Title: Perception and learning
Author(s): Ruth Wong
Source: Seminar on Instruction and Instructional Materials in Institutions of Higher Learning in Singapore, Singapore, 18 - 20 February 1974

This document may be used for private study or research purpose only. This document or any part of it may not be duplicated and/or distributed without permission of the copyright owner.

The Singapore Copyright Act applies to the use of this document.
INSTRUCTION AND INSTRUCTIONAL MATERIALS
IN INSTITUTIONS OF HIGHER LEARNING IN SINGAPORE
18 Feb – 20 Feb, 74, Singapore

PERCEPTION AND LEARNING
by Dr Ruth Wong
Wednesday 20 Feb 74 at 3.15 pm

There seem to be two common notions about perception. First is the simple idea that perception is in some way connected with the use of the eyes, and, perhaps additionally, the ears. Hence we need audio-visual materials to enable us to perceive better.

Secondly, there is the belief that the learner first leans heavily on experience with concrete things and then, having had this primary experience, he makes something mere out of his concrete experiences by a secondary process of classifying, relating, selecting, organizing, etc. through lingual behaviour and discursive symbols; then he proceeds to abstract ideas and concepts. This progression from concrete to abstract is regarded as an unidirectional process, concomitant individual development, in the course of which the learner becomes less and less dependent on the concrete as he accrues more and more experience. Because of this notion, some would discount the need for the use of audio-visual materials at higher levels of education. Can this be the reason also that, in Singapore, we find primary schools replete with charts, drawings, books, television sets, tape-recorders and so on, secondary schools have fewer of the colour, the charts and the books -- more of the notes of the teacher; and finally, in tertiary institutions, all of the notes and non12 of the: charts, etc. It would seem that we are making the assumption that the higher the level of education, the more able are our students to attend to and apprehend what is taught.

Neither of the two common notions mentioned above is entirely wrong. The first is a good example of an error of perception of what perception actually involves. The second reflects a limited concept of the total process of learning, because those who hold this notion are perhaps not aware of other principles of learning.
This paper will therefore attempt to clarify some current theories of perception and learning which are highlighted by research, show their relationship to one another, and draw attention to the relevance of some of these-theories to instructional problems at higher institutions of learning.

Every living organism experiences objects and events. Space and time provide the framework of these experiences and the sense organs -- eyes, ears, nose, skin, etc. are the receptors of incoming stimuli from the environment. As organisms gain in complexity, they are able to react to stimuli even at a distance. Take, for example, the case of a man hurrying home from his work. He is able to "smell" in anticipation, the favourite dish his wife has promised in the morning to cook for him.

Assuming the sensory system to be in good order, the number of stimuli received can be countless at any given moment of time. To cope with these incoming stimuli, therefore, there goes en perpetually, a selective cum organising activity. As a result of the first aspect of activity, experience is given a focus and a margin. We speak of a span of attention and the need to attend to something. The intensity of the stimulus, its novelty, its repetition all help to determine selective activity. In our own experience, an unusually loud sound, or a new shape or the drip-drip of a leaky water-tap has often drawn our attention. It also happens, however, that we get so used to the loud noise or the drip-drip that we “hear” it only when it stops; a new colour may not catch our attention, if set amidst a new arrangement of many new objects. The regular repetition of a stimulus often produces a set of expectation so strong that later members in the series of stimuli cause the same response even when, in fact, they have been changed, as in the case of "proof-reader's illusion", where a misspelled word may be missed because of expectation of the correct forum. These instances show that the mechanism for selection is intricate.

Furthermore, the selection of sense stimuli is subject to modification by a person's intention, his motivation, his attitudes and the part which the particular set of stimuli plays in the whole pattern of perception. If a person is on the look out for a particular place, which he is told by his guide is near a particular landmark, the latter comes into view where it may have slipped his attention previously. If I were to ask you what building is exactly opposite the Hilton where we are meeting, you would perhaps not be able to tell me, though Orchard Road is a very familiar thoroughfare to many of us. This shows how intention helps to determine
attention. Similarly, attention to the landmark is motivated by a desire to get to one's destination.

However, the driving may be hard, because of heavy traffic and the difficulty of getting a parking lot poses a problem. The person who has the attitude, "why should I put myself out to look for so and so?", is unlikely to 'spot' the required landmark in an unfamiliar street.

To take another example – we are aware how often there are different descriptive versions of a happening or an accident. To the passing doctor, the injured person in an accident becomes the focus of attention: other details escape him. One casual observer may be more interested in the activities of the police and the ambulance men; another, in the hurt received by the injured.

Organising activity which accompanies selection permits groupings of sensations. It may result in the grouping of simultaneous stimuli such as those received in a glance at a printed page, or the grouping of sequential stimuli, as in the hearing of a piece of music. Such groupings are not necessarily discrete, as in the case of TV viewing. While it is still not fully clear how sense stimuli are grouped, it has been noted that similarity, proximity and symmetry influence grouping.

Consider the following figure:

```
Figure 1
X  0  X  0  X
0  0  X  0  X
X  X  X  0  X
O  O  O  O  X
X  X  X  X  X
```

The crosses appear to belong together; so do the tiny circles. Patterning in the perception of this figure is influenced by similarity.
In Figure 2, the arrangement of lines as pairs is seen as 3 pairs of close-together lines rather than as 2 pairs of wide-apart ones.

Figure 2

Here we see the principle of proximity at work.

If, on the other hand, lines are so drawn as in Figure 3, the question, “How many pairs of lines are there?” may draw an answer “4”. The pairing in favour of proximity may be abandoned in favour of using all the lines.

Figure 3

Here, the addition of 2 single lines not only forces attention on them but on the symmetry which results.

The last two examples do not rule out the possibility of responses such as any the following to Figure 2, for example – 5, 7, 9, or 11. Here, the answer also depends on the concept of “pair” which the individual possesses. Thus, previously acquired concepts also influence perception. I shall leave Figure 3 for your own amusement.

In dealing with Figure 2 and Figure 3, it is clear that, in both cases, the figure is seen as a unitary whole. Similarly, where objects in the environment are concerned, they are not perceived as a clutter of objects, but as some well-defined collection. Figure 1, for example, appears as a clearly patterned array, 1, 3, 5, 7, 9.

Also, whether the attention is focused on one or a set of objects, whatever is perceived is set off by a background against which its contour is clearly established and the object seen is coherent and continuous within the contour. Sometimes, the object appears ambiguous. The
reversible figure, as in the case of Rubin's famous Peter-Paul Goblet, is a good example. This is brought out more clearly by colour and contrast. [Note the result of superimposing; a colour overlay after projecting the plain figure on the screen].

Also notice that if we look long enough at the goblet, the faces of Peter and Paul will emerge and if we continue to look at the twins, the goblet will emerge. Here, the object process weakens as it becomes satiated. Thus results the alternating perceptions in a reversible figure. Satiation affects size, shape, depth, perspective, direction and movement.

The complexity of objects also influence the perception of size, depth of figures and their shape; so do light and shadow have their effects. Perceived size and distance may not be actual size and distance. This accounts for optical illusions to which observers are sometimes prone. [See examples].

So far, in the discussion, certain principle and conditions of perception have been selected for attention. Because of the many references to the figures provided, it would appear as though perception were merely visual. Actually, there is no situation in which only one sense is alive and other senses dormant. The senses of hearing and seeing may tend to dominate, but they are generally supported so imperceptibly and subtly by the other senses that the latter tend to go unnoticed.

Here, in this room, you may be ostensibly listening to me and looking at the projection screen from time to time, but the sense of drowsy comfort, induced in an air--conditioned room after an elegant hotel lunch, shows that your being, as a whole, is tuned in to something else besides that which eye or ear seeks to inform. Experience is meaningful depending very much on what we do with it. If what I say now appears boring, the "meaningfulness" of this afternoon’s session will not be perceived in the topic I am attempting to elaborate. Yet, your experience here may still be memorable as a few moments of physical relaxation so seldom enjoyed in
the normal routine of busy people. We can, right away, "dampen" the senses of sight and hearing and allow ourselves other sensations which produce more desirable effects.

From the above: it may be seen that there is nothing truly obvious with respect to experience. I go out walking with my 8-year old nephew; the same environment yields hedges full of spiders for him and the fascination of different expressions on human faces for me. Thus, from the same set of stimuli, different perceptions are made.

In every case where perceptions are achieved, the senses cooperate to make meaning of the stimuli received. Bruner describes this process as the achievement of a perceptual field that is, in some sense, balanced. He envisages the individual organism as first selectively accepting a few tentative but prominent cues from his environment. These are then used to set up a tentative structure which becomes more and more detailed as more important information is received. Always, each succeeding perception is under the control of the foregoing one. The establishment of a tentative structure determines the action that the subject will take to get more information. The more detailed the structure, the more likely is the perceiver to insist that new information be consistent with previously received information. Cyberneticists view this process as a "closed-loop sensory feedback". This view of the process associates with it a dynamic capacity which the traditional idea of successive arbitrary pattern setting does not. Through this process, perception leads to concept attainment and concept attainment to learning. If discrimination is an integral part of the learning process, then in the successive adjustments, which the organism makes, perceptual learning also takes place.

In perceptual identification, information is transmitted both by the object and its context. The cues from the object to be categorized and its context may conflict, as in the following situations where non-discriminating Singapore primary school children used to bawl "God shave your gracious Queen!" when singing the National Anthem in the dark old colonial days ... or where a certain person described Reverend So-and-So as a "God-sneering man." One might logically conclude that if the tentative structure were inaccurate, a non-veridical perception would result.

Perception passes on to concept attainment when it is possible for a perceptual invariant to be established with the full recognition of all the characteristics and elements peculiar to a particular experience or set of experiences. A concept should be generalizable beyond the immediate
experience and, if the individual can utilize it in response to a set of not completely identical stimuli, he is said to have learned.

Before passing on to the implications of theory for practice in instruction at our tertiary institutions, let me allude to one other aspect of perceptual experience. We are aware that many of our perceptual stimuli are produced by movements. As we read a page, eye movement goes on. A sense of pain can be produced by a touch which involves the movement of the hand. Experience occurs in a perpetually moving environment; motion and perception very often occur so closely together that we can hardly separate them. Thus behavior organization frequently and generally requires perceptual-motor integration. Cyberneticists have demonstrated that space-organised perceptual-motor coordinations are defined by the maturation process, though manipulative movements are defined through learning to control specific objects and events in the environment. Through maturational and learning changes, the individual also gains increasing control over his own responses and the pattern of his own behavior. This is in keeping with the “closed-loop sensory feedback” view of what defines the interactions between the individual and his environment. I am personally in favour of this model of human behaviour as it emphasises the need to recognize that activity is the normal state of the individual and that energising processes are intrinsic to the behaviour patterns themselves. With this self-adaptive, feedback system available to the individual, learning is inbuilt into the process and is not merely contingent on temporally organised or extrinsically provided feedback.

It draws attention also to the important link between the individual's development and a rich and stimulating environment. If the interaction is officially achieved, maximal learning gains result. Therefore, the individual should be helped as much as possible to establish his own patterns of control over those tasks, skills and knowledge which may be expected to afford social utility and personal satisfaction. In this way, he develops not only the necessary ability to cope with his environment, but also to exercise independent initiative and self control as well. For example, the young person taught to discriminate the nuances of sound and colour in the world about him and to cultivate the hearing ear and the seeing eye is more likely to grow up a better writer than another not so taught.

How rich is the following prose, an extract of a letter by Turgenev(1) as a young man:
“Every evening, before I go to bed, I stroll in the courtyard. Yesterday I paused and began to listen. There are the different sounds I heard. The sound of blood in the ears and of breathing – the rustling, the unceasing murmur of the leaves, the chirping of grasshoppers, there were four in the trees. The fish made a slight noise on the surface of the water, like the sound of a kiss. From time to time, a drop fell with a slight silvery sound. A branch snaps -- what has broken it? There is an remote sound what is it? Steps on the road? Or the whispering of a human voice? And suddenly the fine soprano of a gnat sounding just by one's ear.”

How impoverished and limited is the prose in so many of our readers used in school, readers which purport to support the teaching of language! If only teachers are aware that much more can be learnt from exemplars like the passage above or directly from trees, from birds, from passing sights and sounds! The rich environment is about us, yet we deplete its richness by confounding its messages; we pollute and vitiate it by our human drone and verbal nonsense. We have never allowed the learner the initiative in the learning task.

Our meeting together for this seminar has been for the purpose of examining how we can create a better learning environment for our students, for after all, this is the objective of improving instruction. What I have said above carries both the obvious implications for the preparation and the use of teaching aids and the not so obvious implications for the role of educational technology in higher education.

It is obvious that audio-visual aids are meant to and are able to provide stimulation. The teacher's desire is to produce stimuli having enough strength and definition to get through to the student. Aids can help to fulfill this. We know from the principles of perception that aids have to be relevant to need; charts and diagrams must be unambiguous. The use of hardware and software should provide students with opportunities to achieve insights which are verbally difficult to impart. They should be able to relieve the teacher of the need to teach certain routine tasks. In all these respects, they have a place also at tertiary institutions. Yet, when all is said, the only certain benefit that derives from the use of audio-visual aids is a quantitative increase in the measures which can be taken

to make instruction more flexible and the organization of instruction more varied. A.V.A. or educational media in general have no qualitative significance or methodological implications for learning apart from the manner in which they are used.

Educational Technology, however, is different. It is not merely the hardware or the software. It is not merely the teaching, which is both art and science; it is also the learning, both as art and science. Hence, when we consider educational technology, our concept should be of an organic system in which teaching and learning are coextensive and coexisting, with the management of their integral activity supported in the most meaningful way by the teacher's methods and the materials and hardware of educational media. This system should also be a cybernetic, closed-loop feedback system. In other words, it should have the capacity for correction, adjustment and improvement. The science aspects (more structured) and the art aspects (more intuitively creative) are interdependent, because it is on the basis of structure and knowledge that new elements are most easily discerned as fitting into new design. So to both teaching and learning there should be the structure -- the objectives, the rationale, the methods and the techniques; to both, there should be the creative capacity -- the curiosity, the insights, the "hunches", the freedom. Only when we have appreciated this concept of educational technology can we realise in full the potential of our recent commitment.

What does all this mean in practical terms? I notice that other speakers -- Mr Harburger, Mr Swahn -- have touched somewhat upon this matter. Our definition implies, first the need for all of us as teachers and professionals to re-examine afresh our educational objectives. Can the cognitive be divorced from the affective? Can skill learning be devoid of verbal content? Does a degree pre-empt knowledge for all time? What do students at tertiary institutions really need to know before they leave us?

Next, we need to plan -- not on a basis of UNESCO proportions for five or ten years, nor in response to ad hoc stimuli. It is a plan which takes into account our objectives, the capacity of our students, an assessment of the learning environment and their needs, our strategies, our opportunities, our techniques and the execution of our task. Media services belong here primarily. Such a description of a plan can hardly be exemplified by a set of lecture notes illustrated by audio-visual materials.

Thirdly, the feedback concept is premised on a willingness to evaluate -- our course, ourselves. Have we extended in any measure the horizons of meaningful existence, made our students more vibrant, besides extending
their skills? Have the course objectives been fulfilled? Am I a better teacher than last year? Let me listen to my own voice, tape-record it: is it the monotonous, measured drone others say it is? When did I last update my knowledge and my materials? Do I have some new knowledge of my own to share? Let me be open to the vulgar gaze and then, when corrected, improve myself in all humility.

Finally, let me say a word about methods. These are peculiarly our own. They should be distinguished from techniques. The essence of teaching and learning lies in the methods -- the art. These take a life-time to create, to develop, and to cultivate. The teacher’s methods comprise not only the techniques but the giving of his very self with his skills, his knowledge, his tools, his attitudes and his idiosyncrasies. The learner, too, has to cultivate methods beyond spotting questions, memorization and jumping to conclusions. For him, opportunities for independent and personal activity need to be encouraged. This is not, however, random activity. It should give scope for a particularly personal response.

I come now to the end. Learning at a tertiary or any other institution succeeds only to the extent that our perception of our particular role as educators is kept in correct perspective. We can then consider ourselves to be most important learners in a learning society.