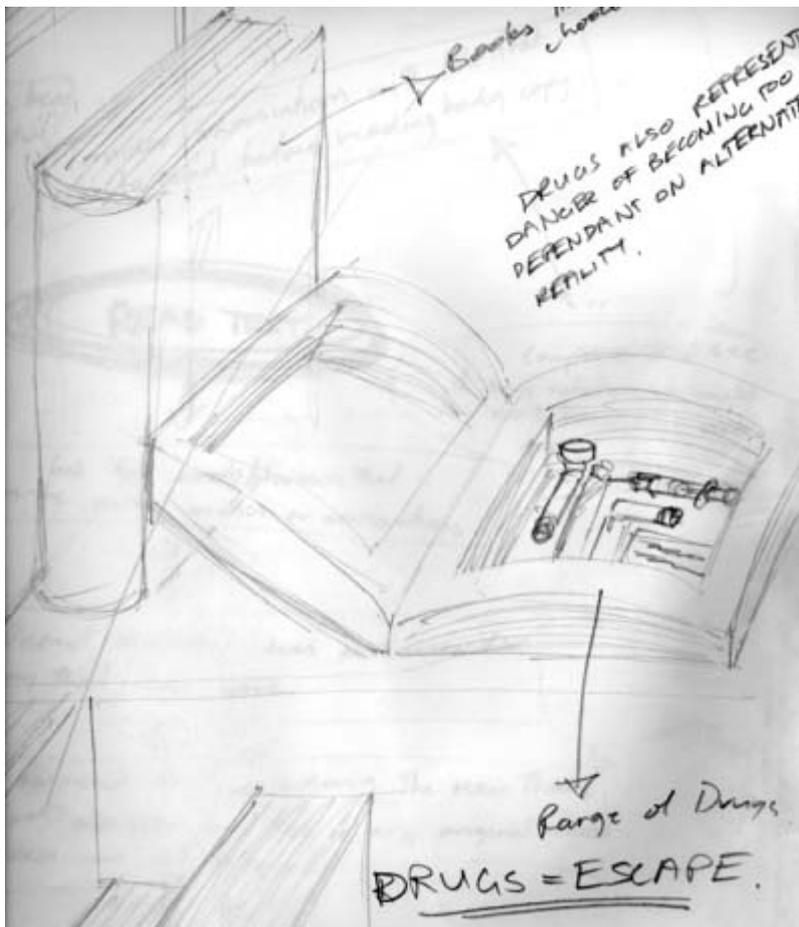
Example 3: Group 1 image. This image directly relates to a piece of text which says "There stand your noble, silent comrades, waiting in their ranks".



Example 4: Group 2 image. The analogy that books are like TV is made through the use of a remote control. The popcorn adds meaning through its association with being entertained.



Example 5: Group 2 image. A book, in the shape of a boat is helping an individual to escape.



Example 6: Group 2 image. Here the analogy is that books are like drugs, they help you escape from reality.

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