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Five Easy Pieces: Reframing the Design of Office Systems

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Abstract

Problems with the use of computer systems may often be traced back to the designers' narrow view or understanding of office work. Neither office work nor design of office systems should be done strictly according to rules or procedures. Similar cases, examples and previous situations play just as important a role. In the spirit of this, we present, not a set of guidelines for design, but five pieces or exercises that stimulate seeing things in new ways. We use metaphors as a way to interpret computer system use. And by the dichotomous ideas of *description* versus *interpretation*, *similarity* and *differences*, *planned action* versus *situated action*, *group discussion* against *individual problem-solving*, and *authoritative knowledge* against *shared knowledge*, we hope to set in motion a dialectical reframing process.

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1. A Story of Silence: An Introduction

Despite years of talk about involving users in the design of information systems, it is commonly known that most information systems simply reflect managers' pre-defined view of office work. Moreover, problems occurring during the use of an information system can often be traced back to managements' or designers' rather limited view of office work. Even relatively advanced office concepts like Desktop Systems reflect a fairly narrow view of office work: office work is what you do at your desk.

Consider the case of a standard Management Information System. Generally the 'problem' is defined as an office with too much paper work and not enough output. And the 'solution' is given as a database with report generating facilities to 'speed the flow of information'. Or reflect, for a moment, on a hospital administration system that 'simplifies' the billing system by terminal-based record keeping. Or the university student registration system, that, in effect, does the same thing. Even with our eyes closed, it is possible to 'see' that most information systems, regardless of whether they are dealing with patients, workers, students or bananas, seem to view the 'problem' of information from a similar vantage point.

Even in cases where people who will actually use the system, are involved in discussions about the design of a new system, the resulting system generally reflects a standard set of assumptions about the role of information in organizations. We don't believe that this is a failure of imagination on the part of the 'users', be they workers, students or patients. Nor do we believe that a call for increasing 'user participation' can necessarily bring about systems that more closely reflect the participants views. Rather, we feel that a central problem in most systems design is the fact that information systems *begin* with a pre-defined problem. We see this essay as an exercise in trying to see things in new ways. It is our way of beginning a dialogue about a *process* that tries to help participants with *problem-setting*, before they jump into the predictable confines of *problem-solving*.

In the beginning of this exercise we are reminded of a story told by Michael Patton [Patton 1980]. The story is of a wise man named Halcolm who sends three students out into the world of the marketplace to observe what takes place. They are to wear the robes of the truth seekers and are to spend six months in the village market, taking a vow of silence during this time.

"After six months in this fashion they returned to Halcolm. 'So', Halcolm began, 'you have returned to us from your journey. Your period of silence is over. What have you learned on this, your first journey?'

The first youth answered, 'In every village the patterns are the same. People come to the market. They buy the goods they need, talk with friends, and leave. I have learned that all markets are alike and the people in the markets always the same. I have learned that all things are ultimately the same from place to place.'"

The second student answered in basically the same way, and then "Halcolm looked at the third youth, 'And what do you have to tell us?' 'I saw the same markets and the same people as my fellow-travellers, yet I know not what they know. My mind is filled with questions. I kept wondering where the people came from and where they went. I pondered what they might be thinking and feeling as they came and went. I have failed, Master, for I am filled with questions rather than answers, questions for the people I saw. I do not know what I have learned'.

Halcolm smiled. 'You have learned most of all. You have learned the value of being able to ask questions. You have learned the importance of finding out what people have to say. You are ready now to return to the world, this time without the vow of silence.'" [Patton, p. 196]

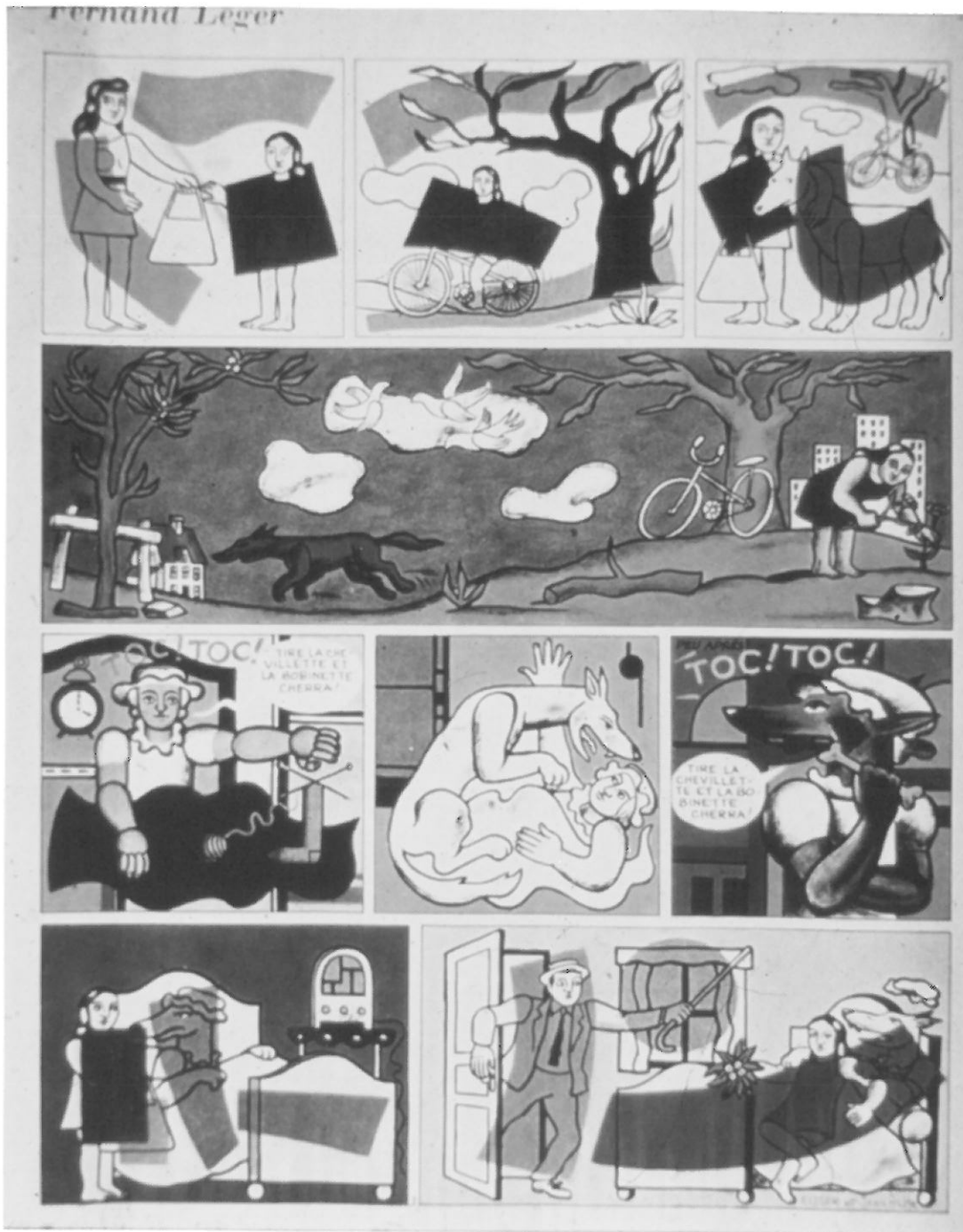
And so, in this next section, we the authors, will take a vow of silence, but hope that you will talk about what you find. As Halcolm says, "Go forth now. Go forth and question." And, we might add, 'go forth and enjoy'.

2. Five, Not So Easy Pieces

This essay, like most, 'borrows' many ideas, and in perhaps a post-modern way, tries to use them in different ways. You can judge for yourself if we are successful.

Exercise 1

Take a look at the photograph that you see on the next page¹. *Describe* what you see. Then *interpret* what you see. Does it tell a story? Talk to someone else about it and compare stories. How is it different when you describe the photo and when you interpret it?



Exercise 2

Consider the following: What are the steps one should take to remove a splinter from the foot of a three year old child?

Look it up in a medical textbook, or ask a doctor what the 'medical' advice is for doing this. Compare it with your own impressions of what steps you would take.

Exercise 3

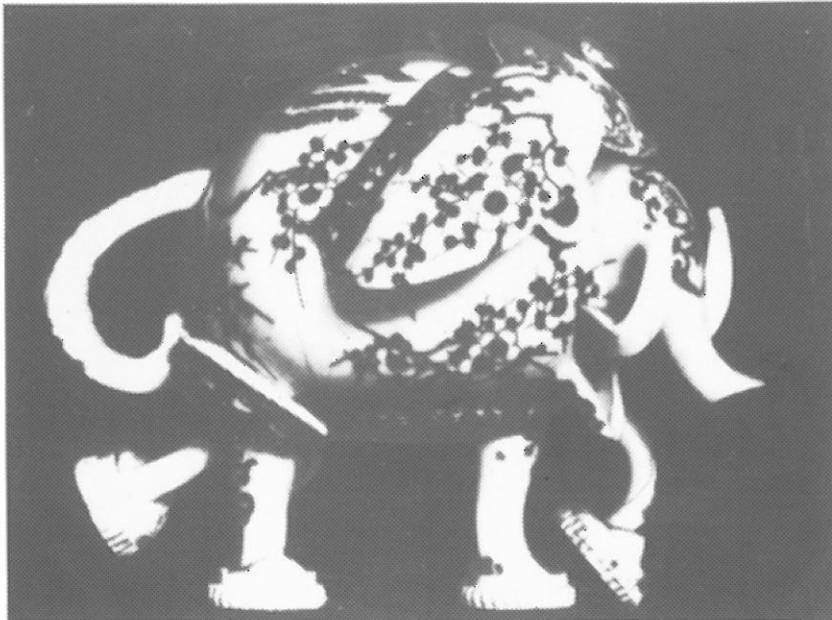
What is the criterion for placing some letters above the line and the rest below. Think about it, and then present it to a group of friends or colleagues.

A EF HI KLMN T

BCD G J OPQRS

Exercise 4

Consider the next picture borrowed from Joachim Israel [1979]. Describe the animal on the picture. What do you see?



Exercise 5

Consider the following story, borrowed from Donald Schön [1979]. Schön's point is that metaphors frame your understanding. In this case, urban-planning is metaphorically understood as treating a disease.

"The experts concluded that if the community were to be healthy, if it were not to revert again into a blighted or slum area, as though possessed of a congenital disease, the area must be planned as a whole.

It was not enough, they believed, to remove existing buildings that were unsanitary or unsightly. It was important to redesign the whole area so as to eliminate the conditions that cause slums, the overcrowding of dwellings, the lack of parks, the lack of adequate streets and alleys, the absence of recreational areas, the lack of light and air, the presence of outmoded street patterns. It was concluded that the piecemeal approach, the removal of individual structures that were offensive, would be only a palliative. The entire area needed redesigning so that a balanced, integrated plan could be developed for the region including not only new homes, but also schools, churches, parks, streets, and shopping centers. In this way it was hoped that the cycle of decay of the area could be controlled and the birth of future slums prevented."

Do you see urban re-development in this way, or are there other thoughts or metaphors that come to mind when viewing a city?

3. Resetting the Pieces: A Discussion

As you no doubt noticed someplace on the last few pages, each of the exercises gives you different results depending on how you see the question. This issue of perspective or *reframing*, as Schön [1979] calls it, involves an almost limitless range of useful and creative cognitive processes that push us out of thinking traps. We use them frequently in daily life, particularly, for example, when talking to friends about *their* problems. Although it's much more difficult to reframe problems that we are part of, we will here try to outline some of the ways (or techniques, if you prefer a more formal word) that we go about problem-setting. In the next part we will apply some of these concepts to the design of information systems.

One of the reasons that reframing is difficult is that we get caught up in the trap of our own unrecognized assumptions. The ways of reframing that we talk about here, all have in common the notion of uncovering and using one's basic assumptions about a situation. They involve something that Hofstadter [1979] in the epic book entitled *Gödel, Escher, Bach* labels "jumping out of the system". Hofstadter's idea, is in a way, similar to the story that Halcolm tells, for it means taking yourself outside of your normal boundaries. Here, within the rather closed system of academic writing, we will try to jump out. Come with us.

Exercise 1, "The Picture"

When *describing* the picture you may, for instance, say that there are 9 pictures and then take each picture and describe it. In the first picture there is a woman and a girl with an object between them. *Interpreting*

the picture, you may say that the object looks like a basket. You may then jump ahead and see the woman and the wolf, so the story about *Little Red Ridinghood* may come to mind.

Interpreting the picture in this way, we search for other parts of the story of *The Little Red Ridinghood* and at the same time we leave out other things. We don't see the bicycle, the apartment building, etc. Seeing Little Red Ridinghood is like seeing the piles of paper in an office and interpreting office work as merely paperwork, you structure your perception around what you first see. In computer science, and the sciences in general, the search is for the regular and formalizable properties whereas in the social sciences questions also point to what makes a situation unique.

Exercise 2, "The Splinter"

Generally parents respond to this problem by telling about various ways of calming the child down and distracting him or her. What the parent does depends on the age of the child, whether the child is crying, and how scared the child seems.

The medical approach focuses on the splinter and what the child stepped on. The doctor starts out by choosing the proper instrument and sterilizing it. Then he/she isolates the splinter, sterilizes the wound and uses an appropriate instrument to remove the splinter.

The parent approach is an *ongoing* process that takes the whole context seriously. The actions are not planned step by step but depend on the situation. On the other hand, the medical approach is a sequential process that ignores the context. The actions are planned beforehand, they are not necessarily dependent on the situation.

The problem you set also sets your actions. If you see the anxious child as the main problem you may take certain action, and if you see the splinter as the problem, you would take other actions. The parent approach starts with people and the medical approach generally starts with information.

Exercise 3, "The Letters"

In this piece you were asked to find a criterion for placing some letters above the line and the others below. Presumably, you started out by searching for a characteristic attribute of the letters above the line; for instance that they were vowels. You might have proceeded by assigning values to the letters according to their position in the alphabet and you might then have tried to figure out an algorithm for

deciding where to put each letter. These attempts were probably in vain. These approaches, are typical for people with a mathematical background. They have an expectation of what they expect to see and act accordingly. They get stuck within their background. To get unstuck, you need to search for new frames.

If you alternatively see the picture not as letters or as letter codes for values, but as graphical signs then you discover that the signs above the line are made up of straight lines whereas the signs below also consist of curves.

Group discussions are often a more effective way to get unstuck, particularly if groups involve people with different experiences. In an office environment, a group of workers brainstorming about what they do will be talking about more than the tasks they perform. In this way, their collective experience can perhaps help them get unstuck.

The puzzle was carefully presented out of context. In order to make the point that, to be able to understand a situation you need the clues you can find in the context.

Exercise 4, "The Animal"

Most people immediately see that the animal on the picture is an elephant. You can see the tail, the trunk, the big round body, the legs. But now, take a look at the picture below:



Now, you don't see an elephant but rather, perhaps, a *teapot*. In the first instance, you leave things out that don't fit what you immediately see, for instance the lid. But things are not necessarily what they seem to be or what you are told they are. The power of suggestion, that is what those in authority tell us, has a powerful influence on what we think we see. Yet, as in this picture, if you turn things upside down you can see them in a new way.

Exercise 5, "The City"

In this piece, the situation is understood metaphorically - urbanhousing is seen as a degenerative disease that must be cut away to be cured.

Alternatively, you may understand the slum as a natural community or as a community with a folk culture. By this socio-anthropological metaphor, you become aware that patterns of social interaction in the community are of great importance and that local space serves as a locus for social relationships, [Schön (1979)]. The urban housing situation becomes a natural community that must be preserved and restored.

In the context of this paper, the importance of metaphors are that they stimulate reflection and make you see things in a new way. Different metaphors present the situation in different ways and point towards actions in different directions.

4. Designing the Whole Office, not the Pieces

Let's return to a discussion of office environments in order to get a better picture of how the exercise pieces may be woven together. First, we take a brief overview of the recent history of computing, using the notion of metaphoric design as a reference frame. Then we will go on to integrate some of the seemingly dichotomous ideas generated by the exercises. By contrasting concepts like *description* versus *interpretation*, *similarity* and *differences*, *planned action* versus *situated action*, *group discussion* against *individual problem-solving*, and *authoritative knowledge* against *shared knowledge*, we hope to set in motion a dialectical reframing process.

In the first part of the '1980's Personal Computers were a dominant theme in office systems design. Looking at Personal Computing as a metaphor for office work, it is clear that most systems design projects thought of work tasks as *isolated* and *personal* activities that could be

done by individuals, separately. By the mid 1980's the notion of 'networking' had spread from the technical jargon of designers trying to tie together the isolated work tasks (and workers!), to social activities that promised dating and romance as an alternative to personal isolation.

The introduction of workstations and desktop systems can be seen as an attempt at concepts that connected the isolated tasks of Personal Computer activity in a more concrete form than the spaghetti of intertwining networks. But, as pointed out in the beginning of the article, Desktop Systems, as a metaphor for work, assume that work is what one does at one's desk. And the workstation concept falls into the same trap.

Reframing office environments means setting them outside the traditional task-oriented approach to work, and seeing them as the social environments that they actually are. As has been pointed out by a number of social scientists studying work, informal conversations, haphazard meetings, and a great deal of judgement, decision-making and emotional support, provide the backbone of the office as a social environment, [Wynn (1979), Suchman & Wynn (1984) and Suchman & Jordan (1988)]. And as we know from architects and industrial sociologists studying the office, informal conversations often take place in hallways, and standing at the coffee machine, as well as leaning over one's desk and standing behind one's chair, [Ergonomic Design Group [1988]]. So the vision of a workstation as a place where work actually takes place, is quite limited seen through the eyes of social scientists peering through the window of work.

But we don't need to be social scientists to generate better visions about office design. For us, one of the messages of the exercises was to give validity to workers' or users' views of their workplace, [Suchman & Jordan (1988)]. Seeing an office in context, like looking at a child with a splinter, means that systems designers can't design systems for users, but must instead, work from the context as seen by the participants themselves, [Bjerknes, ét al. (1986.)].

Returning to the exercises, we can take a look at how the contrasting concepts can help us see things in new ways. One of the contrasts centered around the difference between *describing* action and *interpreting* it. Through formal education, systems developers are taught to describe work activities, as if these descriptions could catch reality at a static point. What tends to be caught, of course, in system developers' documentation of reality, is generally a set of patterned

tasks or procedures, like coding forms, or answering phones. Interpreting workplace action opens up other possibilities, like the chance to climb out of a task-approach and see people's actions as they interconnect in the work arena. But, like the lessons learned in the story of Little Red Riding Hood (exercise 1), what we interpret might jump us past seeing the details and into the woods. Here, the importance of getting differing interpretations of office work becomes increasingly clear. And it is here that we can see the need to involve users in the interpretation of their reality. We need to go beyond user involvement as the empty phrase often repeated in systems text books, to the idea that users have *valid* knowledge and experience about their jobs which is essential for understanding the context of work.

Another point brought out in the first exercise was the contrast between looking for similarities and looking for differences. When we jumped to interpreting the story of Little Red Riding Hood, we may have noticed that we looked for similarities with the story as we knew it from childhood. Looking for similarities or patterns is useful for getting an overview of a situation, as in the case of the third exercise where the letters could be grouped when we found the pattern.

But emphasizing similarities has been a problem in office systems design. Systems developers are trained to look, for example, at the procedures and forms that people use in common, or the fields of information that can be shared in a data base. Opening up the possibility of looking for *differences* in the way people work, can help us see things like the fact that people organize their desks differently. When confronted with the reality of various piles of paper on people's desks, we can easily see that desktops are used for more than work surfaces. Many times you may have noticed that when you go into someone's office to talk with them, they must clear out a section of their desk (or even clear off a chair, for that matter) before you can begin working. The clutter or order on desktops reflects *differing* ways of organizing work processes and information. Office systems generally assume, for example, that we put information into files. But the information we use on the job, may be clumped into piles, stored in a drawer, or simply stored in a person's head for use at another time. How, when, and where we use information affects the way it needs to be processed. And since office systems are more than information systems, we need also to look at the different ways that we relate to each other and to work processes.

In the piece about the child with a splinter, we saw that actions are not always planned, but rather need to happen depending on the situation. The distinction between *planned action* and *situated action*, [Suchman (1985)] says a great deal about the way we work. Suchman makes the argument that too often instructions for the use of office equipment assume that people follow directions according to a set plan. But, as in the example of the letters, above and below the line, we can get stuck trying to understand something if we stick to a single plan or frame of reference. Just as talking on the telephone requires responding to an interactive situation, retrieving information from a data base, or asking someone for information are examples of situation-based actions that happen in an office environment.

In the example of the letters we also realized that *group* discussion, instead of *individual* problem-solving was a way to get outside of a binding frame. In the design of office systems we need to move further away from the Personal Computer metaphor in the direction of seeing group-based activities. Office work seen within a social context, shifts our focus from an individual sitting in front of a computer screen. Instead our view turns towards actions of a group of people as they talk to each other, look at each other, move within their physical surroundings and share information. Several researchers have found that a concrete way to recognize group processes is through action-oriented workshops that get workers together to talk and take action about their problems, [Kensing (1987) and Bødker & Greenbaum (1988)]. Recognizing the importance of group activities, like accepting the validity of user knowledge is a big step outside of the traditional office systems design frame.

The piece about the teapot that looked like an elephant, set up the situation where *authoritative knowledge*, that is directive information, shaped what one could see or think, [Suchman and Jordan (1988)]. We feel that most of the time, authoritative knowledge, in the form of management decisions or systems developers' reports, has the direct effect of thwarting other ways of knowing. If, for example, management sees the problem as one of 'too much paperwork', then the power of this form of information generally propels systems developers to create computer systems to get rid of the piles of desk cluttering paper.

While there is no simple solution to getting around the problem of authoritative knowledge, we see that focusing on *shared knowledge*, or that accumulated by group activities, is another way to transfer validity from 'experts' to groups actively involved in the work

process. And this requires not only taking group activity seriously, but recognizing that the knowledge shared and created by groups is, perhaps, the heart of the office.

In the last exercise we saw how metaphors frame a situation. In Schön's examples the metaphors were identified after the fact in a post mortem-analysis of other peoples way of talking about urban-housing. But, metaphors may also be used consciously to reframe the way we think about computers in an office environment [Madsen (1988)].

So now, we should warn our readers (and remind ourselves) that seeing things in new ways also needs to be seen within the context of conflicts between managerial expectations of a system, and expectations of the system participants. Many information systems (perhaps, most) are contracted for by upper-level managers in order to 'solve' what they believe to be their chief problems. Usually the 'solution' to these problems takes the form of increased efficiency, in the guise of faster information flow, greater control over the work process and, of course, more and predictable output. Once these issues are identified as the problem, middle-level managers carry out the functions of describing the details of the information to be processed. This route to systems design is like using a paint-by-numbers set: the picture is known, only the colors have to be sketched in. When it comes to the point of involving users in system design, project managers and workers are asked to participate in a rather predictable pattern: a picture whose form, and to some extent, content, are already known.

How can seeing things in new ways help in this cluttered forest of conflict? We think that it is useful for systems participants, systems developers, and possibly even for systems managers. It's use lies in helping to shake loose unstated assumptions and put them forward for discussion. We hope that you will agree, or, perhaps, challenge us. But we realize that changing patterns of decision-making takes more than five easy pieces.

5. Postscript: A little story

We borrowed the name of this article from the film with Jack Nicholson, called *Five Easy Pieces*¹. Nicholson plays the role of a highly trained concert pianist, who chooses to bum around the States

¹ Five Easy Pieces, Columbia 1970. Director B. Rafelson.

working at odd jobs. His career as an actor was made in a scene in a diner where he tries to get a side-order of plain toast from a tough waitress who insists that he can get 'only what's on the menu'. Nicholson, in his slow talking, sarcastic fashion tries to get around the rule by ordering a sandwich, and then, one-by-one telling her to 'hold' the ingredients. He doesn't succeed, and in the tradition of American films, a brawl follows. But that's not the point. The success of *Five Easy Pieces*, and Nicholson's almost cult-like fame grow out of the actions of a man who steps outside of his world, and tries to do things a little differently. This 'bending the rules' and looking at things in new ways is a solid piece of the image of American culture. Yet, it also speaks to the need in all of us to 'go outside the system'. It can be used in the individualistic way of the character Nicholson plays, or in a more collective way where we, together, use logic, experience, imagination and humour to see things in new ways.

In this piece we try to suggest that the collective approach is a good strategy to get us out of the bind of technology-driven office systems. Reframing our world takes some training and a great deal of imagination. The character Nicholson plays learns to become a concert pianist by playing 'easy pieces'. We, too, can practice at trusting our experiences and cooperatively learning to use our imagination.

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