Reasoning, make-believe and dialogue

• Father: “If you have blood you’ll die.”
• Mark (aged 4 years 3 months): “Do dinosaurs have blood?”
• Father: “Some blood.”
• Mark: “Some blood – then they die.”
• (MacWhinney, 1991)
Overview

• The early work of Luria.
• Replication and extension by Scribner.
• The puzzle of pretend play.
• New findings with unschooled children and the work of the imagination.
• Thinking through the right interpretation.
• Broader implications.
Luria’s studies of reasoning
(Luria, 1971, 1976)

• “In the Far North, where there is snow, all bears are white. Novaya Zemlya is in the Far North. What color are bears there?”

• One 30-year-old with no education protested: “You've seen them – you know. I haven't seen them, so how could I say!?”

• Luria encouraged him to focus on the wording of the problem: “But on the basis of what I said, what do you think?” and re-stated the problem. Again a refusal: “But I never saw them, so how could I say?”
Luria’s studies of reasoning

• “Cotton grows well where it is hot and dry. England is cold and damp. Can cotton grow there or not?”

• The same 30-year-old said: “I don't know if there's cotton there or not.”

• However, when the interviewer encouraged him to focus on the wording of the problem: “But, from my words, what do you think?” he drew the appropriate conclusion: “If it's chilly, if there is snow, then there won't be any there, of course.”
Luria’s studies of reasoning

• Luria drew two conclusions:
  – given some prompting, adults with little or no education can use a general premise that fits their own experience (e.g. information about cotton) as a basis for reaching new conclusions.
  – Despite this inferential capacity, uneducated adults balk at reasoning from an initial, general premise that lies outside their experience (e.g. information about bears).
Luria’s studies of reasoning

• For example, one 26-year-old who had lived for 2 years on a collective farm solved both problems.

• Asked about cotton growing in England, he said: “No, if it is humid and chilly, it won’t grow.”

• Asked about bears in the North, he said: “You say that it’s cold there and there’s snow, so the bears there are white.”
Cross-cultural studies of reasoning

• Scribner (1977) concluded from various cross-cultural studies (in Uzbekistan, Liberia and Mexico) that disengagement from a traditional, agricultural way of life, and a relatively short exposure to schooling brings about an intellectual transformation in the process of reasoning.
Scribner (1977)

- Children and adults adopt either of two quite different orientations toward the reasoning task. In the absence of schooling, they adopt an “empirical orientation”: they use their own experience to supplement, to distort, or to reject the premises supplied by the interviewer; they reason instead on the basis of their empirical experience.
Scribner (1977)

- After two or three years of schooling, they adopt what might be called a “theoretical” or “analytic” orientation instead: they focus on the claims encapsulated in the premises of the problem even when those premises do not fit into their everyday experience and they confine their reasoning to what follows from those premises.
Scribner (1977)

- This bias is especially clear in justifications - uneducated subjects justify their answer in terms of what they have seen or what they know. By contrast, educated subjects accept the first premise, reason to a logically correct conclusion, and justify their conclusion by referring back to the premises.
Scribner (1977)

• Signs of both orientations can be discerned among Luria’s subjects.
• Some educated subjects prefaced their correct conclusion with the phrase: “To go by your words” or “If you say that...”
• Others adopted an empirical orientation. Recall the protest of the traditional peasant quoted earlier asked about the color of the bears in Novaya Zemlya: “You've seen them, you know. I haven't seen them, so how could I say?!”
Scribner (1977)

- In school, children are exposed to a variety of problems with a formal structure similar to that of the syllogism, and they can learn the appropriate analytic orientation. As a result, they abandon the empirical bias when faced with a reasoning problem and adopt an analytic orientation instead.
Braine, 1990

- “Artificially setting aside part of what you know is an academic game, and there is no reason to assume that our ancestors’ life conditions would lead them to acquire much skill at that game”
Make-believe play

- Children seem able to take a false premise, to temporarily suppose it to be true (e.g. “Suppose that tea were being poured from the teapot...’) and to reason from it (i.e. “Tea falls onto a surface below and makes it wet; so, this tea would wet the animal underneath.”) (Harris & Kavanaugh, 1993).
Make believe and reasoning

- This implies that young children can reason from premises that are not consistent with their empirical knowledge - especially if those premises are presented as temporary suppositions.
- This conclusion does not fit the long tradition of research on syllogistic reasoning which implies that any reasoning that calls for the setting aside of empirical knowledge is not something that comes naturally to young children. Instead, it is something that emerges in the course of education.
Dias and Harris (1988)

• This exploratory study examined the possibility that uneducated subjects - young children - might overcome the empirical bias and reason logically, if given counterfactual premises in a pretend or make-believe context.

• 4- and 6-year-olds were given reasoning problems where the first premise contradicted the children’s knowledge.
Dias and Harris (1988)

• “All fishes live in trees.
  • Tot is a fish.
  • Does Tot live in the water?”

• Predicted answer, given acceptance of the first premise + logical reasoning = “no”
• Predicted answer, given rejection of first premise + an empirical bias = “yes”
Dias and Harris (1988)

• The children were tested under two conditions:
  – a control condition in which the premises were presented only with a brief introduction.
  – a make-believe condition in which the premises were presented in the context of a game of make-believe.
  – Both age groups gave more correct, non-empirical replies in the make-believe condition.
Dias and Harris (1988)

The bar chart shows the comparison between 4-year-olds and 6-year-olds in matter-of-fact and make-believe stories. The y-axis represents the percentage, ranging from 0 to 100, while the x-axis represents the age groups: 4-years and 6-years.
• Children also gave more premise-oriented, non-empirical justifications for their replies in the make-believe condition. For example, they would say: “No - Tot does not live in the water...because you said that fishes live in the trees.”
Dias (1988; Experiment 6)

- Dias carried out a further study in Recife, in North East Brazil, where she tested 5-year-old children who had never been to school and were illiterate.
Dias (1988; Experiment 6)
Dias and Harris (1990)

- This study explored what type of cues can produce this improvement: it showed that three different interventions helped:
  - 1) using a dramatic story intonation
  - 2) presenting the premises in the context of a distant planet
  - 3) asking children to make an image (“a picture in the head”) of the initial premise.
Dias and Harris (1990)

• Conclusion: any cue which gets children to think of the premise as part of a make-believe world will help. This context helps children to accept the initial bizarre premise, to reason from it, and to resist using a more empirically plausible premise as a starting point.
Dias and Harris (1990)
Leevers & Harris (1999)

• These effects were measured only over a short-term. Do they persist?
• Leevers and Harris (1999) gave children instructions and tested them both immediately and after a delay of one week.
• Children maintained the improvement relative to a control group even though they were given no special instructions on the second test.
Leevers & Harris (1999)

Session 1 Session 2

not instructed in either Session
instructed in Session 1 only
Leevers & Harris (1999)
Three objections to the emphasis on a make-believe stance

• How can a pretend stance be so stable?

• How does it help with unfamiliar premises?

• How does it explain parallels between effects of brief instruction and schooling?
First objection to emphasis on a make-believe stance

• It makes little sense to claim that make-believe cues prompt children to adopt a pretend stance, and that they then hold onto that stance or attitude until they meet the interviewer again.
Second objection to emphasis on a make-believe stance

• In earlier work by Dias, some children were given premises similar to those that Luria had used in Uzbekistan. Thus, they were given unfamiliar premises that lay outside their experience (e.g. *All mollusks live in shells* or *All leukocytes are white*). When prompted with make-believe cues children also did better on problems with such unfamiliar premises. The results do not fit the proposal that a pretend stance promotes an analytic orientation by prompting children to set aside empirical knowledge of the real world that might interfere with their encoding of the premises.
Third objection to emphasis on a make-believe stance

• Emphasis on the adoption of a pretend stance makes it difficult to elucidate parallels between the effects of schooling and make-believe cues. After all, it makes little sense to say that a long-term effect of schooling, whether in Central Asia or West Africa, is the induction of a stable pretend stance. Yet short-term intervention and schooling both shift children toward an analytic orientation.
An alternative approach

• When children are given a reasoning problem that starts with a familiar fact – for example, *All fishes live in water* – it is not strictly necessary for them to take account of the initial premise. Even if they ignore it, and concentrate on the second premise and subsequent question – *Tot is a fish. Does Tot live in a tree?* – they can provide the correct answer from their general knowledge.
An alternative approach

• By contrast, to reason accurately from a premise that either runs counter to previous experience or that introduces some new or made-up fact, it is vital to take the initial premise as a starting point, and to co-ordinate later premises with it.
An alternative approach

• For example, if children are told – *All mollusks live in shells. Tot is a mollusk. Does Tot live in a tree?* – encoding and acceptance of the initial premise is critical for a correct solution. If, instead, they focus only on the second premise and the follow-up question, they will be obliged to guess at the answer because they know nothing about mollusks.
An alternative approach

• By implication, any cues that prompt children to focus on an initial premise, and accept it as a starting point for what comes afterwards, are likely to improve the reasoning process whenever the initial premise states something that is either false or unfamiliar.
Leevers & Harris (1999)

- (i) no special instructions.
- (ii) imagery instructions similar to those used in earlier experiments.
- (iii) imagery instructions plus a rationale, namely that using imagery would help them to solve the problems.
- (iv) asked *to think about* the first premise and what would happen if it were true.
Leevers & Harris (1999)

![Bar chart comparing performance in Session 1 and Session 2 with different instruction methods.]

- Session 1:
  - no instruction: 30
  - imagery: 70
  - imagery + rationale: 60
  - thinking: 50

- Session 2:
  - no instruction: 80
  - imagery: 80
  - imagery + rationale: 70
  - thinking: 60
Leevers & Harris (1999)

• Hard to argue that simply “thinking about” the first premise and what would happen if it were true is simply a form of pretending or make-believe.

• Nevertheless, children still improved with that prompt.
Avoiding the three difficulties with the make-believe stance interpretation

• How can a pretend stance be so stable?

• How does it help with unfamiliar premises?

• How does it explain parallels between effects of brief instruction and schooling?
Willingness to accept the initial premise

- We have no need to suppose that children maintain a pretend attitude over the course of a week or more. Rather, when confronted with a similar set of problems, they reinstate their earlier insight into the way that the initial statement of the problems should be handled and apply that insight to the new problems.
Helping with unfamiliar premises

• We have no need to suppose that instruction leads children to set aside empirical knowledge. Rather, it helps them to focus on, and accept as a staring point, the initial premise - whether it contradicts or, alternatively, lies outside their pre-existing experience.
Parallels between effects of brief instruction and schooling

• In school, as with brief instruction, the child is lead to focus on ideas that he or she did not seek out. The adult - be it a teacher in school or an experimenter on reasoning, makes an unsolicited pronouncement.

• The key task for the child is to use that pronouncement as a basis for his or her reasoning ability - even if the pronouncement is unsolicited.
A final question

• If children can be prompted to reason from unfamiliar premises, why did uneducated adults perform poorly in Luria’s original experiments and in subsequent follow-ups?
Three possible explanations

• First, recent developmental research has been based on children growing up in Western, industrialized communities where traditions of schooling and literacy conveyed via adult dialogue or story-book reading may affect children even before they go to school. Such discourse practices might be an effective substitute for schooling. (N.B. hard to apply to the results obtained by Dias in Recife).
Three possible explanations

• Second, maybe the ability to take on an unfamiliar premise and reason from it is available to young children - and can be sustained by schooling - but maybe it disappears if children do not practice that ability at school.
Three possible explanations

• A third possibility is that reasoning from unfamiliar premises is a natural ability – one displayed by children and adults alike when appropriately prompted. On this argument, unschooled adults will adopt an empirical stance whenever they are given unfamiliar premises with minimal introduction – the technique adopted by Luria (1971) but when prompted to suppose that such premises are true, they too will reason accurately and provide analytic justifications for their conclusion – just like young children growing up in Western communities succeed in doing.
Dias, Roazzi and Harris (2005)

• Tested illiterate, unschooled adults and adults who had recently received only a limited, basic education.

• Both groups received problems that included content that was unknown to them (“All leukocytes are white”) and content that contradicted their everyday experience (“All milk is black”).
Dias, Roazzi and Harris (2005)

• Half the participants in each group received the problems following a minimal prompt (Standard Condition).

• Half received the problems following an introduction that explicitly prompted them to suppose that the premises were true (Planet Condition) of another planet.
Mean number of correct replies (out of 6)

![Bar chart showing the mean number of correct replies for unknown and contrary conditions. The chart compares 'Unknown' and 'Contrary' conditions across 'Control' and 'Planet'. The 'Unknown' condition is higher in 'Planet' compared to 'Control', while the 'Contrary' condition shows a lower score in 'Planet' compared to 'Control'.]
Mean number of analytic justifications

![Bar chart showing the mean number of analytic justifications for unknown and contrary conditions. The chart compares 'Control' and 'Planet' conditions.]
Dias, Roazzi and Harris (2005)

• Reasoning from unfamiliar premises is a natural ability – one displayed by children and adults alike when appropriately prompted.

• Reasoning from unfamiliar premises, including premises that contradict everyday empirical knowledge, is not an ability that is engendered by schooling. Rather, it is an early competence that is preserved into adulthood, even in the absence of schooling.
So, granted that unschooled adults have not lost the ability to reason from unfamiliar premises, why do they not do so?

What is it about school that nurtures that ability so effectively and turns it into a spontaneous tendency?

What is special about schooling - as opposed to other kinds of activity?
References


References


References

