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# A Study of the Effect of Reception of Works of Art through an Interactive CD-ROM

László Halász
*University of Fine Arts, Budapest*

Károly Hantos
*University of Fine Arts, Budapest*

Balázs Faa
*University of Fine Arts, Budapest*

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**Abstract:** In their article, "A Study of the Effect of Reception of Works of Art through an Interac-tive CD-ROM," Halász, Hantos, and Faa collected data on the aesthetic impact of art objects through multimedia. They constructed a CD-ROM out of various images, sounds and text. Items were offered to 135 secondary school subjects in the framework of directed interactive polychrome variations. The effect was studied partly by measuring viewing (reading) times for each item, and partly by semantic differential and attitude scales. The data for viewing time and phases, and of items of the semantic differential and attitude scales were analyzed for females and males, for long and short timers, and for the more and less experienced. It was concluded that knowledge of the basic indices of the receivers' characteristics offered a high predictive value regarding the rela-tionship between attitude towards multimedia and (aesthetic) effect. Consequently, interactive artistic multimedia is in itself an unsatisfactory educational tool, requiring further interaction with an educator.

**László HALÁSZ, Károly HANTOS, and Balázs FAA**

**A Study of the Effect of Reception of Works of Art through an Interactive CD-ROM**

**Introduction**

Although art as a part of culture has an obvious declarative value even for less educated people, this declaration neither possesses nor exhibits real value preferences. Specifically, there is significant distance between the declarative and procedural value in this area. The limited time a receiver has for works of art is mostly occupied by consumption of products of mass entertainment of modest levels. Artistic enjoyment as a term is misleading. It suggests that the reception of works of art means nothing other than enjoyment. It also obscures the fact that the receiver is capable of this reception, which requires much effort, only if he/she has already acquired specific knowledge and taste -- which are themselves the result of a long-term learning process. Artistic enjoyment demands motivation to make such efforts systematically, yet no direct interest obliges him or her to do so.

Had we not known it already, we would have understood from Marshall McLuhan (1964) that a new medium is an extension of our capacities, among other things contributing to the creation of new forms of arts. But we know from our experiences that increased perceptuo-motor freedom is only an opportunity. The function of a medium does not depend on the number of ways it can be used but rather on *how* it is used. Home video is a good example of how possibilities have usually had a degrading effect even amongst educated people. What has resulted from it? Has the owner of the apparatus turned into an independent creator of television programs and feature films, with excellent home-produced films in his or her collection, on a par with the classics of world literature in his or her library? The desire for comfortable and agreeable leisure time is dominant and as far as possible a new medium is adjusted accordingly, with the least possible effort being made. Desire is not aroused by the market contrary to the receiver's wishes -- at most it is reinforced by it.

It is obvious that easy access to all the best pieces of literature, all kinds of visual and musical art, and the most pertinent aesthetic, philosophical, sociological, ethnological and psychological works by way of the Internet (and CD-ROMs) has enormous advantages for specialists who have questions, who are searching for something given. Despite the fact that the electronic man or woman in the street has, or soon will have, all the technical skills to use this medium for any purpose, it is quite probable that his or her reading, picture- viewing and listening interests and abilities will be directed to some specific practical aim: how to do or achieve this or that. New ways of information processing, of everyday activity, of entertainment, of participation, and of social interaction are of primary importance. While the new electronic means seems to be the fulfillment of certain (anti)utopian desires, we have to consider the possibility that literature, visual arts and music will increasingly be a lively source of aesthetic experience inseparably from everyday life experience only for those with a professional relationship with the arts.

Even the best works of art remain items on offer. If the receiver cannot interact with them they cannot be profited from. The work is kept alive by interaction indirectly realized between the author and the receiver, and directly between the work and the receiver. This interaction differs from that between two or more people interacting by means of their words and meta-communications, modifying the interaction. Again, the work is an objectified product of an artist (often already dead), but it is deeply imbued with human characteristics. The receiver interacts with them symbolically through his or her imaginative and emotional processes, and as a result the work comes to life again. Meanwhile the receiver is a master almost without limit. He/she can do with the work in his/her mind anything he/she wishes: Reconstruction, the omission, and addition of material, embellishment, and turning it on its head are part of this process. The nature of interaction is transformed fundamentally by the new electronic media. What until now has been possible only in the receiver's mind, in his imagination, from now it can be realized in the outer world, namely on the screen of a computer. In any event, as compared to the many beliefs and assertions about the effects of the new electronic media, including the artistic-aesthetic aspect (see Holland; Landow; Nöth; Turkle; Vitanza; Zillmann and Vorderer), only few reliable data are at our disposal. Our main objective was to obtain relevant data about aesthetic impact through multimedia.

**Method and Sample Data**
**Material**
We constructed a CD-ROM from regular and irregular visual patterns, graphics, sculptures, paint-ings, and videoinstallations, sometimes combining them with music or expository-educational text. There were two main blocks. The first block featured nine rather different items giving experience of the various possibilities for aesthetic representation and interaction: Picture 1; Picture 2; Picture 3; Pattern Generator; Cube as Brush; Impossible Cube; Short Story; Musical Glasses; and Graphic Art Generator.

   To illustrate the way we worked, let us look at the details. Instead of a drawing or a painting one could view the word *picture* in different versions and could modify its size, color, light, posi-tion, aspect, etc. Patterns were generated in different colors and sizes. One could regulate the number and the time duration of the new variations (see <http://www.arts7.hu/dept/vnt/example.html?pix.dcr>). A three-dimensional turning cube worked like a brush if one directed it and the effect of this rather special brush was a space con-struction (see <http://www.arts7.hu/dept/vnt/example.html?mover.dcr>). The Impossible Cube made from strips of wood, was originally created by Escher so that the perspective would suggest directly opposite spatial relations one after the other. Now in each of the upper left, upper right, lower left, and lower right picture fields a small cube presenting the different spatial relations of the cube could be seen, and at the same time as a copy a large cube in the middle (see <http://www.arts7.hu/dept/vnt/example.html?cube.dcr>). A contemporary Hungarian short story -- in length brief, in content enigmatic and playful -- could be read and reread in four segments and the most remarkable words, phrases, and propositions highlighted, thus creating one's own story. Eight glasses were filled with liquid and formed an octave. One could listen to the sound of each glass to perceive the connection between the picture and the sound (see <http://www.arts7.hu/dept/vnt/example.html?glass.dcr>). A nonfigurative graphic art work was in the center and around it 12 smaller ones originating from this central composition. Following interaction, any smaller graphic work could assume the central position, producing a new genera-tion of graphics works around it. If one chose to do so, one could bring about additional new gen-erations.

   The second block contained ten important works of art, representing different periods of art his-tory and different styles, giving multifarious opportunities to realize multimedia effects in order to better understand the works: Arcimboldo: *The Gardener*; Van Eyck, *The Arnolfini Couple*; Holbein, *The Merchant*, Holbein, *The Ambassadors*; Magritte, *Man Reading a Newspaper*; Ray, *Self-Portrait*; Rembrandt-Rubens, *Ear for Music*; Valdambrino, *St. Dorothy*; Vermeer, *Art of Painting*; and War-hol, *Mick Jagger*.

   In contrast with the first block the order of the items was not fixed. Three out of the ten items were combined with expository-educational texts written by prominent art historians. Arcimboldo's *The Gardener* was shown continuously changing into a Duchamp installation and back again. The common traits of the two works, and at the same time metamorphosis as a natural and as an aes-thetic phenomenon, could be seen. This was combined with two relevant expository-educational texts (430 words) in three versions: picture followed by texts, texts followed by picture, and pic-ture and texts side by side. Vermeer's *Art of Painting* gave the possibility of regulating the depth of focus. This picture was presented in two versions: the picture simultaneously with listening to a relevant text (130 words), and the picture by itself (see <http://www.arts7.hu/dept/vnt/example.html?vermi.dcr>). Holbein's *Ambassadors* originally pre-sented two gentlemen and an unrecognizable distorted skull at the bottom of the painting. Now the skull could be seen in a correct perspective, too, then as a three-dimensional object turned around. The picture was also presented in two versions: the picture followed by a relevant text (275 words) and the text followed by the picture (see <http://www.arts7.hu/dept/vnt/example.html?holbi.dcr>). The other works were presented only in picture form.

   Jan van Eyck's *The Arnolfini Couple* was presented as a complete painting and as a magnified round mirror on the wall behind the couple. In the mirror the part of the room which was out of

the "real" field of the painting could be also seen. Holbein's *The Merchant* used the magnification effect in another way. On the background of the picture any strongly magnified detail of it could be presented and in the foreground in a frame the complete painting in miniature could be seen. Within this the barely discernible magnified detail could be seen in another movable frame. Magritte's *Man Reading a Newspaper* consisted of four paintings in the upper left, upper right, lower left, and lower right picture fields respectively. Three paintings were uniform; the fourth had an extra motif. This painting could occupy the place of any of the three (see <http://www.arts7.hu/dept/vnt/example.html?news.dcr>). Ray's *Self-Portrait* could be transformed by a procedure principally similar to that of solarization, discovered by the artist. Rembrandt-Rubens' *Ear for Music* presented different instruments which could be made to play (see <http://www.arts7.hu/dept/vnt/example.html?music.dcr>).

Valdambrino's *St. Dorothy* sculpture was presented turning on its vertical axis and could be stopped in any position (see <http://www.arts7.hu/dept/vnt/example.html?3d.dcr>). Warhol's *Mick Jagger* consisted of three sheets each with a series of ten images. The first sheet could be seen faintly, the second sheet quite clearly with the items presenting a sequence, and the third sheet presented the items at random. On each sheet any item of the series could be seen in magnified (see <http://www.arts7.hu/dept/vnt/index.html>: for this file macromedia shockwave plug-in is necessary; unfortunately, a number of works are not available on the Internet owing to their size). As pre- and post-tests a composite of inventories and attitude scales concerning culture, the arts, reading, computers in general and the given works of art particular were also found on the CD-ROM.

## Subjects

135 secondary-school students with an average age of 18 took part in the study. The students came from two schools in the same district of Budapest, but one group -- that is, half the subjects -- enjoyed a level of education and competence in the arts, literature, mathematics, and computer skills significantly higher (the more experienced group) than that of the other (the less experienced) group. The ratio of women and men was similar in the groups.

## Procedure

IBM-compatible computers were used. In a session ten subjects worked simultaneously in a classroom. They were in two rows of five, one and half meters from each other. They did not have to give their names. If necessary the experimenter demonstrated how to use the computers for the given purposes before the session began. The subjects could regulate the whole process and the viewing time for each phase using the mouse in an interactive way to examine each picture in any position, but they could also view it without any interaction (in an automatic way). Two questionnaires were presented about: a) Time spent with a computer: minimum average three hours per day, minimum average two hours per day, minimum average an hour per day, average some minutes per day, average some minutes per week, even less and b) Ways of using a computer: Internet for surfing, Internet for work-related information, Internet for hobby information, Internet for e-mail, interactive CD-ROM without any game, games, text processing, mathematical-statistical data processing, office work, program writing, not at all.

The pre- and post-tests consisted of five different inventories and scales about: c) The attractiveness of pastimes on five-point scales: engaging in handicrafts, reading, social life, going to museums, concerts, theater, watching TV, listening to the radio, sports activity, visiting sports events, using a computer, amateur performing; d) Expectations of a computer as a means of electronic information processing: gives me aesthetic enjoyment, encourages me, fulfills my expectations, fortifies me, forms me a view of life, gets me to act, gives me a good example, justifies my ideas, makes me think, entertains me, refreshes me, relaxes me, calms me, cheers me up, confronts me with a task, helps me draw up my ideas, sets me free, shocks me, extends my horizons, informs me, reveals relations, serves as a mirror, tells me something that is new; e) Emotions (affects, feelings) during literary reading: I was fascinated, I was interested, I was upset, I was afraid, I was excited, I was sad, I was anxious, I meditated, it released me, it bored me, it enlivened me, it liberated me, it made me angry, it confused me, it made me tired, it enraged me, it made me tense; f) Emotions (affects, feelings) during use of a computer (see e); and g) Semantic

differential scales: original-banal, complex-simple, meaningless-meaningful, dynamic-static, familiar-unfamiliar, continuous-discontinuous, photographic-nonphotographic, disorderly-orderly concerning the given works.

Each graphic art work, visual pattern, painting, or sculpture could be seen in a polychrome representation, without the name of the author or the title. In the second block first each work was presented for fourteen seconds and the subjects had to choose a minimum of five works out of the ten to view and interact with as they wished. In the case of the works combined with an expository text in two or three different orders, each version was presented to one-third or one half of the subjects. After the end of the interaction, each of the chosen works was presented for fourteen seconds again (the works were presented at random.)

The semantic differential scales were used directly following the first and the second fourteen second presentations. Questionnaires a) and b) were filled in only before the blocks, the others both before and after them (the items were at random). They could be filled in quite simply by clicking the appropriate figure or word. Data registration such as the viewing (reading) time for each item, even for specific parts of items as compared to the numbers of entries, was performed automatically.

**Hypotheses**

Significant differences could be expected: a) between the more experienced and less experienced groups considering their differences in education; b) between females and males considering their differences in spatial perception and attitudes towards a technical apparatus; c) between those who attended for longer and shorter periods of time to the multimedia items; d) between those who received the same work in picture-text combination of different order.

**Results**

The basic data referring to hypotheses a), b), and d) were given by the sampling, but to test the hypothesis; c) we had to generate the data. The first block was appropriate for this purpose. The time for any given item was correlated with that for all the other ones. That is, the time spent by a subject on any one item was similar to the time he or she spent on any other. It was as though there existed some personal constant regulating the time one was willing to spend interacting with a pattern, a painting, or a text.

Each subject's time as compared to the average time for each item was checked. The subgroup consisting of those spending more time on the majority (minimum seven-maximum nine) of the items than the average time was separated from the subgroup whose members spent more time on a maximum of two (minimum 0) items. The former were called *long timers* (they numbered 28), and the latter *short timers* (they numbered 61); the ratio of the latter was significantly higher (p<.001) than that of the long timers. Their difference in average total time in the first part of the study, including the first block, was striking: 14.4 vs. 5.1 minutes, p<.0001.

There was significant difference neither in the ratio of longer nor in that of short timers between the more and less experienced subjects, yet the ratio of the short timers was obviously higher as compared to that of the long timers with the more experienced than it was with the less experienced subjects.

Although the ratio of the short timer-males was higher than that of the females, the level was below significance. But when we look at the sex differences in any other respect, the differences were quite striking. (To avoid giving the very great number of average scores and standard deviations, we shall refer even to these only exceptionally, but when we speak of differences, they are always based on the t tests, the level of significance was usually p<.01 here and later).

The women judged half of the works of art (Warhol's, Valdambrino's, Rembrandt-Rubens's, Magritte's and van Eyck's) more positively than did the males: for them they were more liking, meaningful, ordered, original, and in most cases more familiar than they were to the males. This trend was similar when judging the same works again. The females spent significantly more time on some works of art than did the males, but they also spent more time on the other works with which the difference was below the level of significance. Anyway, the females also spent more time on some of the items in the first block than did the males. Furthermore, the women reacted positively to literary reading as such: they were more interested in it and more vivified, released, re-

laxed, and fascinated by it; they felt attracted more by traditional artistic pastimes (literary read-ing, going to museums, theaters, concerts, amateur performing), and less by television than did the males.

The men used computers more often, and spent more time on computer games, but on pro-gramming as well; expected more entertainment, release and help in everyday life from comput-ers; reacted to computers more positively: they were more fascinated, excited, relaxed and vivi-fied by them; felt much more attracted by sports (including watching sports events) and audio-visual mass communication means than did the women.

Ironically speaking we can say that at least two conditions must be satisfied if a multimedia program is to be viewed more thoroughly and judged more positively from the aesthetic point of view (in many cases). The receiver should know, use and prefer the computer less, and he/she should appreciate highly the traditional artistic pastimes. Less provocatively: the 16-19 year-old secondary-school females as compared to their male counterparts well compensated for their un-certainties about any kind of (electronic) machines by more mature, learning-centered and con-formist attitudes. However, another interpretation cannot be excluded. The females spent more time on the multimedia items since they were slower, liking more works and judging them to be more complex, meaningful and original than the males, as their judgments were more lenient and less demanding.

We can give an unambiguous answer only following the time differences: The *short timers* used computers often and for different purposes; felt attracted more by sports (including watching sports events) and audio-visual mass communication means, and using computers as a special form of amusement than did the long timers. The *long timers* judged the works of art more posi-tively in several respects both before and after the interactive viewing; reacted to literary reading as such more positively; felt attracted more by traditional artistic pastimes. The *short timers* were able to accomplish the whole study within a shorter time than the long timers. If we know the time as compared to the average which was paid by subjects to the visual-aesthetic and literary materi-al, we can predict their time as compared to the average to reading questions and answering them. At the same time, we had some proof that longer timing was not the same as slow pro-cessing or dull intellect. A considerable ratio of the long timers showed greater curiosity and desire to explore. The pattern and the graphic art generator in the first block gave a good opportunity to invite newer and newer versions (in the former case an average of 55.7 sec. and 25.5 versions, in the latter one 108 sec. and 13 versions.)

Although there was practically the same average time for inviting a version between the short and long timers, there was a strikingly significant difference in the total time and in the number of the versions between them. That is, the long timers were more motivated to deal with the tasks; that was why they were more patient and more keen to see additional versions than were the short timers. And more significant circumspection by longer timing (see mostly females) was cor-related with more positive judgment of the works of art. However, this positive judgment was ba-sically formed following the first presentation. It is true that then each subject could view each work of art for fourteen seconds, but that was only the upper limit. No doubt the long timers used the time at their disposal maximally to take a good look at the work, while the short timers were mostly impatient in these cases, too. Yet, a positive attitude cannot be excluded by short timing, supposing that exceptionally quick information processing correlates with it. Otherwise, there is a great chance that short timing goes first and foremost together with a motor routine (reinforced by computer games as well) which is rather suitable for a profitable search through a loose mass of information. And it is suitable for rapid mouse clicking together with the "This is not it, this is not it either" experience, but it is unsuitable for an aesthetic reception of multimedia. Again, it perfectly fits in with the masculine assertiveness which is not unfamiliar from the postpubescent boys in our sample, because of their troubles in self-definition and producing their identity as men.

The findings have informative value even if they were valid only for the works presented on the computer screen, but a comparative study on the judging of original works, slides and computer-ized reproductions showed that the important factors to do with judging the novelty of the con-tents of pictures and their aesthetic qualities were basically similar (see Locher et al.). According

to the differences depending on experience the *experienced* subjects spent less time on the first block than did the inexperienced, but the difference was below the level of significance. The case was similar to the greater part of the second block. But according to the total time of the study the experienced subjects finished it in a shorter time than did the inexperienced ones (23.2 min. versus 26.1 min.). Besides, the experienced used computers, especially the Internet for various purposes more, and felt attracted more by sport and audio-visual mass communication means than did the inexperienced.

We have to admit that these latter differences were definitely modest, and they hardly verified our expectations that the blocks of the multimedia program should have brought about a real sensation for the inexperienced subjects, with the result that the (positive) effect would appear quite clearly in their case. Contrary to this, there was no such a sign at all, and on the whole the differences seemed small as compared to those between sex or timing.

As for the multimedia effect of picture and text combination the average time for the Arcimboldo work was remarkable neither in the case when the expository text could be read first followed by viewing of the picture nor in the opposite case, when the expository text could be read following interaction with the picture. The average time for the interaction with the picture was no more than one-quarter -- one-quarter of that for the picture-text side-by-side version (16 sec. as against 63 sec.), but in the latter case the average time for the text itself also was much more than in the former one (71 as against 44 sec.).

The continuous simultaneity -- the real multimedia idea -- stimulated the subjects immediately to test interactively on the left side of the screen what they had just been reading on the right side of it. The multiple interactive possibility was favorable from the point of view of reception: it increased the time not only for the picture, but also for the text, as opposed to the arrangement whereby viewing and interacting with the picture were directly separated from the text reading. Then the time for the picture in interactive and automatic ways in all was much less (26 sec.) than the time for reading the text (45 sec.), while with a side-by-side presentation the (longer) picture viewing and the (also longer) text reading took nearly the same time. The reaction to Vermeer's picture together with listening to an expository text showed a specific multimedia effect, too. The average time was increased significantly not only by the requirement of listening to the text at least once (as compared to that of viewing the picture in itself), 43 sec. as opposed to 23 sec., but also by the fact that listening to the expository text stimulated the subjects to focus on the different spatial strata of the painting presented by the optical simulation of a well-known phenomenon from photography.

The automatic way of Holbein's text-picture version took an exceptionally long average time (54 sec.); usually this was about 10 sec.. The text referring to the enigmatic skull stimulated the subjects to view the skull, which turned into the correct perspective automatically, after which the distorted form could be seen again. As compared to this the interactive way of viewing was not interesting enough for the spending of similar or even more time (the average time spent 23 sec.). Again, the subjects who could see first the picture itself studied it interactively for a longer time as compared to the automatic way. As they could read the text only later, in vain did they spend considerable time on it comparable to that spent by the members of the former group: They could not directly view the picture again, only if they repeated the choice of the entire item. Several of them did this, which did not happen with those who received the text-picture version.

The multimedia effect utilizable in aesthetic education was verified. However, despite the significant differences in timing between the versions of picture-text combination, the results of repeated judgment, that is the judgments on the semantic scales between the pre- and the post-tests, did not show any significant difference. In other words, where conscious judgment did not show any significant effect, the less or nonconscious behavior towards works of art -- that is, the time spent on dealing with them -- showed significant and clearly interpretable effect. These objective timing data were more sensitive "instruments" of effect than the verbal data. The (positive) effect of interactions could not be followed in most cases as the repeated judgments were not changed at all and when there was some change it was contradictory. Arcimboldo's work was less ordered (in all the three versions), Vermeer's work was less complex and likable (in both versions) and Hol-

bein's was more meaningful and complex, but less ordered than before the interactive viewing process commenced.

## Conclusion

If we are looking for optimal subjects for aesthetic reception of multimedia in a group of age and education similar to those of our sample, we take the smallest risk if we enlist females, then leave out the short timers who, anyway, would be a minority out of them, and those who are too experienced in using computer as a means of electronic information processing. This composite will also reveal that the members of the sample feel attracted by the traditional artistic pastimes more, and at the same time, by sport and audio-visual mass communication means less. That is, to understand and enjoy the arts through computers or their new varieties requires an artistic culture based on systematic reception of works of literature, fine art, films and music. The subjects did not experience time measuring and could not exert any influence on it, as we ourselves were unable to influence it. Even, it was quite improbable that when the subjects paid attention to a given piece or work of art, they would have experienced the time itself. Awareness of time was significantly reduced, if not suspended altogether by the attention paid to the number of paintings and pieces of graphic art (and written or spoken text, and music together with them). In opposition to this, the subjects obviously pondered how to react to the scales, inventories and questionnaires. That is, all the other data of the study depended on their conscious answers. A smaller percentage of the questions required factual responses based on retrospective estimation, but a greater part of them called for affectively constructed judgments, not rarely stimulating the subjects' self-reflection about their own psychological processes.

According to the results organized into a systematic unity, the "hard, half-soft and soft" measures in the given frame mostly completed and mutually authenticated each other. Preverbal and verbal processes were in accordance. There was an important predictive value of the specified patterns of sex, timing and attraction as to pastime. In other words, if we know the basic indices of the receivers' sex or/and characteristics of timing and/or pastime, their attitudes towards multimedia and the (aesthetic) effect can be predicted to high probability. Of course, where the limit in age, profession and culture is of the results of such sample of 16-19 year-old secondary-school students remains an open question. The strong connections verified it rather likely that a sample of university students would still be within this limit.

The significant changes in the pre- and post-test judgments about multimedia items showed several times that the works became more problematic than they were. According to these findings, although the works became familiar following viewing the uncertainty brought about by interacting with them was not always compensated for. To put it differently: The interactive CD-ROM featuring works of art does not displace the role of the visual arts teacher but instead requires it. Considering that the judgments following the first viewing of the artworks were not changed radically in any case, it is appropriate to point out the importance of the well-known primacy effect in other areas. By all means, interactive artistic multimedia in itself is unsatisfactory for the strong overwriting of our attitude towards invariances, that is, towards a stable and easily recognizable world. This is why, the multimedia awaits, and requires the presence of a teacher.

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Author's profile: László Halász teaches psychology of the arts at the Research Institute for Psychology of the Hungarian Academy of Sciences and the University of Fine Arts (both Budapest). His many publications are primarily about the question of literary appreciation and understanding in English, German, Italian, and Hungarian. In addition to numerous articles in learned journals and several books in Hungarian, he is author of *Dem Leser auf der Spur. Literarisches Lesen als Forschen und Entdecken. Zur Sozialpsychologie des literarischen Verstehens* (Vieweg, 1993) and he edited the volume *Literary Discourse: Aspects of Cognitive and Social Psychological Approaches* (de Gruyter, 1987) and co-edited *The Short Story*, a special issue of the journal *Poetics: Journal of Empirical Research on Literature, the Media and the Arts* (1988). Halász is fellow of the IAEA: International Association of Empirical Aesthetics. E-mail: <halasz@mtapi.hu>.

Author's profile: Károly Hantos is chair of the Department of Artistic Education at the University of Fine Arts, Budapest. An artist specialising in computer arts, Hantos has participated in various art projects conducted at the University of Stuttgart and at the Fraunhofer Institut für Bauphysik (Stuttgart), 1991-95. His works have been exhibited since 1980 in Berlin (1987), Stuttgart (1992), Karlsruhe (1992), Ludwigsburg (1994), Tokyo (1999), and Budapest. Email: <hantos@voyager.arts7.hu>.

Author's profile: Balázs Faa teaches at the University of Fine Arts, Budapest. An artist specialising in computer arts, Faa was awarded a bronze prize in the Osaka Graphic Triennale in 1992. Among numerous other activities, he participated in a project at University of Marseille in 1994 and his works have been exhibited since 1992 in Marseille and Budapest. E-mail: <bs@voyager.arts7.hu>.