COMPREHENSION OF PICTURES IN EDUCATIONAL MATERIALS ON HIV/AIDS

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Abstract

The article reports on a research project that was aimed at determining differences in picture comprehension between literate and low-literate audiences in the context of HIV and AIDS. Structured interviews were held with 30 low-literate and 25 literate adult speakers from African languages. The responses were coded, and analysed. Although metaphorical pictures proved to be problematic for both literates and low-literates the low-literate group was more inclined towards literal interpretation of pictorial metaphors, and culturally encoded meanings seemed to obfuscate the meaning of certain commonly used mass media symbols. Pictures containing symbolic-abstract components posed particular problems for the low-literates, and interpretation problems were compounded by poor legibility, complexity and an unclear figure-ground distinction.

Opsomming

Die verstaan van visuele voorstellings in voorligtingsmateriaal oor MIV/VIGS: Die artikel doen verslag oor 'n navorsingsprojek wat daarop gerig was om verskille te bepaal tussen geskoolde en laaggeskoolde lesers se begrip van illustrasies binne die konteks van MIV en vigs. Gestruktureerde onderhoude is gevoer met 30 laaggeskoolde en 25 geskoolde volwassse sprekers van Afrikatale. Die response is gekodeer, en geanaliseer. Hoewel metaforiese illustrasies problematies was vir sowel geskooldes as laaggeskooldes, was die laaggeskoolde groep meer daartoe geneig om visuele metafore letterlik te interpreteer, en dit het geblyk dat kultureel geënkodeerde betekenisse die betekenisse van algemeen bekende massamediasimbole beïnvloed het. Dit is veral afbeeldings met simbolies-abstrakte komponente wat vir laaggeskooldes problematies was, en interpretasieprobleme is vererger deur swak leesbaarheid, kompleksiteit en 'n onhelder onderskeid tussen voor- en agtergrond.

1. The problem: HIV/AIDS, literacy and health communication

Effective communication is the backbone of health promotion and disease prevention. People need to understand health information to apply it to their own behaviour. Davis,

Michael, Couch, Wills, Miller & Abdehou (1990: 533) regard comprehension as the most important of all the literacy skills used in health care. These authors found in their research in the United States that the average reading comprehension of public clinic patients was the 6th grade 5th month, whereas most tested patient education materials required a reading level of the11th to the 14th grade. Forty percent of all public clinic patients tested, were reading below a 5th grade level and could be considered 'severely illiterate' (cf. also Plimpton and Root, 1994: 86). The South African situation is comparable. Basic instructional materials on health issues (including HIV and AIDS) have a readability level of just below 60, which is equivalent to Grade 9 (Carstens & Snyman, 2003), while more than 70% of the South African population have only marginal reading skills: 30% are functionally illiterate and the other 40% have limited skills (Carstens, 2004; Project literacy, 2004). A compounding factor is that, as a rule, 30-50% of low-literate patients read 3-5 years below their educational level (cf. Davis et al., 1990: 535; 537). Moreover, the grade level reported by low-literate audiences is often adjusted upward by a few levels, presumably to save face.

One may ask why formal education is so important in the realm of health. The answer lies in the fact that years of schooling completed is one of the most important socioeconomic correlates of good health in adult populations (Grosse & Auffrey, 1989: 281). The most poorly educated adults, those with the lowest literacy levels, suffer the highest rates of morbidity and mortality from chronic diseases and conditions (Rudd, Moeykens & Colton, 1999; Plimpton & Root, 1994; NWGLH, 1989). This correlation can be explained as follows: If people cannot understand the health care information available to them, they are unable to change potentially harmful behaviours, and improve their health.

In developing countries such as South Africa, where almost two thirds of the population cannot read basic health education materials, the solution is often sought in visual media (Arbuckle, 2004). In health campaigns across the world pictures are used where the written word fails to communicate effectively – usually to supplement, extend or reinforce oral instructions (cf. Doak et al., 1996: 92; Mayeaux et al., 205; 207). Moreover, various studies report on the successes of using pictures in health education in developing countries (cf. Hoffmann, 2000; Linney, 1995; PATH, 2002; Plimpton & Root, 1994; Tomaselli & Tomaselli, 1982; Zimmermann, 1981).

However, there are deficiencies in the research conducted thus far:

- It has not been proven beyond doubt that people who cannot read well, will be able to comprehend and learn from visual communication (Doak et al, 1996: 92).
- The findings of previous research are sometimes contradictory; for example, research in development contexts indicated that low-literate people generally have problems interpreting aspects of depth perception (cf. Colle & Glass, 1986; Linney, 1995: 23-24; PATH, 2002: 2). Messaris (1994: 13) disputes this claim. According to him it would be hard to argue, in the case of depth perception, that the informational cues typically used by more experienced viewers constitute an arbitrary, exclusively pictorial set of conventions.
- Few, if any, systematic and/or empirical studies have been carried out to prove that people who cannot read will understand certain types and styles of visual presentation, whereas other types and styles cause comprehension problems (cf. Hoffmann, 2000: 43).
- Almost all the studies on the interpretation of pictures in health education that have been undertaken, lack a purposeful theoretical orientation and a sound theoretical basis (Hoffmann, 2000: 136). Many sources on problematic pictures in development contexts can at most be regarded as anecdotal accounts or hybrid lists of the difficulties observed (including a variety of semantic, syntactic, pragmatic, cognitive, cultural and stylistic, problems) (cf. Colle & Glass, 1986).
- No comparative studies have been done to prove that there is a significant difference in the comprehension of certain types of pictures between low-literate and literate audiences.

The research reported on in this article was particularly aimed at establishing

- whether purely analogical (representational) pictures are interpreted without difficulty by literate as well as low-literate audiences;
- whether low-literate audiences experience problems interpreting symbolic-analogical pictures, whereas literate audiences experience fewer problems or no problems at all;
- whether low-literate audiences experience problems interpreting symbolic-abstract pictures, whereas literate audiences experience fewer problems or no problems at all.

2. Categories of pictures often reported as 'difficult' for low-literates

The problems mentioned in the diverse literature on picture comprehension by low-literate audiences can be roughly categorised as

- pictures with too much distracting detail in the background, causing the unskilled viewer to miss the central focus of the visual, or to focus on the wrong detail (Ausburn & Ausburn, 1983: 113; Doak et al., 1996: 93; 103; Linney, 1995: 23; NCI, 1994; PATH, 2002: 2);
- pictures that are misunderstood due to differences in the knowledge systems of the author/compiler/designer and the audience (Bradley, 1995: 1; Cornwall, 1992; Doak et al., 1996: 99; Tomaselli & Tomaselli, 1984; Tripp-Reimer & Afifi, 1989: 613);
- pictures reflecting western pictorial conventions of depth perspective, including linear perspective, occlusion, relative size, etc. (Arbuckle, 2004; Bradley, 1995: 74; Linney, 1995: 23-24; PATH, 2002: 2);
- pictures representing unseen entities, e.g.
    - objects that are too small to be observed by the human eye, such as the HI virus;
    - objects that are concealed inside an outer 'shell', such as internal organs;
    - the operation of systems (Colle & Glass, 1986: 161; Dudley & Haaland, 1993: 37);
    - depiction of movement, such as a physical object traveling from one point to another, emission of light, steam, breath, sound, etc., by making use of lines (Arbuckle, 2004; Colle & Glass, 1986: 161; Hoffmann, 2000: 142; PATH, 2002: 2) .
- pictures rendered in unfamiliar art styles, e.g. cartoon-style drawings of people and objects, which both simplifies and distorts (Doak et al 1996: 95; Plimpton & Root 1994: 86);
- complex pictures of which the meaning is dependent on a particular sequence, e.g. left to right, or correct interpretation of a particular relationship, e.g. causal, temporal, etc. (Colle & Glass, 1986: 161; Haaland, 1984; Hoffmann, 2000: 95; 134; 142; Linney, 1995: 23-25);
- pictures containing symbols from popular media or non-familiar knowledge domains, e.g.:
    - metaphoric symbols, such as a heart (love), a dove (peace), etc. (Linney, 1995: 24; PATH, 2002: 2). (Although they are representational, a transferred meaning is conveyed, which is often culture-dependent);
    - abstract symbols of which the meanings are not transparent, but have been fixed by convention, e.g. road signs, arrows, ticks, crosses, mathematical symbols,

circles and splashes of colour (to point out or indicate) (Colle & Glass, 1986: 161; Doak et al., 1996: 103; 106; Kress & Van Leeuwen, 1996: 61-70; PATH, 2002: 2); as well as certain pictorial conventions used in the cartoon style, e.g. thought balloons and speech balloons (Colle & Glass, 1986: 16; Hoffmann, 2000: 142; PATH 2002: 2; Hugo & Skibbe, 1991:49).

It was decided to concentrate on one of the above types, namely **pictures with symbolic elements**, firstly because they are mentioned as being problematic in various studies on the interpretation of pictures by low-literate audiences (cf. Colle & Glass, 1986; Doak et al., 1996; Hugo & Skibbe, 1991; Hoffmann, 2000; Linney, 1995; PATH, 2002). The research by Hugo & Skibbe, conducted a study at Tygerberg Hospital in 1989, strongly suggested that the participants' limited ability to interpret pictures representing abstract knowledge concepts was caused by their low literacy level (Hugo & Skibbe, 1991: 49). A second motivation for this research focus was an observation during a preliminary survey among ABET students at the Waterkloof Airbase in Pretoria, that pictures with some kind of symbolic content introduced visual noise.

3. Pictures with symbolic elements

In semiotics signs are often classified as either symbolic (where the relationship between the signifier and the signified is arbitrary) or analogical (where the relationship between the signifier and the signified is logical, natural or direct). In the case of pictures, 'analogical' normally also entails literal, and irrespective of the literacy level of the viewer, this type of picture is usually only misunderstood if the viewer is not familiar with the object portrayed.

Following Gralki (1985), Hoffmann (2000: 8) distinguishes two types of pictures with a partially or completely symbolic (arbitrary) content, namely **symbolic-analogical** and **symbolic-abstract**. These types of pictures are not direct representations of people's real-world perceptions. In other words, they are not purely analogical. Some kind of cognitive transformation, based on academic or cultural knowledge, is needed to connect them to their intended meanings.

Symbolic-abstract representations are images that are purely fixed by convention. Hoffmann (2000: 85) characterizes them by saying that with these images 'there is a constant tendency to cross the line into the field of written representation'. Figures, formulae, tables, mathematical symbols (e.g. the conventionalized symbols for

equation, addition, subtraction, multiplication, division, etc.), logical notation (e.g. an arrow to signify entailment), etc., are examples of signs that are closer to written signs than pictorial signs. Although not mentioned by Hoffmann, speech balloons and thought balloons may be categorised as symbolic-abstract as there is no direct, natural or logical resemblance between form and meaning (apart from the fact that they are 'containers' of embedded meaning), and since their meanings are only fixed by convention.

Despite the fact that signets and logos may have originally been analogical Hoffmann categorizes them as symbolic-abstract once they have become the standard symbols for companies (e.g. the Mercedes star), products (the international wool mark) or organizations (e.g. the five Olympic rings, the International Red Cross).

Symbolic-analogical pictures constitute a hybrid category between symbolic and analogical. These signs are interpreted symbolically in that that their use is fixed by convention, and analogically in that some structural or functional resemblance to the object represented is preserved in the meaning. This category includes

- various types of diagrams which people use to convey abstract concepts, such as quantities, relationships or processes: a bar chart shows a comparison between separate entities of different 'sizes (containers); a line graph shows relationships between elements (evolution);
- pictorial metaphors, such as a (schematic) representation of the heart to represent love; a representation of a spider's web to indicate a URL/Internet site;
- pictorial metonymies, in the case of which the picture represents an element or an attribute of an object, action, event or condition, e.g. a representation of a clock to represent time in general; a smiley face to represent happiness or friendship; a knife and fork to represent a restaurant, a bed to represent overnight accommodation (cf. Hoffmann, 2000: 85).
- Graphemes with fixed, conventional meanings that present unseen entities, e.g. lines to indicate movement, sound, light or heat, etc., are analogical in a certain way. Although these lines depict imaginary objects or events, scientific knowledge (e.g. about light and sound waves, etc.) partially motivates them.

Although the exposition given above suggests that the categories **analogical/literal**, **symbolic-analogical** and **symbolic-abstract** are non-discrete, this article will treat all non-literal pictures as either belonging to the category symbolic-analogical or symbolic abstract.

4. Research methodology

The method of data-collection is primarily qualitative (structured interviews), but demonstrates elements of an experiment since the same interview schedule was used for two different respondent groups, and after coding the data, the two groups were compared, using statistical techniques.

4.1 Respondents

The experimental group comprised 30 low-literate speakers (persons with literacy levels below 9 years of formal schooling) of 8 African languages between the ages of 22 and 55 years, and the control group comprising 25 literate (with literacy levels above 9 years of formal schooling) speakers of 8 African Languages aged between 23 and 49.

The literacy levels of the respondents were determined on the basis of self-reports regarding years of formal schooling. Eight years of schooling was set as the upper limit for the experimental group, because it is regulated by South African law that learners who have passed Grade 9 may leave school and start tertiary training. A supporting motivation was that persons with fewer than 9 years of schooling are regarded (in terms of the categories defined by Project Literacy 2004) as only 'marginally literate'. The lower limit for the control group was 9 years of schooling and the upper limit was students who have completed a first degree.

The sampling method was both convenient and purposive, as the data gatherers relied on personal acquaintances to identify and recruit respondents who satisfied the literacy requirements. All the respondents were interviewed individually. Low-literate respondents were interviewed in Constantia Park and Waterkloof Glen in Pretoria as well as in KwaMhlanga, and literate respondents were interviewed in Pretoria Central, Menlo Park, Lynnwood and Hatfield.

The gender imbalance (25 females vs. 5 males in the experimental group; and 18 females vs. 7 males in the control group) should be attributed to the sampling strategy (convenience).

The following matrices summarize the socio-demographic profile of the respondents:

Table 1: Socio-demographic profile of the experimental group

Age	Years of formal education	Gender	Occupation	Home language
Mean 41.5	Mean 6.5	Female 25 Male 5	Domestic workers 16 Unemployed 7 Gardeners 4 Cleaners 3	IsiZulu 9 IsiNdebele 7 Sepedi 7 Sesotho 3 Setswana 1 Siswati 1 Xitsonga 1 IsiXhosa 1

Table 2: Socio-demographic profile of the control group

Age	Years of formal education	Gender	Occupation	Home language
Mean 32.8	Mean 12.6	Female 18 Male 7	Domestic workers 5 Administrative workers 13 Undergraduate students 7	Isizulu 4 IsiNdebele 1 Sesotho 1 Sepedi 1 Setswana 1 Siswati 1 Tshivenda 1 Other 15

4.2 Materials

The materials comprised a compilation of fourteen pictures from various public information documents on HIV/AIDS that had been collected from educational and public health care facilities (clinics, hospitals, schools) in and around Pretoria during the period 2000-2004. The pictures were scanned and arranged in a narrative sequence, which could be characterized as 'the story of AIDS'. A narrative sequence was chosen to introduce logic into the design, in the absence of written text or oral narration. In the case of the low-literate respondents a pre-interview briefing was done to ensure that they were familiar with the main concepts regarding HIV and AIDS.

The picture sequence included pictures on talking about sex and pregnancy; talking about sex and protection against HIV/AIDS; postponing sexual debut; HIV/AIDS and pregnancy; negotiating condom use; HIV-testing (and counselling); regular exercise; getting rest; healthy and unhealthy food choices (lunch); prohibition of smoking and alcohol use; taking antiretroviral medicines according to schedule (compare Addendum A).

Due to the availability of pictures on the different aspects of the AIDS narrative, and in order to test particular picture types, the portfolio included pictures rendered in different art styles: black and white semi-realistic line drawings, coloured, cartoon-style

line-drawings; coloured, realistic line drawings with background detail; a silhouette; coloured, semi-realistic line drawings without background detail; shaded colour drawings without background detail; shaded colour drawing with background detail.

4.3 Data collection

The data were collected via structured interviews. The general procedure was to start each interview by introducing the interviewer, and asking about the preferred language for the interview. Interviewees were informed that their responses would be tape-recorded anonymously, that their participation was voluntary, and that they were entitled to withdraw their participation at any stage during the research process. Each respondent was asked verbally for his/her consent to use the data, and to proceed with the interview.

After the introduction, the respondents were briefed on the purpose of the research, namely to assist the researchers in finding out which of the pictures should be included in health education materials distributed at clinics.

It was assumed that low literate participants would have less general knowledge about preventing and living with AIDS than literate participants. Therefore, in the low-literate condition the structured interviews were preceded by a semi-structured briefing (without visual support) on the topic of HIV/AIDS, according to a schedule covering sexual debut, prevention of HIV/AIDS, and coping with the illness. The researcher asked questions, confirmed correct answers, and provided correct information where the respondent did not know the answer or held erroneous beliefs, in order to create sufficient contextual knowledge for the interpretation of the pictures. Respondents were invited to ask questions, and to comment on any of the issues raised. In the literate condition, this phase was skipped.

Subsequently, socio-demographic information was recorded (age, occupation, years of formal schooling, mother-tongue), followed by the actual experiment. In both conditions the interviewer presented the respondent with the pictures one by one and asked questions in a semi-structured fashion about (i) the recognition of the objects, (ii) the relationship between the objects and (iii) the message of the visual. Respondents were invited to comment on particular aspects of the visual if they had not referred to them in the initial response.

The first ten low-literate respondents were interviewed in the township of KwaMhlanga by the first author. The interviews were conducted at the house of one of the participants, Ms Elsie Mahlangu. The pre-interview briefing on HIV/AIDS took the

format of a group discussion. Since the mother tongue of all the attendees was IsiNdebele, but the preferred language was English, both languages were used, with interpretation between them by a fluent speaker of both. The actual interviews took place individually. After the first two respondents, the interviewer realised that the respondents were much more fluent in Afrikaans than in English. Therefore, all the other interviews took place in Afrikaans, as it saved time, and produced direct and reliable answers. The assistance of the interpreter was sought whenever a word or phrase in either Afrikaans or IsiNdebele was not understood by one of the participants.

The other twenty low-literate respondents were interviewed in Constantia Park and Waterkloof Glen. The interviews took place by prior arrangement with the home owner, and were conducted individually. Pre-interview briefings and interviews were done individually. All the interviews were conducted in Afrikaans, the lingua franca in the eastern suburbs of Pretoria. All the interviews were recorded, transcribed and translated into English by the first author.

The interviews with the twenty four literate respondents were conducted individually, using English as a medium of communication.

4.4 Coding and analysis of data

After conducting a session of interviews the responses were typed on data sheets. A code book was devised on the basis of the research questions and the specific characteristics of each picture included in the testing instrument. The following categories of information were included in the code book:

- **column number** , 1-30 (low-literates); 1-25 (literates)
- **column label**, e.g. vis1_1, vis1_2, etc.
- **column descriptor**, e.g. - in the case of vis1_5 –‘Able to identify shape as a thought balloon’
- **value**, e.g. 1, 2
- **value label**, e.g. 1 = ‘yes’ (if the respondent gave an appropriate interpretation of the pictorial symbol); and 2 = ‘no’ (if the respondent failed to give an appropriate interpretation of the pictorial symbol).

The variables (column labels) and values were read into version 13.0 of the statistical analysis program SPSS, and the data was coded in order to calculate frequencies and averages.

The database comprised 70 variables or questions (represented by the column labels), of which 6 covered the socio-demographic details of the respondents. The remaining 64 questions were operationalisations of the research questions. The following dimensions of the respondents' picture comprehension performance were covered:

- Literal (analogical) recognition of people and objects: pictures 1 through 10 (control questions)
- Interpretation of symbolic-analogical aspects of pictures
    - pictorial metaphors (pictures 4 and 5)
- Interpretation of symbolic-abstract aspects of pictures
    - abstract symbols (pictures 1, 3, 5, 8a, 8b, 9a, 9b)
    - symbolic-abstract cartoon-style conventions: thought and speech balloons (pictures 1 through 5)

5. Discussion of findings

5.1 Interpretation of analogical pictures

Both literate and low-literate respondents had little difficulty in recognizing analogical pictures with a literal meaning (irrespective of art style): 89% of the low-literate respondents and 82% of the literate respondents identified the people/objects in the pictures correctly. Compare the distribution in the following table:

Table 3: Literal (purely analogical) recognition of objects

	Low-literates		Literates	
	No. of correct interpretations out of 30	**%**	**No. of correct interpretations out of 25**	**%**
Picture 1: Recognises female adult and child in main picture	24	80	23	92
Picture 1: Recognises man, woman and baby in thought balloon	22	73.3	22	88
Picture 2: Recognises the male adult and boy	24	80	23	92
Picture 2: Recognises the condom in the speech balloon	26	86.7	23	92
Picture 3: Recognises young male and female	27	90	23	92
Picture 3: Recognises the bed in the thought balloon	29	96.7	25	100
Picture 4: Recognises young male and female	30	100	24	96
Picture 4: Recognises condom in speech balloon	28	93.3	15	60
Picture 5: Recognises the adult male and female	30	100	21	84
Picture 6: Recognises the syringe	30	100	20	80
Picture 6: Recognises the test tube with blood	11	36.7	12	48
Picture 6: Recognises the male and female	28	93.3	20	80
Picture 7a: Recognises the person as a male playing with a ball/playing soccer	28	93.3	22	88
Picture 7b: Describes the person as a female who is sitting on a couch, reading a book	29	96.7	24	96
Picture 8a: Recognises the foods	30	100	19	76
Picture 8b: Recognises the foods	29	96.7	18	72
Picture 9a: Recognises the bottle of liquor	28	93.3	22	88
Picture 9b: Recognises the ash tray and cigarette	30	100	13	52
Picture 10: Recognises the young female	30	100	19	76
Picture 10: Recognises pills/medicine	23	76.7	22	88
Averages		**89.3**		**82.0**

The only object not recognised or incorrectly identified by both low-literates (37%) and literates (48%) was the test tube with blood in picture 6a. In the low-literate group, 9 respondents did not recognize the test tube with blood at all. Other responses included

'pills' (4), 'a man's thing' (2), 'vaccine' (1), 'the things you put on your lips'(1), and 'a condom' (1). The poor recognition can probably be attributed to a lack of familiarity with the object. Few of the respondents might have gone for HIV-testing, or have seen the type of container in which blood is transported to testing laboratories.

5.2 Interpretation of pictures with symbolic-abstract elements

Two types of symbolic-abstract pictures were reasonably well represented in the corpus, namely callouts (speech and thought balloons) containing pictures representing what is said or thought by the characters in the main pictures, and abstract symbols.

The following criteria were applied to establish how well speech and thought balloons were understood:

- correct interpretation of the relationship between the contents of the callout and the rest of the picture, demonstrated by using either a verb of saying (say, talk, discuss, teach, tell, instruct, etc.) or a verb or cognition (think);
- naming the shape correctly, by using words such as *speech/thought balloon*, or *callout*.

Tables 4 and 5 summarize the responses relating to these criteria:

Table 4: Correct interpretation of speech and thought balloons

	Low-literates		**Literates**	
	No. of correct interpretations out of 30	**%**	**No. of correct interpretations out of 25**	**%**
Picture 1: The respondent uses a verb of cognition such as *thinks*, *understands*, etc. to describe the relationship between main picture and thought balloon.	3	10	13	52
Picture 2: The respondent uses a verb of saying such as *say*, *talk*, *tell*, etc, to describe the relationship between main picture and speech balloon.	20	66.7	20	80
Picture 3: The respondent uses a verb of cognition to describe the relationship between main picture and content of thought balloon.	1	3.3	9	24
Picture 4: The respondent uses a verb of saying to describe the relationship between main picture and speech balloon.	11	36.7	6	24
Picture 5: The respondent uses a verb of cognition to describe the relationship between the main picture and the thought balloon.	4	13.3	2	8
Averages		**26**		**37.6**

Table 5: Correct labelling of speech and thought balloons

	Low-literates		Literates	
	No. of correct interpretations out of 30	%	No. of correct interpretations out of 25	%
Picture 1: Able to label shape as a thought balloon	1	3.3	0	0
Picture 2: Able to label the shape as a speech balloon	1	3.3	2	8
Picture 3: Able to label the shape as a thought balloon	0	0	1	4
Picture 4: Able to label shape as a speech balloon	0	0	1	4
Picture 6: Able to label the shape as a thought balloon	0	0	2	8
Averages		**1.3**		**4.8**

On average both literate and low-literate respondents scored low on understanding the relationship between a speech or a thought balloon and the persons whose speech or thoughts are captured in these shapes. It could be assumed that second language speakers of English would not know the appropriate terms for these shapes. However, the researchers were surprised that such a large percentage of literate respondents was not acquainted with the pictorial convention itself. Less than 40% of them gave appropriate explanations for the relationships between the callouts and the main pictures. The fact that 67% of the low literates and 80% of the literates seemed to understand the relationship between the speech balloon and the two characters (the man and the boy) in picture 2, could perhaps be attributed to their interpretation of other visual cues, namely the adult male's parted lips.

Table 6 gives an overview of the interpretation of abstract symbols by the two groups:

Table 6: Correct interpretation of abstract symbols

	Low-literates		Literates	
	No. of correct interpretations out of 30	**%**	**No. of correct interpretations out of 25**	**%**
Picture 1: Interpret content of thought balloon correctly (if a man and a woman have intercourse they can have a baby)	4	13.3	20	80
Picture 1: Able to name abstract symbols (+ and =)	1	3.3	6	24
Picture 3: Interpret the content of the thought balloon appropriately	15	50	21	84
Picture 3: Recognize the cross as a sign of prohibition	9	30	22	88
Picture 5: Able to identify the question mark in the thought balloon	5	16.7	6	24
Picture 5: Able to relate the question mark in the thought balloon to the main picture	0	0	3	12
Picture 8a: Describe the food as not healthy	18	60	24	96
Picture 8a: Indicate the red cross in support of previous answer	13	43.3	18	72
Picture 8b: Indicate the green tick in support of the previous answer	13	43.3	16	64
Picture 8b: Describe the food as healthy	22	73.3	22	88
Picture 9a: Interpret the prohibition correctly	27	90	23	92
Picture 9a: Indicate the red cross in support of previous answer	25	83.3	22	88
Picture 9b: Interpret the prohibition correctly	27	90	24	96
Picture 9b: Indicate the red cross in support of the previous answer	24	80	22	88
Averages		**48.3**		**71.1**

Table 6 shows that the low-literates scored 22% lower than the literates on the interpretation of pictures with symbolic-abstract elements. This is not surprising: their lack of formal education did not facilitate the development of a vocabulary for abstract symbols, and also resulted in a limited development of formal (higher order) thought processes such categorisation and critical reflection.

Crosses and ticks were noticed and interpreted correctly by the low literate group in those pictures where the symbols were emphasised through the use of colour, and legibility (size and weight). A red cross as a sign of prohibition, superimposed on an object, was recognized by approximately 75% of the low-literate respondents (compare the responses for pictures 9a and 9b). However, where the abstract symbol was buried in

the background, recognition dropped by about a third. Less than half of the low-literates recognized the cross and the tick in pictures 8a and 8b. The complexity of the picture also seems to reduce the probability that an abstract-symbolic visual will be recognized and correctly interpreted by people with limited literacy skills. In picture 3 only a third of the low-literate respondents identified and correctly interpreted the cross in the thought balloon. Cognitive load could have been decreased by introducing an additional cognitive-perceptual layer, namely colour. Since bright orange was used for headings in the booklet from which this particular picture was taken, spot colour could have been used for emphasis in black and white line drawings.

Mathematical symbols presented major problems for the low-literate group. Only one respondent was able to name the symbols + and = in the thought balloon of picture 1, and to give an acceptable interpretation of the content. A confounding factor might have been that the symbols in the balloon are not used in their primary logico-mathematical senses. The symbol + is used as a synonym for *unite* rather than for *the sum of*, and the symbol = means "is the product of", rather than "equals". Another possible reason why the + was not interpreted as a mathematical symbol, is that in the context of health education, this symbol is often used to represent health care facilities. Four of the low-literate respondents identified the + as a sign for a hospital or clinic.

5.3 Interpretation of symbolic-analogical pictures

Mayeux et al. (1996) advise that ‘To be effective with patients whose literacy skills are low, patient education materials should be short and simple, contain culturally sensitive graphics and encourage desired behaviour.’ Culturally sensitive graphics would, for instance, include pictures portraying taboo objects, and unfamiliar pictorial metaphors. Although only two culture-dependent metaphorical pictures were included in the testing materials, the responses indicated that this kind of visual was problematic. Even the literate respondents (the majority of whom are speakers of African languages) had some difficulty in relating the pictorial metaphor to its intended meaning in picture 5. Compare Table 7:

Table 7: Correct interpretation of metaphor

	Low-literates		Literates	
	Number of correct interpretations out of 30	%	Number of correct interpretations out of 25	%
Picture 4: Associate hearts with love	9	30	17	68
Picture 5: Recognize the red object in the thought balloon as a metaphor for illness	9	30	4	16
Averages		**30**		**42**

When including picture 4, the researchers did not anticipate that the hearts surrounding the boy's head would be ambiguous. It was taken for granted that the romantic meaning of red hearts had been popularized by mass media such as cartoons, greeting cards, etc. The responses of the low-literate group could be interpreted as a lack of exposure to print materials in general. Another possible explanation for the comprehension problems that occurred, is the influence of language-supported cultural meanings. When 5 low-literate respondents answered that the e boy is 'thinking with the heart' (and when asked for an explanation they said he was worrying or ruminating), specialists of a number of African languages were consulted to find out whether these languages contained a semi-idiomatic expression that would be translated directly as ‘thinking with the heart’, but meaning "to worry". According to Ms S. Mahlangu, a lexicographic practitioner at the University of Pretoria (personal conversation, 15/11/2004), who speaks several African languages, the Sepedi expression *o bolela ka pelo*, and the IsiZulu expression *ukhuluma ngenhliziyo*, can be literally translated as 'to talk with the heart', but actually means "to worry". Although the number of respondents who assigned this meaning was relatively small, their responses indicated that metaphorical portrayals should never be used without pretesting them among members of the cultural group(s) of which the audience is part.

Picture 5 was included because it was expected that the low-literate respondents may experience problems with interpreting the metaphor for AIDS. Astonishingly, not only the low-literates scored very low on comprehending the picture in the thought balloon; the literates performed worse: whereas 30% of the low-literate respondents related the red monster to sickness (responses included the terms 'sickness', 'germ', 'bacterium' and 'virus'), only 16% of the literates gave appropriate answers. According to Ms. Mahlangu (personal conversation, 15/11/2004) the African languages do not have a unified way of metaphorising AIDS. In IsiNdebele, for instance, AIDS is viewed as a big,

prehistoric animal, which has been lexicalized as *isilwani*. In Ms Mahlangu's opinion it would be extremely difficult to use one single metaphorical picture to symbolise the meaning of AIDS for speakers of all the African languages.

6. Conclusion

6.1 Summary of findings

Consistent with previous research, it was found that purely analogical (literal; representative) pictures pose relatively few interpretation problems (on average less than 18%). The fact that the low-literates' recognition of objects was slightly higher than that of the literates (by 7%) is probably due to the pre-interview briefing of the low-literates on the core concepts of HIV and AIDS.

As far as the interpretation of **symbolic-analogical** (metaphorical) pictures by low-literates is concerned, two problems are worth mentioning:

- overriding of (intended) popular mass media interpretations by culturally/linguistically encoded meanings (picture 4);
- literal (analogical) interpretation of metaphorical pictures (picture 5).

An unexpected finding regarding the literate group was that they scored lower on recognising purely analogical pictures than the low-literate group. Only 16% (as opposed to 30% of the low-literates) related the red monster in the thought balloon (picture 5) to HIV/AIDS, illness or a related concept. This could be due to the absence of a pre-interview briefing session, the style of the interviewer, and/or the time allowed by the interviewer to peruse each picture before responding.

These findings suggest that in special-purpose communication, such as health education materials, it is dangerous to use metaphorical portrayals that have not been tested among members of the target populations, irrespective of literacy level.

The research in connection with **symbolic-abstract** pictures confirmed that people with limited reading skills and limited exposure to written media experience major problems interpreting abstract picture conventions such as speech balloons and thought balloons; and symbols from systems of formal logic, such as plusses, minuses, crosses and ticks. Interpretation problems are compounded where cognitive load is high, e.g. when the legibility is poor, when the symbols form part of a complex visual, or when they occur in the background of a picture.

Contrary to expectations the literates' interpretation of the content of speech and thought balloons were only approximately 12% better than that of the low-literates, and they also performed poorly on labelling these shapes. They did, however, understand symbols with logical/mathematical elements significantly better than the low-literates. They were also generally better equipped to reflect on their responses, such as indicating a symbol (cross, tick, etc.) as the source of a particular answer (e.g. picture 3 and 8b).

6.2 Limitations of the research

Three limitations may be singled out, namely the composition of the corpus (selection of materials) and the interview procedure. Firstly, due to the qualitative (and therefore exploratory) nature of the initial design and the availability of materials, the portfolio of testing materials did not include a sufficient number of pictures in each problematic category – for instance symbolic-analogical (metaphorical) pictures. The findings are therefore not conclusive, and need further testing before generalisations can be made. Secondly, two different interviewers conducted the interviews, which may have influenced the quality and the quantity of the responses.

6.3 Suggestions to materials developers

What has become clear, is that certain types of pictures are problematic across a wide spectrum of literacy levels. It is therefore suggested that simple, low-literacy materials with clear concrete graphics be considered for all patients, regardless of their reading skills (cf. NWGLH, 1989). In the US patients in both high and low socio-economic and reading ability groups have indicated that they prefer short, simple and colourful materials (NWGLH, 1989). A study comparing a simplified sixth grade reading level brochure about polio (which combined simple text and line-drawings with captions to a 10^{th}-grade level brochure) demonstrated that patients of all reading levels and all socioeconomic levels preferred the shorter and simpler pamphlet. High-level readers understood both brochures equally well but took less time to read the shorter one. No one was offended by its simplicity.

Designers of public health education materials in South Africa are advised to design these documents at a 5^{th} grade level (NWGLH, 1989), and include colourful, culturally relevant pictures as well as ample white space. Pictorial metaphors, art styles that distort objects, complex pictures with partially symbolic content, as well as abstract symbols from the written language should be omitted where possible.

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Addendum A: Pictorial narrative of HIV/AIDS

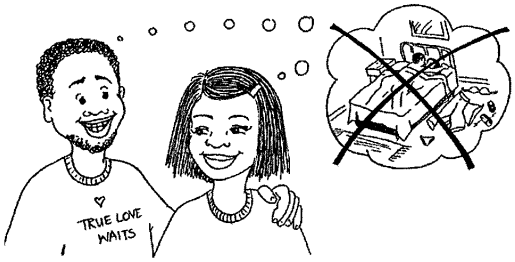
1

(Edwards 2000)

2

(Edwards 2000)

3



(Edwards 2000)

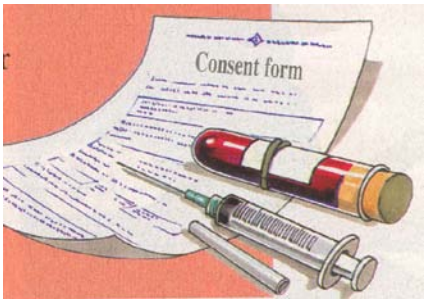
4

(National AIDS Programme s.a.)

5

(National AIDS Programme s.a..)

6a



6b

(SoulCity/Khomanani 2004)

7a

7b

(Gauteng Provincial Government 1999)

8a

8b

(Tshwane City Council s.a.)

9a

9b

(SoulCity/Khomanani 2004)

10

(SoulCity/Khomanani 2004)