

# Measurement of actively open-minded thinking (AOT)

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# AOT in context

A general “theory” of good thinking.

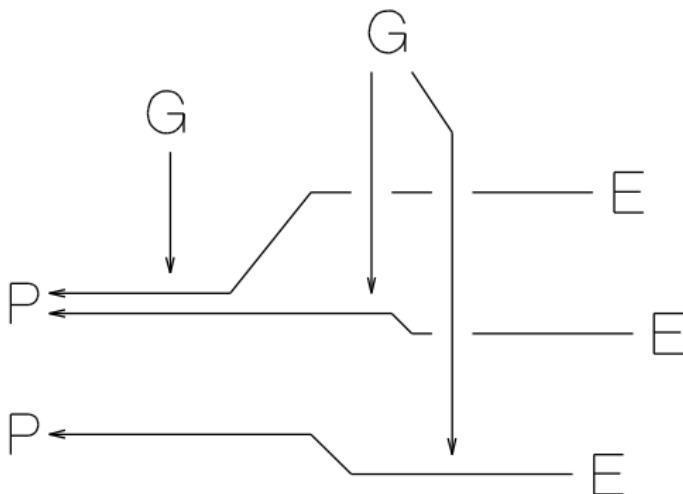
- ▶ philosophical statements: Mill, Dewey
- ▶ early 20th century psychology: Selz, Duncker, Wertheimer
- ▶ developmental theories: Piaget, Kohlberg, Perry
- ▶ integrative complexity: Schroder, Driver, Streufert; Suedfeld; Tetlock
- ▶ Janis
- ▶ Christie Lerch, Stanovich

# A framework for thinking

Thinking = search + inference

Three objects:

- ▶ possibilities (options, hypotheses)
- ▶ evidence (arguments, reasons)
- ▶ goals (criteria, objectives)



## Myside bias (a.k.a. confirmation bias)

- ▶ Selective recall and production of arguments (Perkins)
- ▶ Biased assimilation, polarization (Lord, Ross, and Lepper), and neglect of counterevidence (Kuhn)
- ▶ Selective exposure (biased search)
- ▶ Belief overkill (Jervis; Ellsworth and Ross), excessive consistency between belief and choice, search for dominance (Montgomery)
- ▶ Overconfidence (or inappropriate extreme confidence)

## AOT as a virtue

- ▶ Fairness to the other side in search and inference
- ▶ This requires *active* search
- ▶ Appropriate weighing of evidence in inference
- ▶ Results in appropriate confidence

## Measures

- ▶ listing arguments (Perkins, Baron, Gürçay)
- ▶ giving grades to thinking of others (Baron)
- ▶ beliefs about good thinking (Stanovich/West/Toplak, Baron)
- ▶ self-report (Metz)
- ▶ task performance (Stanovich et al., Gürçay)
- ▶ multiple-choice argument listing with self-report (new idea)

## Goals of rejected proposal

Better measures would allow tests of generality, effects of educational manipulations, and would provide clear criteria for devising such manipulations. "Teaching to the test" should ideally not be a problem.

- ▶ Measure of thinking that could be used in different domains
- ▶ Analysis of components and their correlation
- ▶ Test of understanding
- ▶ Extension of giving grades to others' thinking

## Actively open-minded thinking

"The whole strength and value, then, of human judgment, depending on the one property, that it can be set right when it is wrong, reliance can be placed on it only when the means of setting it right are kept constantly at hand. In the case of any person whose judgment is really deserving of confidence, how has it become so? Because he has kept his mind open to criticism of his opinions and conduct. Because it has been his practice to listen to all that could be said against him; to profit by as much of it as was just, and expound to himself, and upon occasion to others, the fallacy of what was fallacious." J.S. Mill (On liberty)

## Integrative complexity (Tetlock, Suedfeld, et al.)

Abortion is a basic right that should be available to all women. To limit a woman's access to an abortion is an intolerable infringement on her civil liberties. Such an infringement must not be tolerated. To do so would be to threaten the separation of Church and State so fundamental to the American way of life.

Many see abortion as a basic civil liberty that should be available to any woman who chooses to exercise this right. Others, however, see abortion as infanticide.

Some view abortion as a civil liberties issue — that of the woman's right to choose; others view abortion as no more justifiable than murder. Which perspective one takes depends on when one views the organism developing within the mother as a human being.

## Perkins, Bushey & Faraday (1986)

Taught high school students to think in an actively open-minded way through a sixteen-session course that emphasized searching thoroughly for arguments on both sides of an issue. Arguments should be:

- ▶ *true* (to the best of the thinker's knowledge)
- ▶ *relevant* to the issue, and
- ▶ *complete* – that is, all important relevant arguments should be considered.

Controversial issues were discussed in class, and students were encouraged to generate and evaluate (for truth and relevance) arguments on both sides, especially the other side.

## Perkins et al. test items

Before and after the course, students were tested by asking them to write down their thoughts on issues that were “genuinely vexed and timely” and that could be discussed on the basis of knowledge that most people have:

- ▶ “Would providing more money for public schools significantly improve the quality of teaching and learning?”
- ▶ “Would a nuclear freeze agreement between the U.S. and the U.S.S.R. significantly reduce the possibility of world war?”
- ▶ “Should all 19-year-olds be required to fulfill a one year social service obligation?”
- ▶ “Would a ban on selling and owning handguns significantly reduce violent crime?”

## Results from Perkins et al. training

The course nearly doubled the number of arguments that students gave on the *other* side from their own. The rated quality (truth and relevance) of these arguments increased as well.

The course did not increase the number or quality of arguments on the student's own side. The effect was truly a matter of increased open-mindedness.

Other courses that involve thinking in some way had no effect: a first-year law-school class, a high school debate class, a first-year college class that taught "critical thinking," and a graduate course on thinking.

## Baron (1995): Positive arguments

The lists of thoughts varied in the student's initial side (yes or no), the number of arguments on the student's side (2 or 4), and the number of arguments on the other side (0 or 2).

- ▶ Killing of human beings is wrong, and abortion is killing a human, even though the human is only a fetus.
- ▶ Aborting a fetus is preventing someone from having a life, and this is wrong. None of us would have wanted to have been aborted ourselves.
- ▶ There is no clear place to draw the line between early abortions, late abortions of fetuses that could survive on their own, and the killing of handicapped or unwanted infants.
- ▶ Condoning abortion is likely to reduce respect for human life in general, leading to decreased effort to preserve human life in other cases.
- ▶ Women who get pregnant by mistake are irresponsible, and they should not be rewarded by being allowed to correct their error.
- ▶ Abortion is never absolutely necessary as a means of birth control. If someone really doesn't want to get pregnant, they can try

## Negative arguments

- ▶ The fetus is not hurt by early abortion. It has no future plans, no knowledge of life, no pain, and no fear of death.
- ▶ Families must be limited in today's world. If we are going to limit births, it is, on the whole, better to limit the births of unwanted children than the births of children who are wanted. Abortion is one means of preventing unwanted children from being born, when it is too late to prevent them by other means.
- ▶ Contraceptive methods are all subject to failure, so the only way to be sure of not getting pregnant is to abstain from sex. This would be an intolerable burden to impose on married couples who are not ready to have children.
- ▶ Women should be able to decide whether they want to go through something that affects them as much as pregnancy and childbirth do.
- ▶ It's unfair that women should bear the brunt of mistakes for which men are at least as responsible.
- ▶ Many women who get pregnant by mistake are adolescents and others who are not ready to care for children. The possibility of abortion allows many of them to continue their education and have children when they are mature enough to raise them well.

## Argument evaluation test (Stanovich & West, 1997)

Each of 23 items began with a fictitious person, e.g., Dale, stating an opinion about a social issue, for example, "The welfare system should be drastically cut back in size."

The subject indicated agreement or disagreement (to indicate the subject's side).

Dale then gave a justification, for example, "because welfare recipients take advantage of the system and buy expensive foods with their food stamps."

A critic then presented a counterargument, for example, "Ninety-five percent of welfare recipients use their food stamps to obtain the bare essentials for their families."

Finally, Dale rebuts the counterargument, for example, "Many people who are on welfare are lazy and don't want to work for a living."

## AOT scale: “Questions about thinking” ( $\alpha = .67$ )

Response scale: Strongly agree . . . Strongly disagree (5 points)

- ▶ Allowing oneself to be convinced by an opposing argument is a sign of good character.
- ▶ People should take into consideration evidence that goes against their beliefs.
- ▶ People should revise their beliefs in response to new information or evidence.
- ▶ Changing your mind is a sign of weakness. (-)
- ▶ Intuition is the best guide in making decisions. (-)
- ▶ It is important to persevere in your beliefs even when evidence is brought to bear against them. (-)
- ▶ One should disregard evidence that conflicts with one's established beliefs. (-)
- ▶ People should search actively for reasons why their beliefs might be wrong.

## Belief overkill (Baron, 2009)

Candidate 1 favors a constitutional amendment defining marriage as between a man and a woman and favors increased income taxes on those with high incomes, to reduce the deficit.

Candidate 2 opposes a constitutional amendment defining marriage as between a man and a woman and opposes increased income taxes on those with high incomes, to reduce the deficit.

What is your position on the two candidates (assuming they both have equally acceptable positions on everything else you care about)?

Strongly favor Candidate 1 – Favor Candidate 1 – Neutral – Favor Candidate 2 – Strongly favor Candidate 2

What is the effect of the candidates' position on a constitutional amendment defining marriage as between a man and a woman on your evaluation of the two candidates?

Strongly favors Candidate 1 . . . [The same question was asked about the other issue.]

## AOT indicators in adolescents (Metz, 2017)

The *Argument Thoughts task (AT)* consists of three argument scenarios in which subjects are asked to imagine themselves. Below each scenario are listed 6–8 possible thoughts likely to occur to someone in that situation. The task is simply to select which of these possible thoughts are most likely to occur to them. E.g.:

- ▶ “Try to empathize,” “What is that other person thinking?”
- ▶ “You’re wrong,” “I know I’m right,” “I need to win.”
- ▶ “I want to understand what Arden means.”
- ▶ “I wonder why they think that?”
- ▶ “I’ll prove you wrong!”, “This is stupid; it’s obvious who’s right.”

## Gürçay (2016) Example questions

### STUDY 1A

Which is largest?

- A. Philadelphia, PA
- B. Boston, MA
- C. Baltimore, MD

### STUDY 1B

Which one has the most calories per serving?

- A. Banana
- B. Oat bran muffin
- C. Strawberries

### STUDY 2

Which is the movie that has the most recent release date?

- A. V for Vendetta
- B. The Matrix
- C. Se7en

Which is the most populous country?

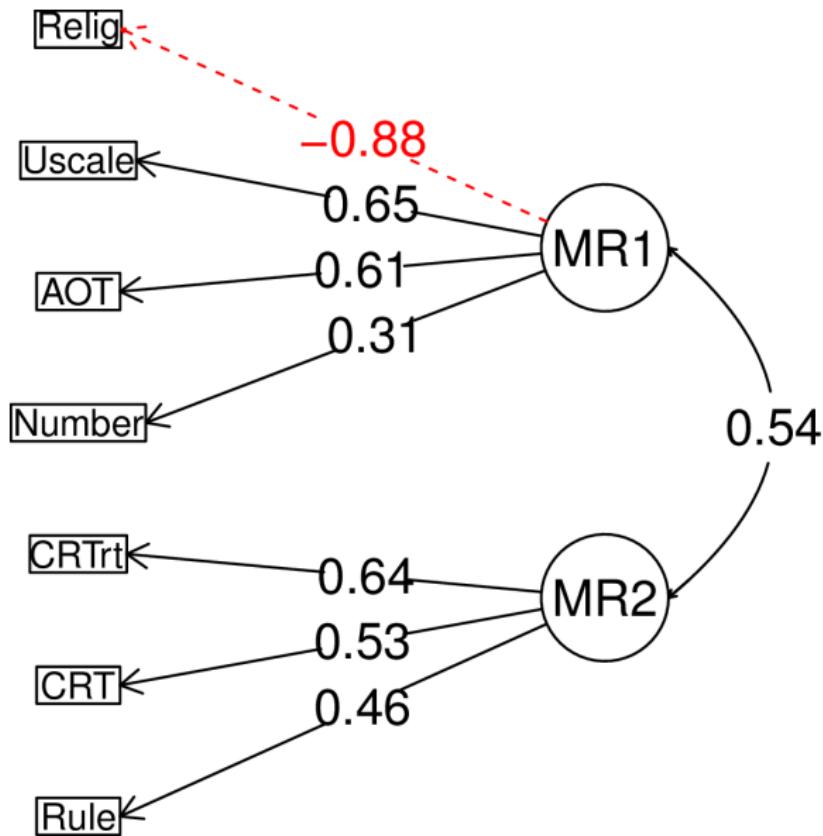
- A. Turkey
- B. United Kingdom
- C. Ukraine

## Baron, Scott, Fincher & Metz (2015)

	Relig	AOT	Uscale	ActRule	ActOmit
Relig	<b>0.83</b>	-0.817	-0.808	-0.264	-0.346
AOT	-0.609	<b>0.67</b>	0.683	0.417	0.285
Uscale	-0.570	0.433	<b>0.60</b>	0.318	0.611
ActRule	-0.200	0.284	0.205	<b>0.69</b>	0.436
ActNum	-0.270	0.200	0.404	0.310	<b>0.73</b>

Reliabilities in bold. Raw  $r = .200$  is  $p = .05$  2-tailed.

## Oblimin factor analysis, 2 factors, Study 4.



## Correlations with beliefs

Belief in divine command theory (Piazza)

Kahan: AOT scale correlates .27 with liberalism (.41 corrected for unreliability of the measures).

CRT correlates .00 in the same study.

These results may have more to do with people's "epistemological stance" than how they think about everyday problems.

Opposition to AOT may serve to justify otherwise-unjustifiable beliefs.

Thus, what may be important is understanding of why this is a problem.

## Manifestations of AOT

- ▶ amount of search vs. direction of search;
- ▶ direction of search vs. direction of inference;
- ▶ search for possibilities vs. evidence (vs. goals);
- ▶ conclusions required vs. not required (but confidence is assessed);
- ▶ solving new problems vs. questioning of existing beliefs and plans.

## Analysis of AOT

decisions, search for additional possibilities (direction is implied)

decisions, search for additional goals served by current favored option

decisions, search for additional goals not served by current favored option

decisions, search for evidence in favor of current favored option

decisions, search for evidence opposed to current favored option

decisions, extent of search

short-term beliefs, search for evidence in favor of current favored option

short-term beliefs, search for evidence opposed to current favored option

short-term beliefs, extent of search

long-term beliefs, search for evidence in favor of current favored option

long-term beliefs, search for evidence opposed to current favored option

long-term beliefs, extent of search

## Understanding AOT: Knowing purposes

We look for other possibilities to make sure that the current favorite is really the best, or to look for ways to modify it to make it better, by taking pieces of other possibilities.

We look for counter-evidence, again, to prevent error and to suggest ways to modify a possibility.

More generally, the reason for all of these elements is to increase our justified confidence in whatever possibility we choose in the end.

Possible questions:

- ▶ “How confident should we be in this conclusion if we do not [do X]?", where X is some type of thinking,
- ▶ “If we [do X] and reach the same conclusion, what should happen to our confidence that this conclusion is the best choice?”

(These could serve as prompts, so they should be last.)

## Possible test of understanding

You have a problem. Your collection of compact disks (CDs) is taking up too much room on your small bookshelf. There is a lot of wasted space, because the shelves are far apart, and deep. You look online for some way to solve this problem.

The first thing you look for is another container that would hold the CDs more efficiently. You find two, X and Y. Based on pictures, X looks more attractive.

Approach A: You examine the details of X, its size, price, capacity, and so on. It all seems reasonable, so you buy it.

Approach B: You ask yourself what you really want aside from attractiveness, and whether some other attribute might be more important. [search for goals]

Approach A: You examine the details of X, its size, price, capacity, and so on. It all seems reasonable, so you buy it.

Approach B: You ask yourself what you really want aside from attractiveness, and whether some other attribute might be more important. [search for goals]

A is better because it will increase your confidence in your choice of X.

A is better because you will have more information.

B is better because Y could be much better on some other attribute that you care more about than attractiveness.

B is better because it will increase your confidence in your choice of X.

B is better because some other option Z could be better than both X and Y.

B is better because you may care more about some other attribute, and knowing this would reduce your confidence that X is the best choice and result in continued search.

Approach A: You examine the details of X, its size, price, capacity, and so on. It all seems reasonable, so you buy it.

Approach B: You examine the details of both X and Y, their size, price, capacity, and so on. Then you compare X and Y and decide between them.

A is better because it will increase your confidence in your choice of X.

B is better because you will have more information.

B is better because Y could be much better on some other attribute that you care more about than attractiveness.

B is better because it will increase your confidence in your choice of X.

B is better because some other option Z could be better than both X and Y.

B is better because you may care more about some other attribute, and knowing this would reduce your confidence that X is the best choice and result in continued search.

Approach B: You examine the details of both X and Y, their size, price, capacity, and so on. Then you compare X and Y and decide between them.

Approach C: You try to think of other solutions to the problem aside from a new container.

B is better because it will increase your confidence in your choice.

B is better because you will have more information.

C is better because some other option Z could be better than both X and Y.

C is better because you may think of something, and that would reduce your confidence that X is the best choice and result in continued search.

C is better because you may not be able to think of any other approach, and this would increase your confidence in your choice.

Approach D: After examining the attributes of three different containers, X, Y, and Y, you think X is best. So you buy X.

Approach E. After examining the features of three different containers, X, Y, and Z, you think X is best. But you look for product reviews of all three options.

D is better because you will have more confidence in your choice of X.

E is better because it will increase your confidence in your choice of X.

E is better because Y or Z could be better on some other attribute that you care about.

E is better because it could find information that would change your choice.

Pat, now 18 years old, was raised in a religion that asks its followers to obey many rules and accept many beliefs about the supernatural. Some of the rules concern behavior, such as appropriate dress, worship, and sexual relations. Other rules concern controversial issues of public policy or law, where the religion takes one side in an ongoing debate. Some of the beliefs seem to conflict with modern science.

Pat' friends often hold different views about these issues and sometimes find Pat's personal behavior to be strange, although they are always polite about the latter.

Approach A: Pat repeatedly consults authorities in her religion to hear their explanations of why the rules must be followed.

Approach B: Pat repeatedly consults authorities in her religion to hear their explanations of why the rules must be followed. But she also asks her friends to explain why they think her religion's views on controversial issues are wrong.

Approach A: Pat repeatedly consults authorities in her religion to hear their explanations of why the rules must be followed.

Approach B: Pat repeatedly consults authorities in her religion to hear their explanations of why the rules must be followed. But she also asks her friends to explain why they think her religion's views on controversial issues are wrong.

A is better because it will increase her confidence in her beliefs.

B is better because it will reduce her confidence in beliefs that might be incorrect.

B is better because it might make her more likely to arrive at the truth.

B is better because it will increase her confidence in her beliefs.

Bill grew up in a family with strong political beliefs, and he absorbed his family's views and now has a strong position on issues such as free trade, the minimum wage, immigration, and taxes. Recently he discovered that some friends who share his views on some of these issues do not share his views on others, such as taxes.

Approach A: Bill asks his family to recommend some articles about taxes.

Approach B: Bill asks those who disagree with him to recommend some articles about taxes.

A is better because it will increase his confidence in his beliefs.

B is better because it will make it more likely that he will arrive at the best position.

B is better because it will reduce his confidence in his original beliefs.

## Future directions

- New belief and self-report scale
- Self vs. ideal (for others)
- Generality across domains
- Generality across components of AOT
- Simulated decisions and tests of understanding
- Grading and analysis of examples
- Criteria for belief and moral judgment
- Training



