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ABSTRACT

An experiment was conducted in which the relationships of basic television and film codes to particular literacy mental skills were examined. Different versions of the same film, each focusing on a different code, were produced and shown to fifth graders. It was found that children with initially better mastery of the relevant skills extract more knowledge and meaning from the presentation. Where filmic codes supplant a critical skill, rather than call upon it, those with initially poor mastery benefit as much as those with better mastery. (CH)

THE EFFECTS OF TV FORMATS ON MENTAL SKILLS[1]

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Paper presented at the Conference on Visual Literacy

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Abstract

It was long assumed that exposure to the visual media somehow enhances the development of cognitive skills. A theory was developed by Dr. G. Salomon which outlined hypothetical ways through which media codes could develop particular mental skills. In a series of experiments designed to test these hypotheses it was found that: (a) particular filmic codes explicitly supplant mental skills, thus allowing for their imitation and internalization, while others develop skills by calling upon them; (b) individuals with poor initial mastery of the needed skills tend to improve their mastery when skills are supplanted whereas those with good initial mastery improve where skills are called upon.

A later study examined the effects of exposure to Sesame Street on the mastery of specific cognitive skills. This field study further supported the previous finding. It suggested that psychologically demanding TV programs, when cross-culturally transferred, may gradually enhance universally-shared TV-literacy skills. Another result of the study was a battery of TV-related literacy tests.

Recently an experiment was carried out by Drs. Salomon & Cohen and others, in which the relationships between basic TV and film codes to particular literacy mental skills were examined. Different versions of the same film, each capitalizing on a different code, were produced and shown to fifth graders. It was found that, as expected, each code calls upon different mental skills. Children with initially better mastery of the relevant skills (i.e. have better literacy) - extract more knowledge and meaning from the presentation. Where filmic codes supplant a critical skill, rather than call upon it, those with initially poor mastery benefit as much as those with better mastery.

A cross-cultural comparison between the U.S. and Israel, in which long lasting effects of TV exposure on cognition are studied, is presently underway.

Our western culture is a highly visual one. Wherever we turn, we encounter visual images. Some are more conventional, while others, partucularly television, are much more novel. Added up, these visual stimuli appear to engulf and bombard us constantly.

It seems reasonable to argue that we are apparently quite skillful in handling this large quantity of visual material. We must, in all likelihood, be equipped with those mental skills which enable us to process some, if not all, the information transmitted to us through these visual images.

Or are we? Indeed, what do the visual images require in terms of perception, selection and processing of information? Perhaps an even more interesting question is what do they do to us, the decoders of visual messages? Or do we remain unaffected by them?

The latter question entails numerous variations. Visual images come in many forms and carry many kinds of contents. In addition, they are carried by means of different technologies of transmission. Clearly then, visual images may affect us, if they do at all, through their contents, through their technologies, or through their very symbolic nature. However, whereas much thinking and research has been devoted to questions of content and technology, very little attention has been paid to the question of how, if at all, do the symbolic modes of visual media affect our cognitions.

It was long assumed that the visual media affect us cognitively through their symbolic modes, or rather, their formats of

representation. Carpenter (1960) and later Mcluhan (1965) drew our attention to this possibility. Research on language acquisition, the well known Whorfian hypothesis, as well as daily observations all lent support to the contention that media formats, rather than content, affect cognitions. And yet, little empirical evidence can be found either to substantiate or to refute this contention. It is to this area that our research was devoted.

It is rather difficult to define the construct of symbolic codes, or formats or representation. Let us, therefore, say that the codes, or formats, are the sign vehicles, that is - those optional components of a communicational message into which a raw idea is dressed (Harrison, 1974). The spatial arrangement and signs in a map, the non-notational two-dimensional attributes of drawings, the close-up, split-screen, slow motion or time-compression in films, and the mosaic-like nature as well as the interruptions caused by comercials on TV, are fair examples of what is meant by the formats of representation. Clearly, there is much overlap among the different visual media. But there are also unique additions contributed by what each technology potentially makes possible and by how producers and artists succeed in materializing these potentialities. Indeed, new formats of representation, such as holographs, are still in the process of being developed.

The theoretical possibility that such representation formats can affect cognitions has been explicated elsewhere by Salomon (1972).

Briefly stated, it was hypothesized that some representation formats can serve a dual function: they serve in an overt communicational function, and they may serve in a covert mental representational one. Accordingly, it was hypothesized that some representational formats, which are used in communication, are internalized to serve in a covert function as mental skills. Thus, for instance, a cartographer would be expected to internalize the spatial transformations used as formats in maps, thereby making him better able to represent space to himself cognitively, beyond any geographic content. Similarly, a child who is a heavy television consumer should be better able to mentally perform specific transformations which he has adopted from television formats.

Interestingly enough, Münsterberg pointed out as far back as 1916, that "the photoplay obeys the laws of the mind rather than those of the outer world". In other words, the world of film externalizes our mental skills. This may be the case. However, for the child who is still in the process of acquiring the necessary skills to handle film, the formats used by the medium serve as external simulators of mental-skills-to-be-learned. He can thus imitate, internalize and generalize them to be used as schematic mental tools.[2]

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2) Following the publication of this hypothesis, at least two similar ones saw light: Lesser (1974) extended the idea into the area of television while Tikhomirov (1974) did the same with respect to computers.

How do representation formats, which are used in communication, affect cognition? And how are their cognitive effects related to media literacy? Any message entails both content and format. As Olson (1974) describes, the content is related to knowledge to be acquired, whereas the format is related to the mental skills utilized in the process of acquiring the knowledge. The means of presenting information, it is claimed, determine the mental activities by means of which knowledge is acquired. Thus, the mental activity brought to bear upon the information biases the knowledge acquired. As a consequence, any handling of coded messages has two facets: The activation of mental skills relevant to the psychological requirements of the representation format used in the message, and the acquisition of the knowledge entailed in the message.

The coded message is never a "raw" message; the code used in it necessarily biases the information by imposing specific modifications on it. A television presentation constructed as a kaleidoscope of events differs from a smoothly developing presentation, in terms of the modifications each format imposes on the message, even if content is the same. The two messages share some basic common formats, and hence call upon similar mental skills. However, to the extent that they differ, also different mental skills are required for the extraction of information from each message. <u>These mental skills are needed to overcome the modifications produced by the codes</u>. Since each code imposes different modifications,

different skills are needed to overcome them. Thus, e.g. in the face of close-ups one has to relate the enlarged detail to preceding or subsequent long-shots, and in the face of two-dimensionality one has to mentally add the third dimension.

Media literacy is thus one's ability to overcome the modifications imposed by the codes of a medium on its messages. It can be hypothesized that by overcoming such modifications, a person is better able to extract the information from the message.

We have recently completed an experiment, which was disigned to test this hypothesis. Five versions of the same short television film were produced. Whereas content was held constant, the dominant formats were varied. One version emphasized close-ups, a second version was heavily loaded with zooms, a third emphasized logical gaps, the fourth - spatial gaps, and the fifth emphasized no particular format at all. The subjects, all fifth graders, were initially pretested on a number of mental-skill tests. Each test was assumed to tap mastery of a mental skill which is necessary in order to overcome the modifications imposed by a particular television code. Later, each group of subjects was exposed to one of the filmed versions. Following exposure, the children were given a posttest which measured their knowldege of the film's content, logic, spatial arrangement and the like.

As expected, the acquisition of knowledge from each version correlated with previous mastery of at least one mental skill.

Moreover, these correlation patterns differed for each version. Hence, e.g. whereas the skill of relating part to wholes was relevant for the acquisition of knowledge in the close-up version, the skill of bridging logical gaps was relevant in the logical-gaps versions. Similarly, the verbal-logical skill was necessary to overcome the modifications of the spacially-fragmented version, but was irrelevant in all other versions.

Two conclusions can be drawn from this experiment. First, different codes call upon different mental skills; and second, the acquisition of knowledge is strongly facilitated by the activation of that skill which aids in overcoming the dominant code of the message.

These findings do not show as yet how media literacy develops, nor how, if at all, media affect cognition. They do show, however, that cognitive skills are called upon by different codes in the service of acquiring knowledge from messages.

Media literacy may well develop from what seems to be the initial starting point, namely - the child's ability to distinguish between referent and representation. It is only later on that the media-specific skills develop. This development depends, however, on at least two factors: The child's experience with the codes, and his general cognitive development.

Our investigation into the effects of Sesame Street on Israeli kindergarten and school children provided the opportunity to look

into these factors (Salomon et al., 1976). For Israeli children, there was much novelty in the program's formats, thus potentially causing a mismatch between their already mastered skills and the psychological requirements of the novel formats. It should be noted that the content of the program was of a rather common and universal nature.

Indeed, accumulated exposure to the program resulted in improved mastery of those mental skills which we have assumed to be needed to overcome the modifications caused by the novel formats. Thus, with experience, mastery improved. Furthermore, this mastery transferred to other, non-television material. In addition, improved skill mastery resulted in better ability to acquire knowledge from other filmed material, indicating that indeed generalized skills were cultivated.

However, such cognitive changes were not uniform across ages. Whereas second and third graders showed large changes, preschoolers did not. The most plausible explanation is that the preschoolers did not yet experience the mismatch between their skill mastery and the program's requirements. They were equipped to acquire the knowledge with which they felt comfortable. For the somewhat older children this level of knowledge was not enough and hence their need to accommodate their skills to the program's requirements. The conclusion we can thus draw from the study is that experience with demanding codes is necessary, but that sufficient cognitive

development is needed just as much. No wonder, therefore that mastery of map reading skills comes much later than film literacy (Snyder and Feldman, 1975).

The evidence thus far supports the contention that media codes affect the mastery of relevant mental skills, that these skills generalize beyond the handling of specific codes, and that experience with the codes as well as cognitive development play crucial roles in this process. But how do these cognitive effects occur and what is their nature?

Another series of experiments which we carried out recently (Salomon, 1974) subsequently followed by a study by Rovett (1974) examined the process through which media codes affect cognitive skills. These studies dealt with filmic codes such as the zoom, laying-out of objects, and rotations in space. The unique attribute of these codes is that they have the potential of overtly supplanting mental transformations, which otherwise would have to be executed covertly. Thus, e.g. the zoom supplants the process of relating wholes to parts and the process of laying-out solid objects supplants the relationship between an object and its 2-D plan.

The major and consistent findings of the experiments were that whenever such codes are used, and hence - specific transformations are overtly supplanted, observers imitate and internalize the codes. After numerous such exposures, the imitated codes become somewhat generalized and can be applied as mental skills to new stimuli.

Thus, the dual function of codes (overt communication and covert representation) is realized.

It is important, however, to notice that not all observers go through this process of imitation and internalization of the codes. Only observers with initially poor mastery of the relevant skills tend to imitate them. Those with relatively good mastery of the skills do not improve as a result of exposure to supplanting codes. Rather, what affects their mastery of mental skills are codes which call upon or arouse the mental skills. Thus, e.g. the zoom, a supplanting code, improves the skill of relating parts to wholes of initially less skillful observers. The close-up, on the other hand, which calls upon the same skill, improves mastery of the more skillful observer.

Such were the findings in experiments carried out in laboratory settings. They showed how media codes can be made to affect cognitive skills. But is this the way media codes influence mental skills under more natural conditions? The five-version experiment, mentioned above, sheds some light on this question. Children's ability to relate parts to wholes was strongly related to their knowledge acquisition ($r = .67$) when exposed to the close-up version. However, in the zoom version, which supplanted rather than called upon that skill, the relationship was substantially weaker ($r = .27$). In other words, when the skill is supplanted by a code, rather than called upon, its initial mastery is of much less relevance for the extraction of information.

The Sesame Street study provides even more direct evidence: whenever there were codes which called upon existing skills, only already skillful children showed improvements; whenever there were supplanting codes, unskillful children benefitted. Thus, codes affect cognitions through supplanting them or by calling upon them also under natural conditions of exposure.

We may now offer, by way of a brief summary, an overall view of how the media affect cognitive skills and media literacy. Media literacy is one's skill in overcoming the modifications imposed on messages by codes. This is done in the service of extracting knowledge from the coded messages. While engaged in the activity of acquiring knowledge from a coded message, the mental skills one activates to overcome the codes' modifications undergo changes. These skills gradually develop, and possibly transfer to other domains. However, larger changes take place when a mismatch is experienced between available skill mastery and the (novel) requirements of a code.

Two processes possibly account for the acquisition of media literacy and for the cognitive changes caused by media codes. Some codes (particularly of film and television) overtly supplant mental processes. They are imitated and internalized by observers, notably those who lack mastery of the skills needed to "break" the codes. Other codes cannot supplant skills but rather call upon them. By repeatedly doing so, they gradually shape and cultivate the skills.

It can be hypothesized that imitation of supplanting codes precedes, and that the cultivation of skills by calling upon them follows. But this still needs to be empirically tested.

What our research teaches us thus far, among other things, is that media can be made to have desirable cognitive effects, thus making it possible to utilize them educationally for novel and desirable purposes. Our research also tells us that media seem to have cognitive effects under natural conditions of exposure. Whether this is indeed a significant cultural factor in a child's course of mental development, is a question which we are presently studying in a cross-cultural setting comparing American and Israeli children.

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