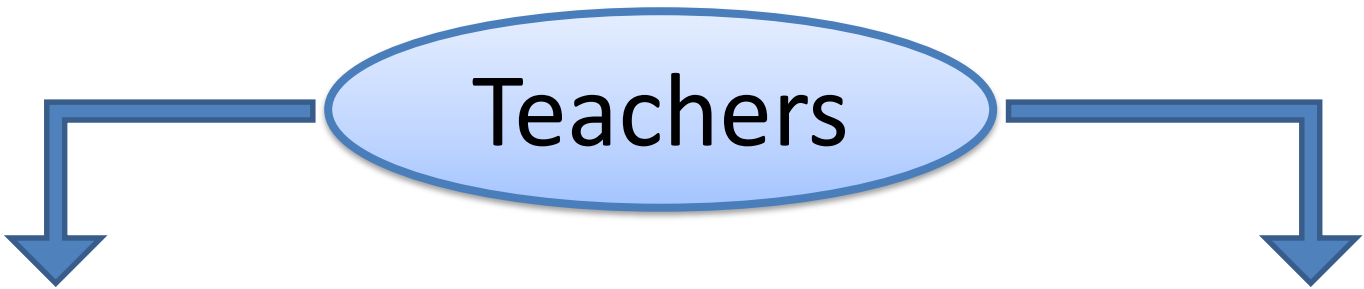


1

Part A

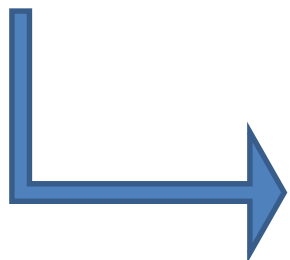
Cognitive aspects of the classroom

Seminar 2 Thinking, problem-solving and concept learning.

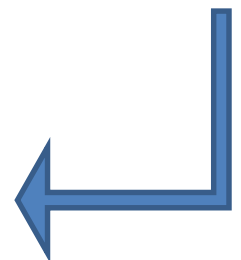


Required to teach Children **TO THINK**

AIM: Teach structure and main concepts of a subject rather than the **FACTS**.



Develop intellectual power, the capacity of thinking and that of **CONCEPTUALISATION**.



2



HERE, many questions ARISE:

1. What are teachers exactly asked to do?
2. Do we all think?
3. Do we all think in the same way in similar situations.?
4. What is a concept?
5. What is involved in Pbl. solving?

N.B. Try to always keep in mind that we are dealing with P.P, that is we are investigating the human mind/behaviour (that of the learner, most particularly) to see what appropriate decisions could be made to perform pedagogy as a Teaching Sce.

3

Today's psychologists' interest is

① In cognitive processes by means of which man makes sense of his ENVRT.

② In thinking, pbm. solving and concept learning.

Material

Social

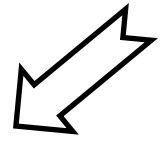
③ Basic cognitive processes used by children in school.

Factors likely to help teachers design lessons to develop these processes.

Once again, everything is a path leading to PEDAGOGY as a sce. of teaching.

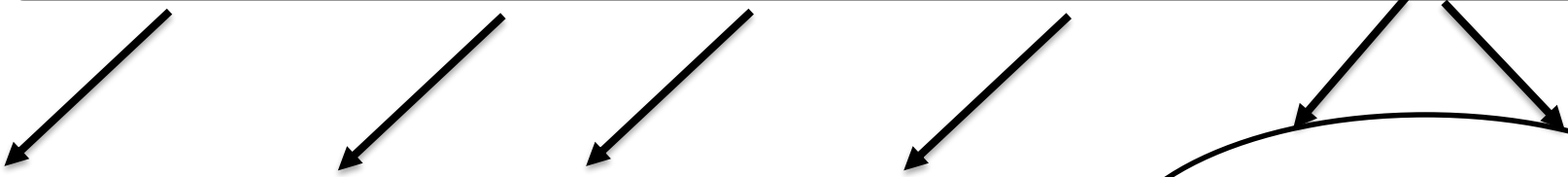
1. Thinking

- Like INT.
- Polymorphous term.
- Applied to many sorts of activity.
- From rigorous analysis to free-dreaming.



1.1. Ways of thinking

Six types of thinking commonly used in sch. situations



- 1. Everyday thinking
 - 2. Artistic TH.
 - 3. Logical & mathematical TH.
 - 4. Explanatory TH.
 - 5. Productive TH.
 - 6. Directive TH.
- Together**

5

1. Everyday thinking

- According to Barlett (1958), Thinking is an advanced form of skilled behavior.

- In his own words:

“... it is not simply the description either by perception or recall, of something which is there, it is the use of information about something present to get somewhere else.”

- Barlett’s def. of everyday TH. :

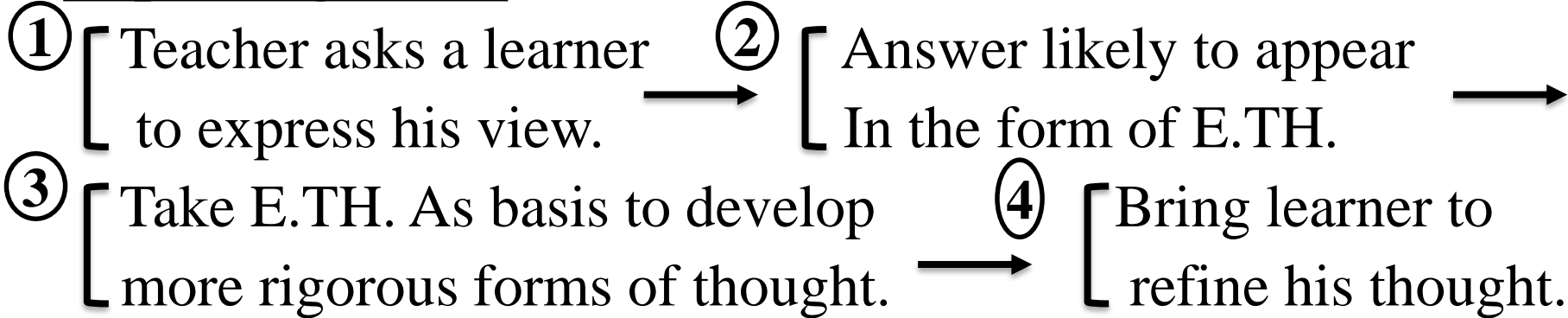
“Those activities by which most people, when they are not making any particular attempt to be logical or scientific, try to fill up gaps in information available to them in which for some reason they are especially interested.”

6

- **Aspects of everyday TH.**

- Mainly related to social matters.
- Characterised by thinker's tendency to favour certain viewpoints and to reject others.
- In E.TH. An argument is attempted **NOT** on the basic of **EVIDENCE** but on the **MANNER** the statement is made.
- In E.TH. There is an appeal to GP.CONSENSUS.

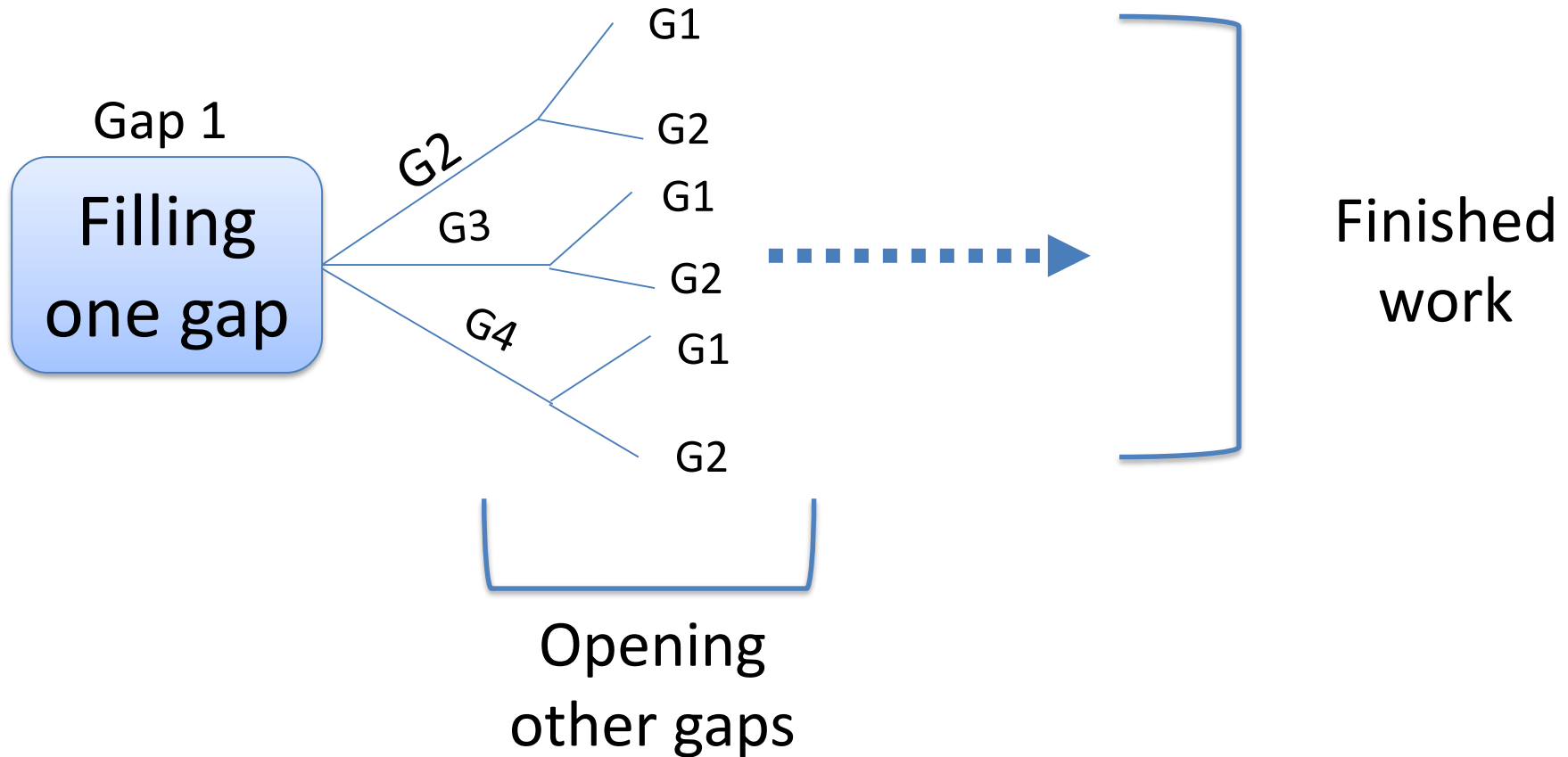
- **Exploiring E.TH.**



Qs. Do you see any pedagogical implications in this proposition?

7 2. Artistic TH.

In this form of TH., the ARTIST, through intuitive progression, fills ONE gap, BUT thereby OPENS others until he BRIDGES them all and arrives at the finished work.



8 The special nature of this process is illustrated by Bell (1956) in the following marvelous words:

“Virginia Woolf and Picasso belong to another order of beings, they were of a species different from the common; their mental processes were diff. From ours; they arrived at conclusions by ways to us unknown. Also, their conclusions or comments or judgments or flights of fancy or witticisms, or little jokes even, were true or convincing or effective or delightful for reasons that are not the reasons of logic nor yet of our well tried common sense...”.

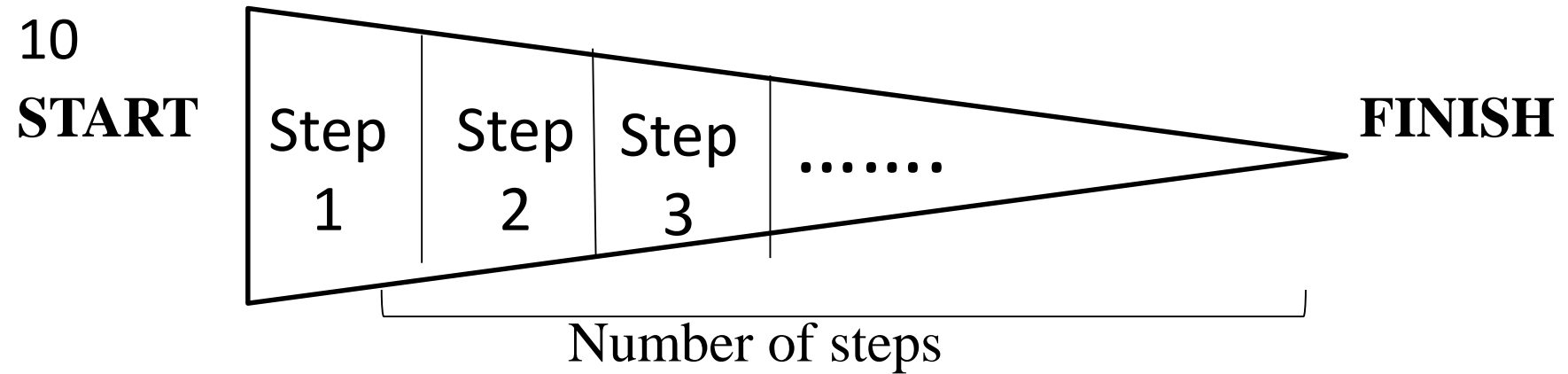
➤ These people reached conclusions as satisfactory as those of mathematics, **BUT** through quite diff. **roads**.

- 9 ➤ According to PEEL (1960)
- Children's ART. TH. Is **IMAGINATIVE**.
 - TH. Here is **FREE**.
 - The thinker is bound by no practical pbl to solve.
 - **HOWEVER**, although it is fairly free, it has to be consistent with the theme of essay, the painting, the piece of music, etc.

Qs. What do we have to retain, here, as people committed to the performance of reacting through the use of well-thought psychopedagogical principles?

3. Logical & mathematical TH.

- The most structured form of TH.
 - Requires the thinker to proceed from START to FINISH as accurately as possible.
- According to Barlett, a characteristic feature of this form of TH. Is that: "As the number of steps taken towards filling up a gap increases the number of probable next steps decreases".



Qs: how can this be made useful in the classroom?

4. Explanatory TH.

Peel (1960) suggests 4 features in explanatory th. :

1. The control of associations by practical criteria,
 2. The testing of hypotheses against the facts,
 3. the acceptance of some event or theory as being reasonably probable,
 4. And the formation of language that deals with concepts and classes of objects.
- Expl. TH. implies the thinker making use of what he already knows to explain or describe actions and events which initially puzzle him → use of **previous knowledge**.

- Barlett's Experimental TH. Is one form of EXP.TH.
- According to him, it has to include:
 1. A relatively late dvp. In the search for knowledge of the world.
 2. Based upon prior accumulation, description and classification of observed facts.
 3. Based upon the invention of special methods and usually special instruments for establishing controlled sequence among facts.

Qs. Positive implications?

- A good pedagogy not only **INSTRUCTS**, but **CULTIVATES** the scque & academic attitude/behaviour.

12 5 & 6. productive & directive TH. (Wertheimer 1880-1943)

(whole is greater than sum of its parts → Gestalt school)

- It requires the pupil (thinker) **to go beyond** what he has absorbed, and **RESTRUCTURE** a pbl. in order to reach a solution.
- There is, not only **REPRODUCTION**, but **CREATION** of new schemes of thought.
- The thinker is required to grasp the total structure of the pbl.
- Dvlt. in thinking is essentially a **RESTRUCTURING** process.
- Here, → understanding of the pbl. as a whole.
- Strains & stresses engaged in thinking must yield vectors in the direction of improvement of the situation.

Qs. How can we use prod. & direct. TH.?

1. Productive not reproductive (repetition).
2. Have an understanding of pbl. As a whole and channel one's efforts towards → solution.
3. A rational use of the pupil's thinking capacity.

13 1.2. Helping children to think

⇒ **Arousing curiosity**

- In Berlyne's (1965) view, epistemic curiosity or will to know is aroused by **CONCEPTUAL CONFLICT**.
- What does that mean.
 - It is when 2 symbolic response patterns appear to be **INCOMPATIBLE**.
 - This brings the learner/thinker to question himself and the situation.
 - In other words, they are incompatible → there is a pbl.,
→ let us think → **SOLUTION**

14 ➤ Berlyne names six types of **CONFLICT** likely to lead to **EPISTEMIC CURIOSITY**.

1. **Doubt:** the subject is torn betw. belief & disbelief.
2. **Perplexity:** two sets of belief seem equally tenable but are mutually exclusive.
3. **Contradiction:** the subject is virtually forced to accept two incompatible beliefs.
4. **Conceptual incongruity:** the subject has to accept that two properties occur together which he has not previously expected to occur together.
5. **Confusion:** when the subject has incomplete information → interference in the subject's search for a solution.

➤ What to retain:

Surprising questions stimulate the thinking process

15 ➤ To experience **conceptual conflict** is likely to bring about an attempt to reduce it ⇒ Hence, motivation to think about the topic.

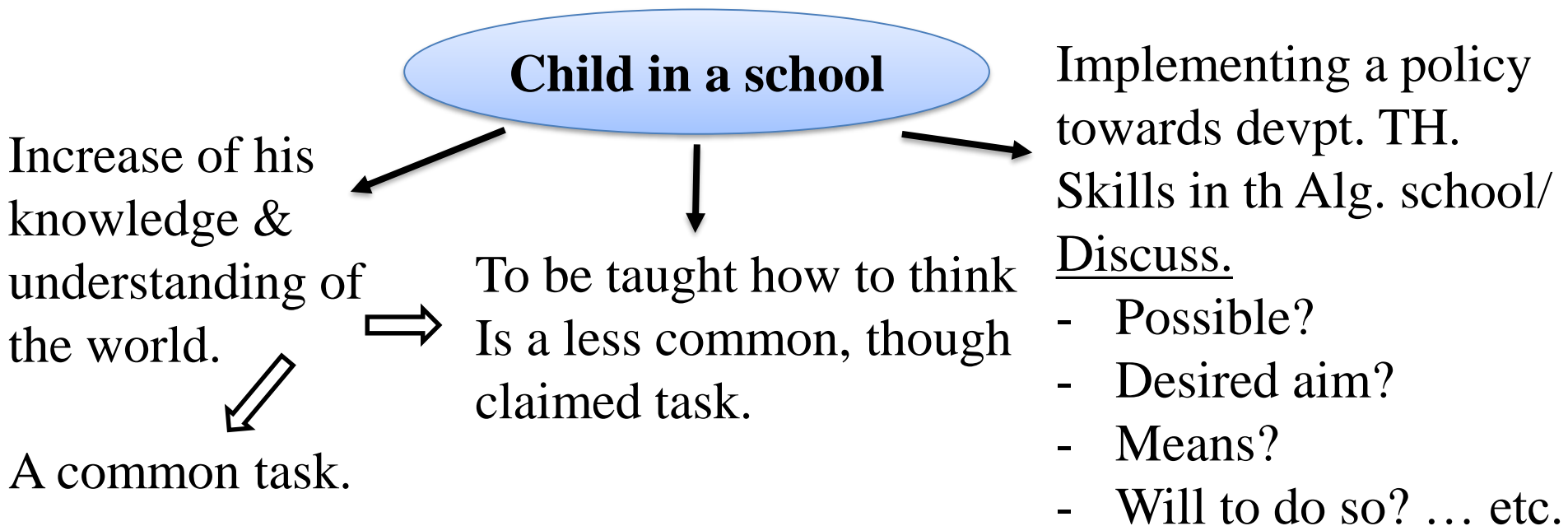
➤ Information is valued and gathered only after a period of **UNCERTAINTY**.

➤ The new information will reduce the conceptual conflict.

Qs. Are these elements part of the pedagogical instructions Algerian teachers officially receive?

→ In either case, DISCUSS.

DEVELOPING THINKING SKILLS



16 ➤ Furth and Wachs (1974) conducted a rche. in what they named a "THINKING SCHOOL" where six characteristics were maintained:

1. the activity of thinking was intrinsically worthwhile .
2. Freedom within structure of sch. Activities → FOSTRED.
3. Each activity was intended to challenge child's thinking.
4. Children are encouraged to focus on activity NOT on teacher .
5. Children were expected to work with small gps of peers to have their thinking influence each other and to dvpt socially.

➤ Debate → Thinking Vs non-thinking sch.?

➔ Sch. role ➔ emphasise thinking in child as natural equipt.

Otherwise ➔ child will not be able to avoid learning failures.

Qs. 1. do you know about activities likely to foster thinking?

2. how do you value the importance of thinking in sch. activities?

17 2. Problem solving

- To solve a pbl requires INT. & other specific cognitive processes: directed thinking, insight, hypothesis testing...
- In sch., pupils are often asked to solve pbls.
- Only teachers aware of process of bpl. solving are likely to be able to help → Qs. Appropriate teacher training?

2.1 what is a pbl.?

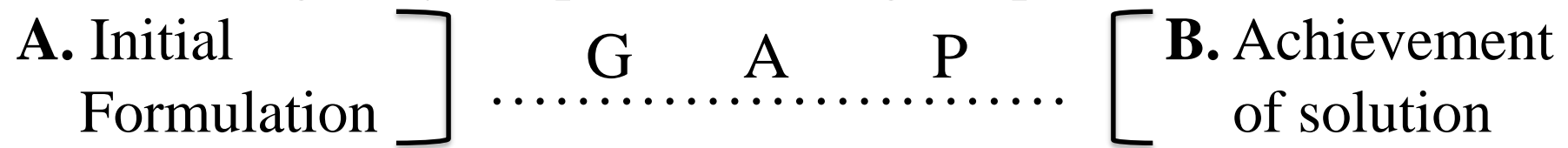
Examples of pbls:- a puzzle to be solved
- a house to be designed
- an explanation to be found

These are targets

We know **WHAT** should be done but we do not know **HOW**.

- The formulation of the pbl. or asking the right Q. is in itself a pbl.
- **THUS**, there are many types of pbls.

18 • Whatever the pbl., there must be a gap betw. The initial formulation of **TARGET & ACHIEVEMENT** of solution to be bridged by the person solving the pbl.



➤ To Gagné (1966)

“pbl. solving is a change in individual **performance** leading to a change in **capacity**.”

- The pbl. solver must develop a new rule, not recall an old one.
- This makes pbl. solving sound like a form of learning.

⇒ i.e. learning a new rule.

➤ Gagné makes the following difference:

- In **trial and error learning**, the act to be learned is a part of the learning situation.
- Whereas, in pbl. Solving, the solution is not part of the learning situation.
- This is why Gagné calls pbl. solving a **non-reproduced type of learning**.

19 2.2 theoretical approaches to the pbl. solv.

Process

1- The Gestalt approach: (Gestalt sch. of. psych)

- Stresses the importance of seeing pbl. as a whole.
- Subject must grasp total situation.
- Situation would fit in the whole → (suddenly)
- Restructuring the material becomes sufficient condition for pbl. solv.
- Often opposed to trial & error behaviour.
- Named « seeing the light » or « insight ».
- Gestalt insightful approach → essentially cognitive.
⇒ any pedl applications?

20 2- The behaviourist approach:

- S/R approach.
- Concentrates on external behaviour.
- Building up associations bet. stimulus & response.
- Stresses the central role of reinforcement.
- These rules/laws operating in simple learning situ. apply to the most complex forms of human beh., includ. pbl. solv.
- The process is same form of conditioning.
- There is a chaining of responses.
- Discrimination learning.

➤ Skinner (1966)

- Talks of « operant analysis » of pbl. solv.
- Often mistakenly identified with S/R theories.
- In operant analysis, a correct answer is rewarded and hence strengthened.
- The reward depends on the subject initially making the correct response.

21 3- Pbl. solv. as a form of learning:

In Gagné's (1964) point of view:

- Learning must precede pbl. slov.

Ex: ability to manipulate letters & symbols is a pre-condition for being able to use them as tools in solutions of verbal & numerical pbls.

- Pbl. solv. in itself is a form of learning.

- Subject's previous knowledge must be stressed.

- Likely to result in indiv. diffces. in expertise.

- Instructions given to subject act as stimulus.

➤ Gagné presents the process (pbl. slov.) as a mixture of:

1. Internal processes.

2. External processes.

3. Individual diffces.

Qs. Any pedl. Projections into lesson designing?

22 4- Pbl. solv. as infor. processing:

- Computer analogy.
- Infor. is originally stored in memory.
- Infor. is retrieved and used in new pbl. sov. situation.
- Infor- processing theorists argue that human pbl. solv. can be ‘simulated’ by a computer.
- Primarily concerned with process.
- However, immense difficulty to simulate human thinking.

➤ Hunt (1968) summarized this issue as follows:

“Of this date, no programme has been shown to simulate human pbl. solv., although there are several programmes which solve pbls.”

23 3. Concept – learning:

3.1 what is a concept? (2 main Qs.)

What is it that a person has when he has a CPT.?

What is it that he has to do to get a CPT.?

Two fundamental Qs. In the **learning of concepts**.

One of the most fascinating areas of hum. cognitive beh.

Illustration (ex: if Amel has a concept and Lakhder does not, Amel will be able to do things that Lakhdar cannot.)

Concept = Sadism

- Amel will recognise new instances of sadistic beh. & not associate the word SADISM with certain behs. she has heard others call sadistic.
- She will be able to distinguish sadistic acts from other action which unintentionally causes pain.

24 Hence,

- A person who has formed or attained a cpt. can:
 - a. firstly, recognize relevant attributes.
 - b. Secondly, know how they are related to one another.
- 3 forms of relationship betw. attributes.



(a) Conjunctive (b) Disconjunctive (c) Relational

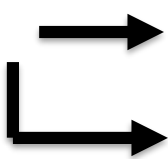
a. Conjunctive relationship: When the cpt. requires all relevant attributes to be present. **Ex:** yellow squares with a green circle in the center.'

⇒ Exemplars of this cpt. Have to be yellow, square & have a green circle in the center.

b. Disconjunctive relationship: When one or both attributes exist, the cpt exists. **Ex:** anything which is yellow, square, or both is an exemplar.

²⁵c. **Relational relationship:** when it is the relationship betw. two attributes which defines the cpt. **Ex:** “all sch. classes with equal nbers. of boys & girls and IQ”

→ **relationship betw. mental age & chronological age.**

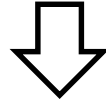
Qs: so, what is a concept?  Mental image.
A mental representation.

Qs: do you think we all form or attain cpts in the same way? ⇔ What is there, in the pr. of cpt. formation?

26 3.2. How are cpts. learned?

Bruner, Goodnow, Austin (1956) made an iplt. distinction in learning cpts. betw.: **cpt. form. & cpts. lear.**

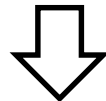
- **Concept formation:** initial creative action which results in the formation of **subordinate classes** or **abstract categories**.



Which means: to see how things are **like** and to provide a **name** to express this **similarity**.

Ex. Of concepts initially formed by a person: ‘overkill’, ‘ed. priority areas’, ...

- **Concept learning:** more often of interest to teachers.



Which means: the activity of finding exemplars of a cpt. which is already in mind or attempting to reconstruct the cpt. That is already in someone else’s mind.

Qs: what do we learn from cpt. learning?

- Cpt formation is a more fundamental process.
- Cpt attainment is a more familiar process.

27 3. Facilitating concept learning:

- According to some researchers (Klausmeier, Fraye -1974-) 3 categories of factors can affect cpt learning:
 - a. Characteristics of learner (age, ability, analytic cognitive ability,...).
 - b. Characteristics of cpt (difficult, complex, easy, concrete/abstract)
 - c. Characteristics of instructional situation:
 - Klausmeier listed 6 functions of instruction in cpt. Learning (of **VALUE** to **TEACHER**):
 1. To acquaint the subject with stimulus material.
 2. To acquaint subject with response desired.
 3. Inform subject of strategy or method to apply for the solution of the task.
 4. Provide substantial inform.
 5. Provide a set of recall relevant inform.
 6. Change the level of motivation of subject.

Qs: 1. pedagogical usefulness?

2. Link betw. cpt learning & T.L. process?

Concluding terms

- Abstract concepts are more diff. to learn than concrete.
- Abs. cpts have less perceptible common attributes.
- Interaction of learner, instructional situation, and nature of cpt. affect copt-learning.

Qs: What do you think we should do as teachers to enable others to attain a cpt?

Thinking about thinking is a complex task but it is fundamental to the educational process.

End of lecture,

Thank you.