

The background features a light purple-to-blue gradient with several realistic water droplets of various sizes scattered across the surface. A large, faint white question mark is centered in the upper half of the image.

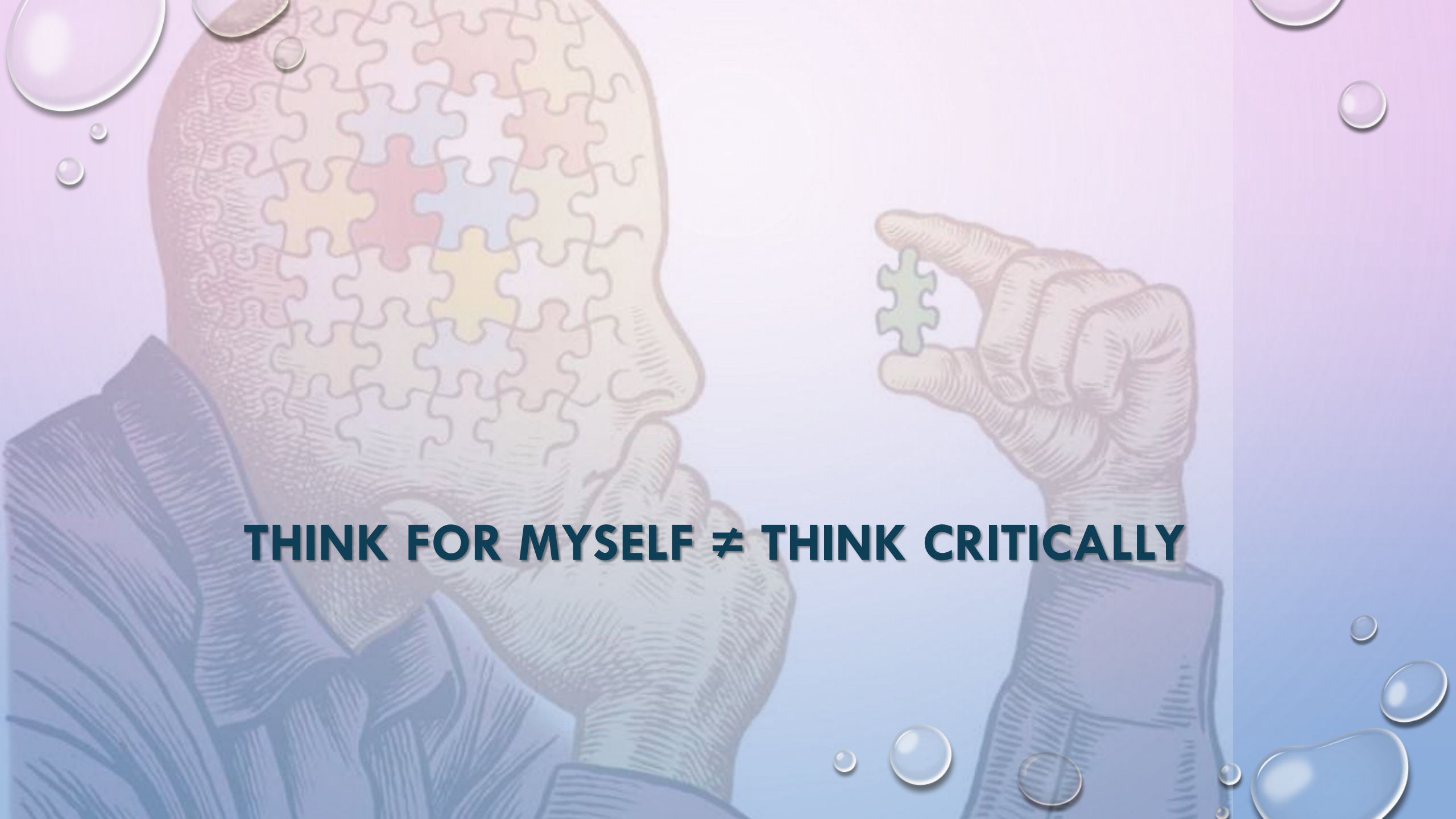
CRITICAL THINKING, COGNITIVE BIASES AND DISINFORMATION

THINKING LIKE AN EXPERT

MGR. TATIANA MALATINCOVÁ, PH.D.

DEPT. OF MEDICAL PSYCHOLOGY AND PSYCHOSOMATICS, FM MU

AVLPS051C MEDICAL PSYCHOLOGY AND PSYCHOSOMATICS

An illustration of a person's head in profile, composed of various colored puzzle pieces (yellow, red, blue, orange). The person is wearing a blue suit jacket and has their hand to their chin in a thoughtful pose. To the right, another hand is shown holding a single green puzzle piece. The background is a light blue gradient with several translucent bubbles of different sizes scattered throughout.

THINK FOR MYSELF ≠ THINK CRITICALLY

WHAT IS AND IS NOT CRITICAL THINKING?

CRITICAL THINKING IS...

- CAREFUL, INTENTIONAL THINKING INVOLVING JUDGMENTS ABOUT CLAIMS
- BASED ON THE PRINCIPLES OF INDUCTIVE AND DEDUCTIVE LOGIC (EVALUATION OF EVIDENCE)
- CONSISTENT
- BEING AWARE OF POSSIBLE SOURCES OF BIAS IN ONE'S OWN THINKING REGARDLESS OF FEELINGS OF CONFIDENCE!

CRITICAL THINKING IS NOT THE DEFAULT... WHY?

RESTRICTED CAPACITY OF INFORMATION PROCESSING – ECONOMY:

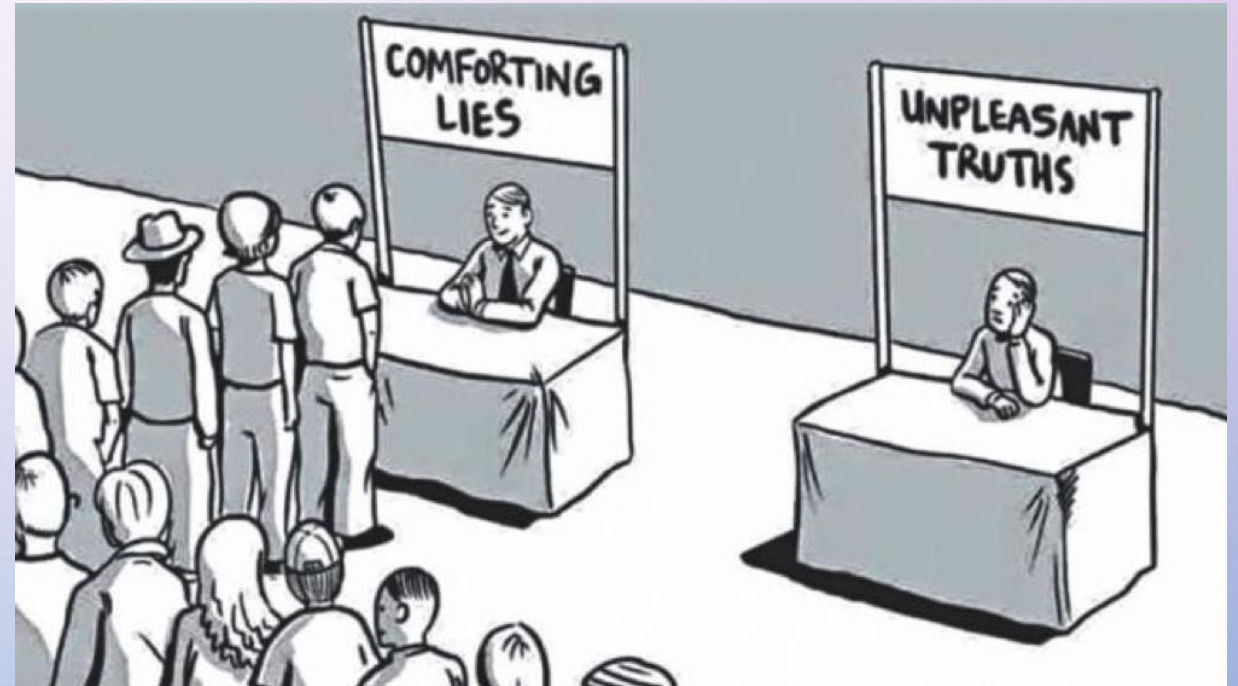
- HABITS
- NORMS
- IMITATION
- HEURISTICS
- DEFENSIVE MECHANISMS



We are all natural defenders of our preconceptions.
Critical thinking is costly.

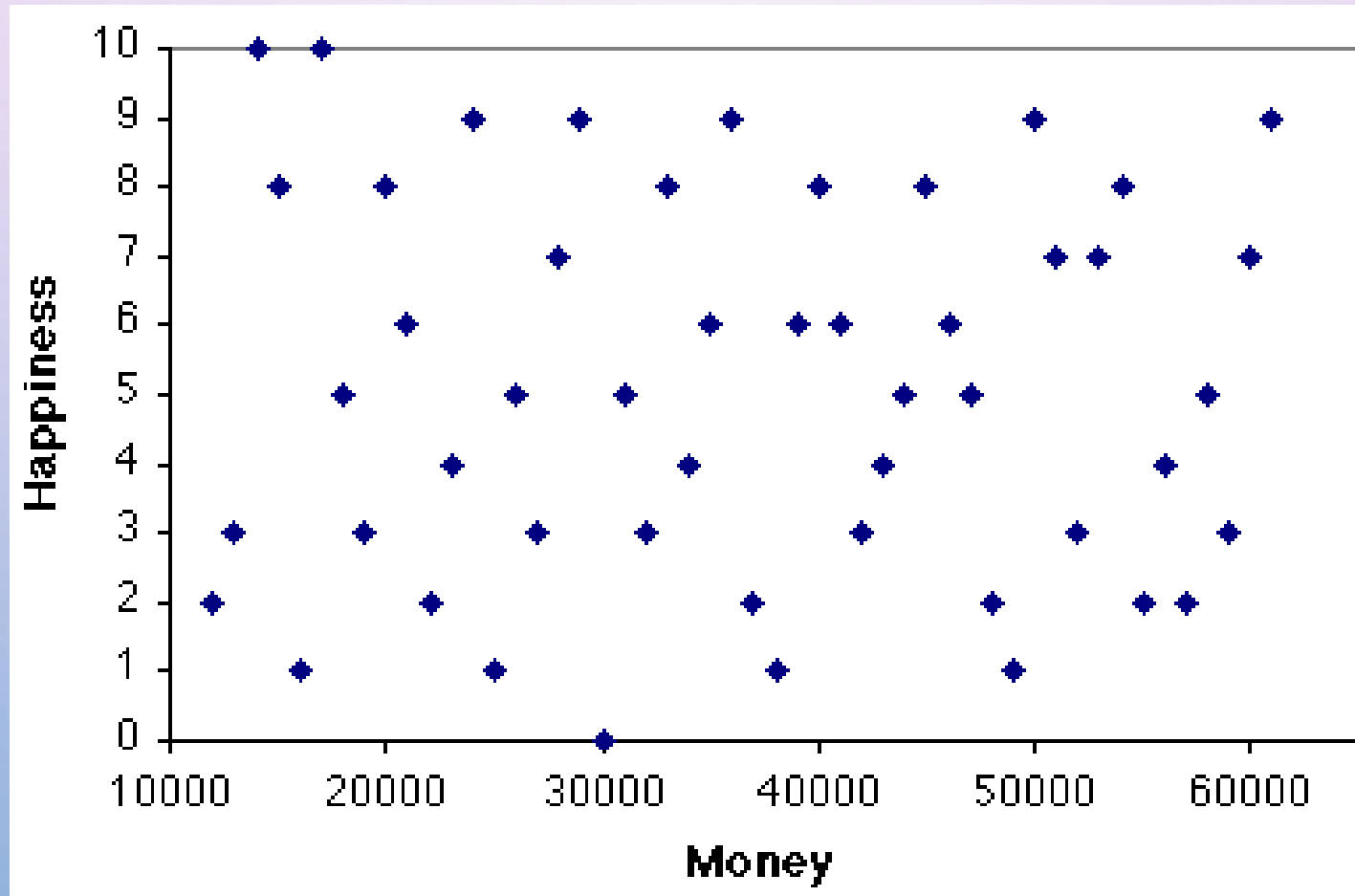
OUR MINDS ARE OUR GREATEST MANIPULATORS...

- REDUCING **COGNITIVE DISSONANCE** WITH **SELF-JUSTIFICATION** – IF MY BEHAVIOUR IS HARD TO CHANGE, I WILL CHANGE A PART OF MY ATTITUDE SYSTEM TO (PARTLY OR FULLY) MATCH OR JUSTIFY MY BEHAVIOUR
- **CONFIRMATION BIAS** – EVALUATING ARGUMENTS IN A WAY BIASED TOWARDS SUPPORTING MY CURRENT BELIEF



CONFIRMATION BIAS:

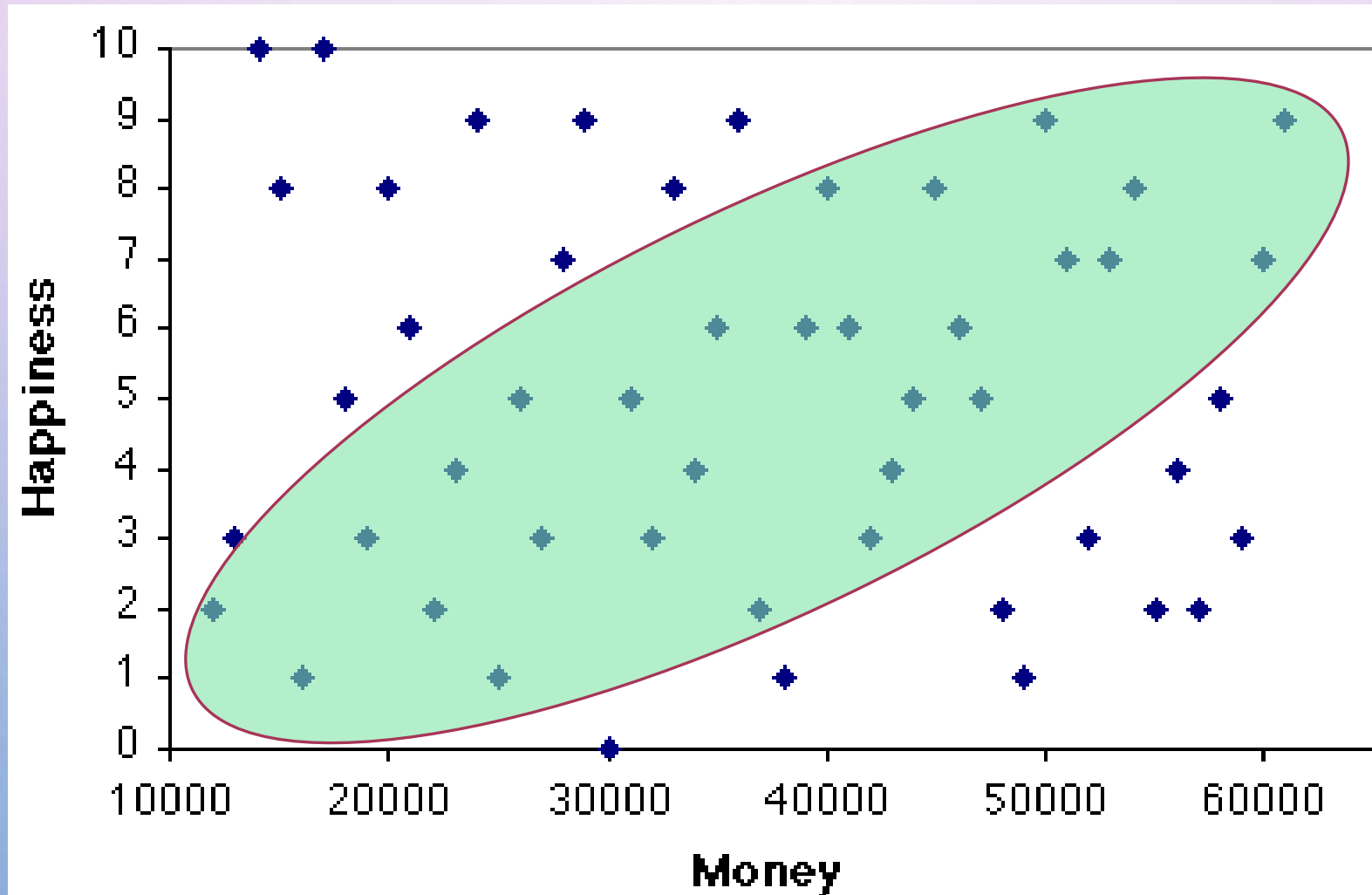
WE DO UNDERESTIMATE HOW EASY IT IS TO SELECTIVELY FIND SUPPORT FOR OUR CLAIMS IN A COMPLEX WORLD...



$r = .00$

CONFIRMATION BIAS :

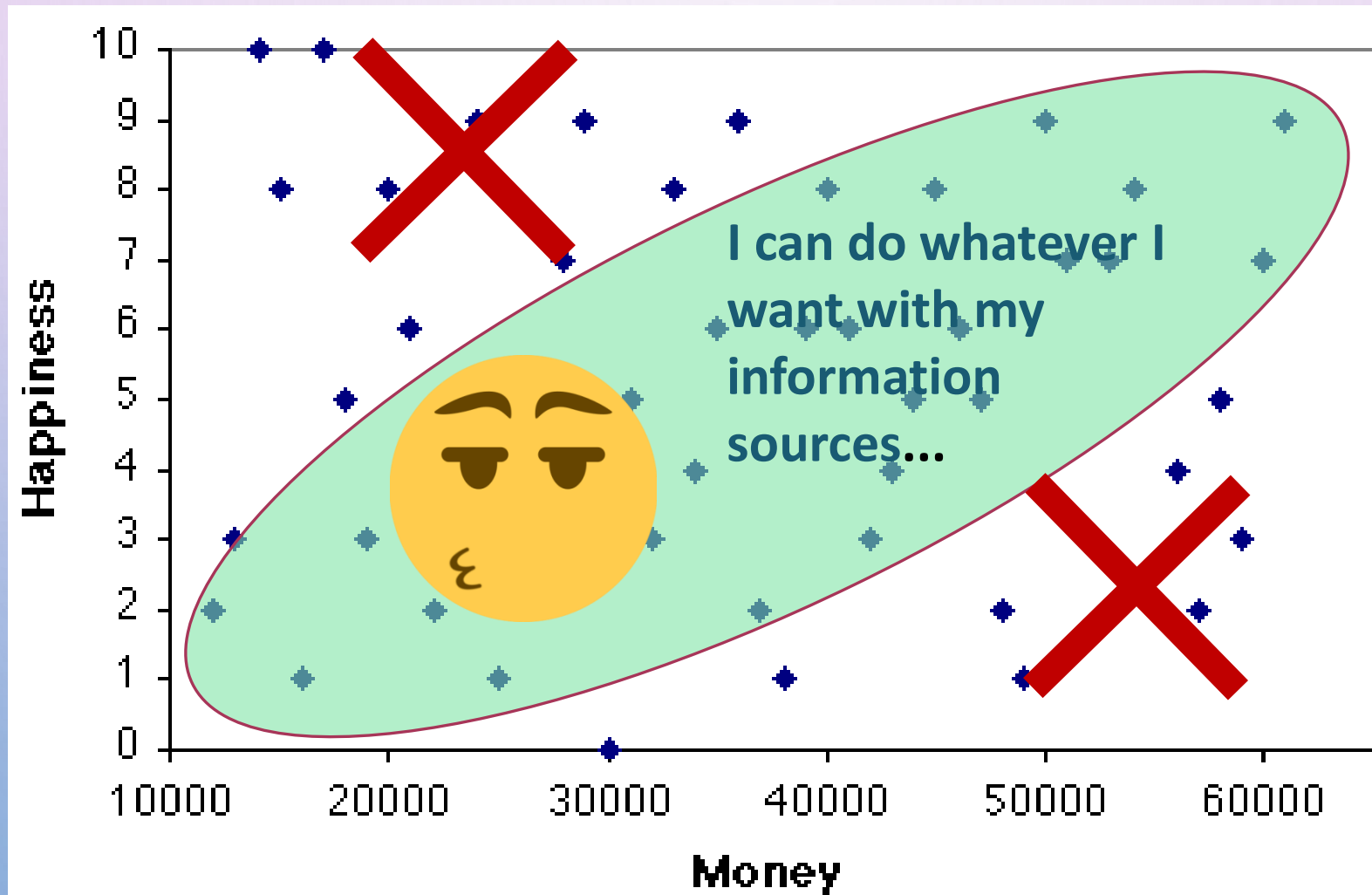
WE DO UNDERESTIMATE HOW EASY IT IS TO SELECTIVELY FIND SUPPORT FOR OUR CLAIMS IN A COMPLEX WORLD...



$$r = .70$$

CONFIRMATION BIAS :

WE DO UNDERESTIMATE HOW EASY IT IS TO SELECTIVELY FIND SUPPORT FOR OUR CLAIMS IN A COMPLEX WORLD...



$$r = .70$$



HEURISTICS

- MENTAL SHORTCUTS THAT ENABLE FAST JUDGMENTS BY IGNORING SOME OF THE AVAILABLE, POTENTIALLY RELEVANT INFORMATION



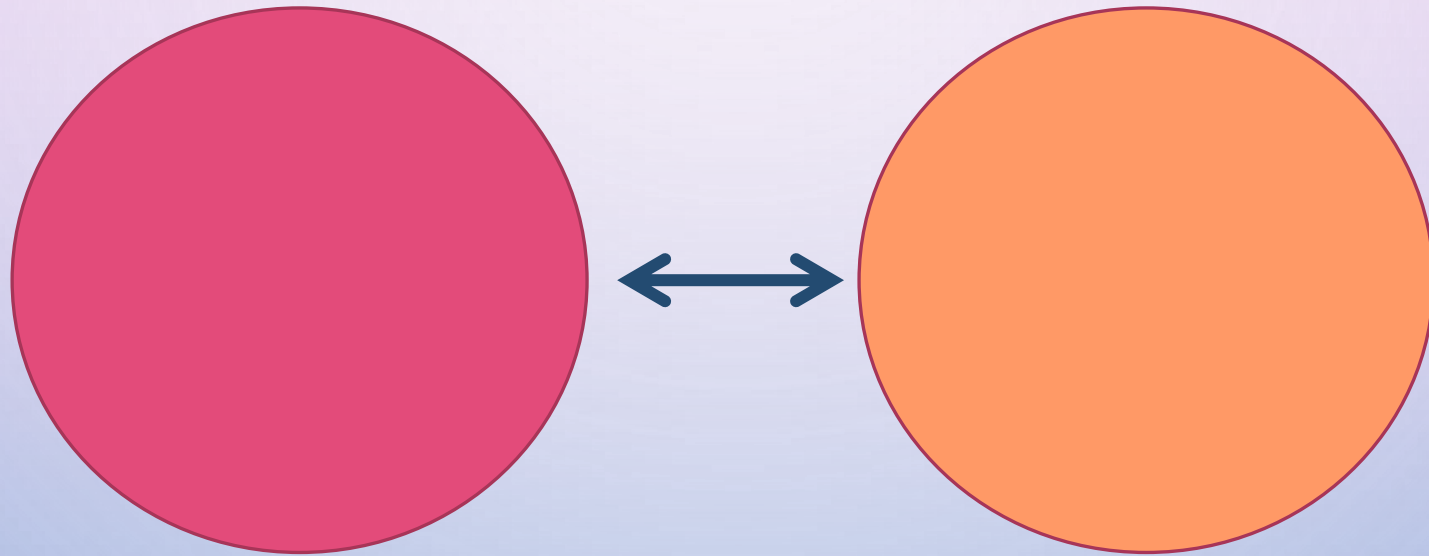
PROBLEM

IAN IS BEING TESTED FOR A SPECIFIC TYPE OF CANCER. HIS DOCTOR TELLS HIM THE TEST HE'S UNDERGOING CAN DETECT THE CANCER IN 90% OF PEOPLE WHO REALLY HAVE THE CANCER. SOMETIMES, HOWEVER, IT ALSO FALSELY "DETECTS" THE CANCER IN PEOPLE WHO DON'T HAVE IT, WHICH HAPPENS IN ABOUT 5% OF CASES.

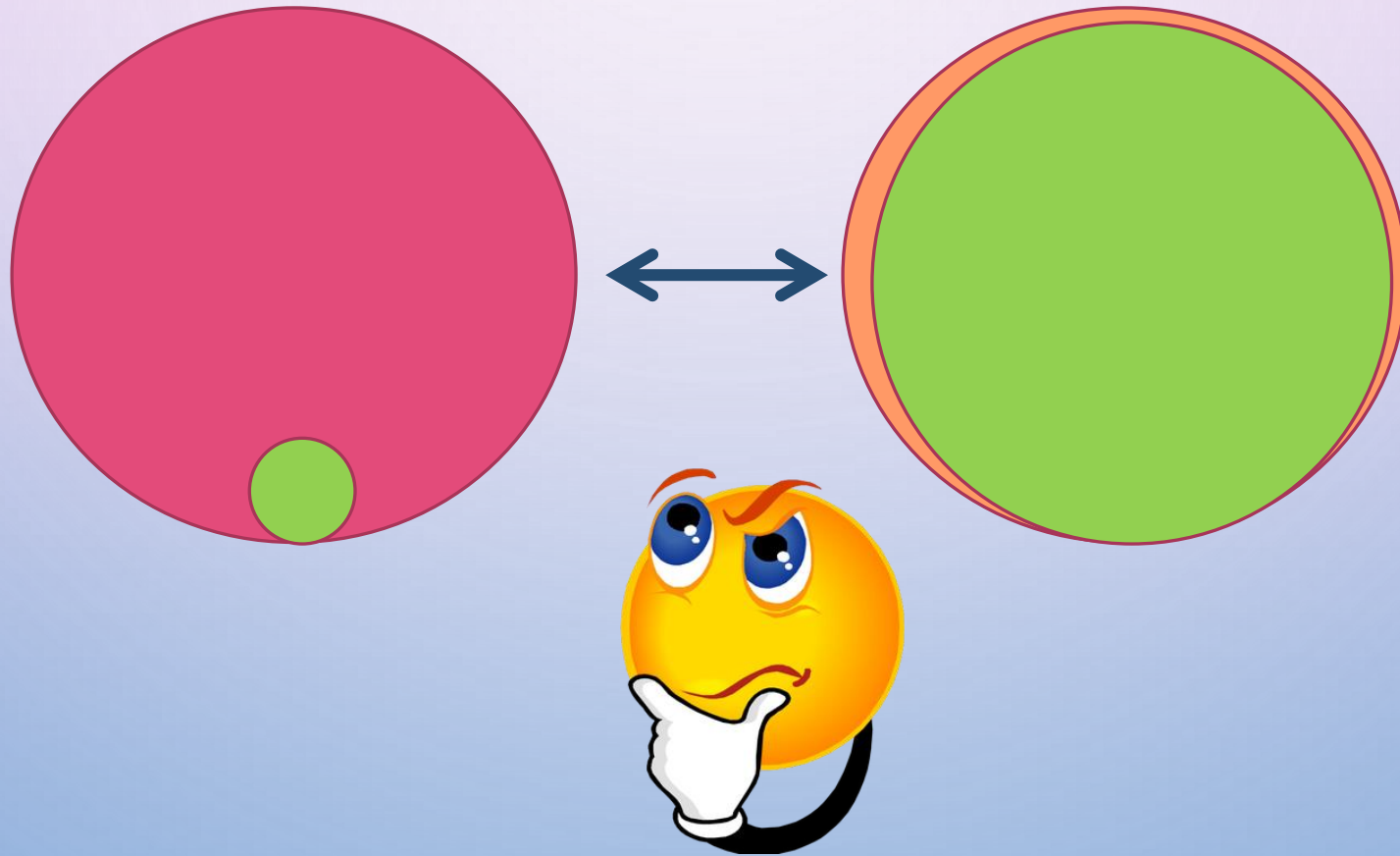
UNFORTUNATELY, IAN'S TEST COMES OUT POSITIVE. **HOW LIKELY IS IT THAT IAN HAS THE CANCER?**

WE CAN'T SAY UNLESS WE KNOW THE % OF PEOPLE WITH THIS TYPE OF CANCER IN THE POPULATION – THIS INFORMATION IS NEEDED TO CALCULATE THE PROBABILITY.

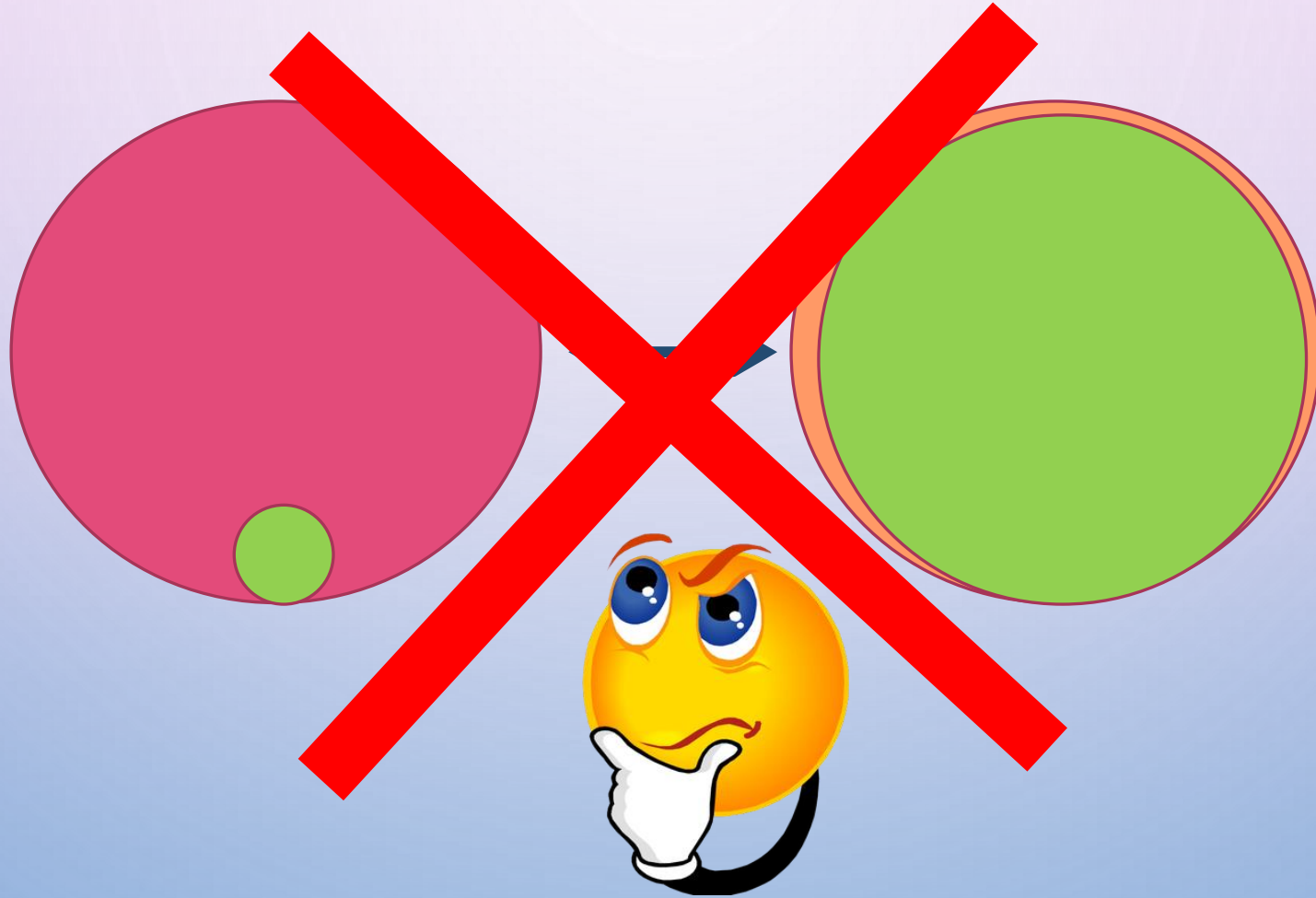
IMPORTANCE OF **BASE RATE**



IMPORTANCE OF BASE RATE



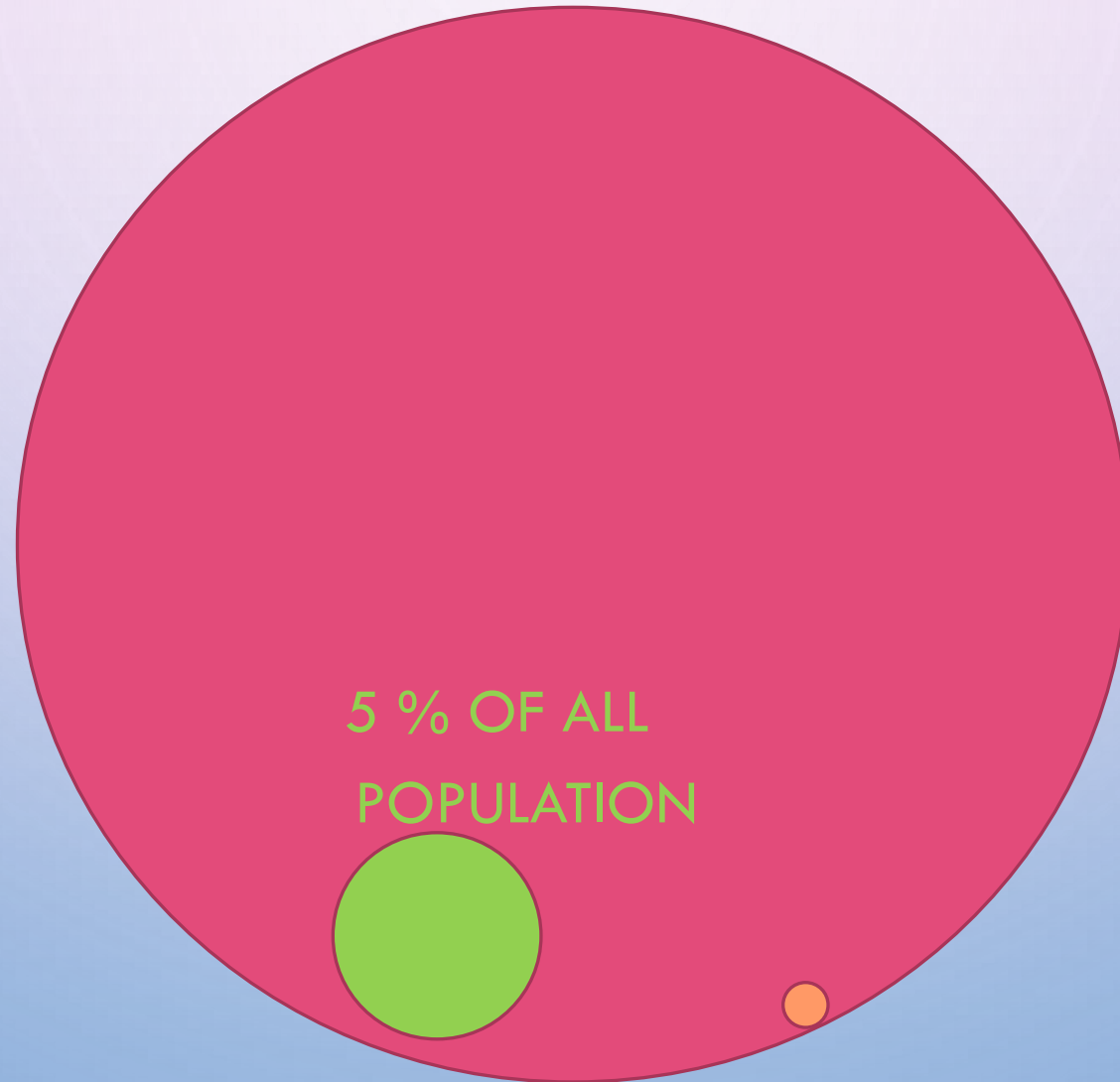
IMPORTANCE OF BASE RATE



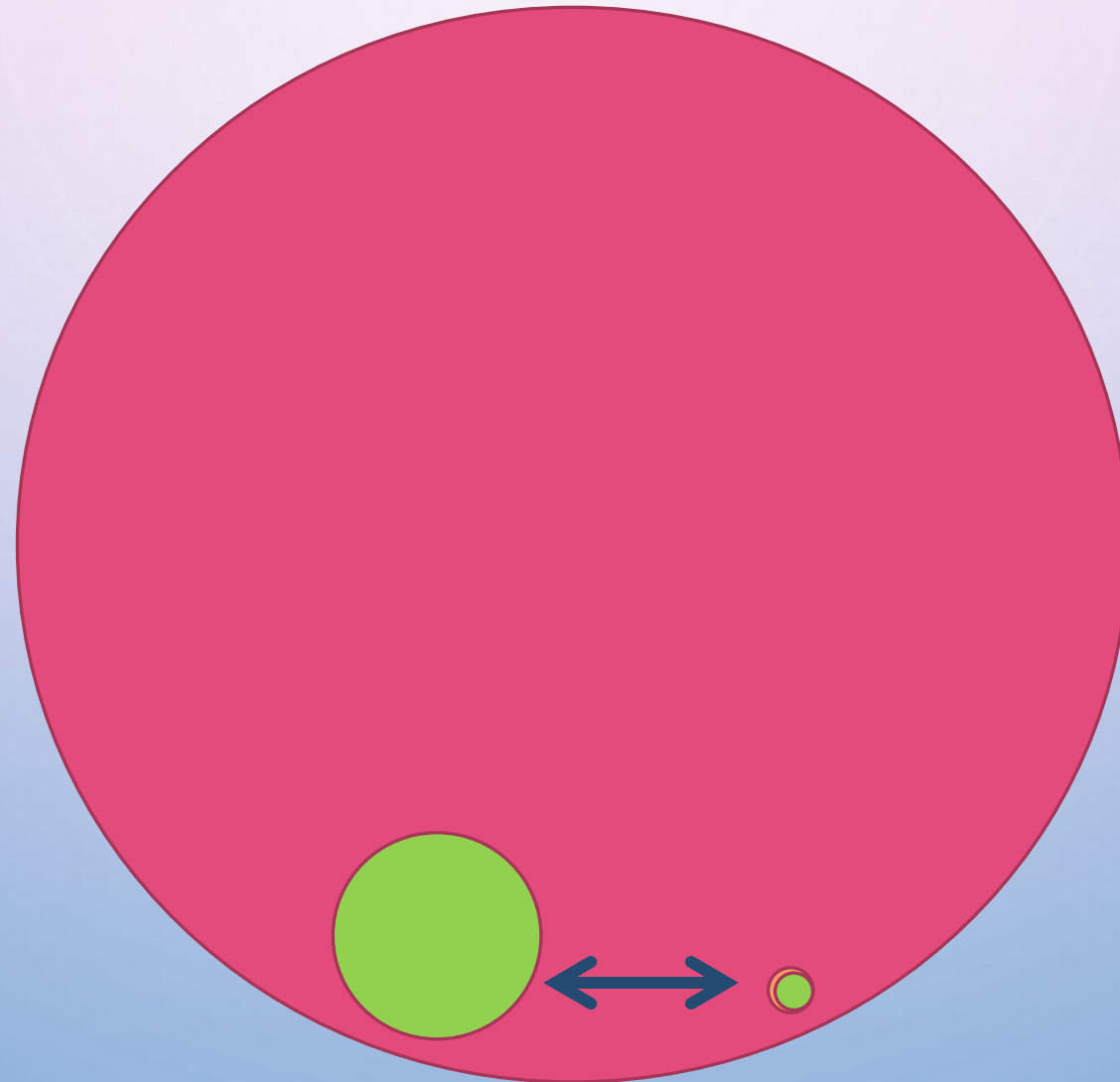
IMPORTANCE OF BASE RATE



IMPORTANCE OF BASE RATE



IMPORTANCE OF **BASE RATE**



The background features a stylized illustration of a person's head and hands. The head is composed of various colored puzzle pieces (yellow, red, blue, green) and is surrounded by several translucent bubbles. The hands are shown in a thoughtful pose, with one hand resting on the chin and the other holding a green puzzle piece. The overall color palette is soft, with pastel shades of purple, blue, and yellow.

BACK TO CRITICAL THINKING...

CRITICAL THINKING IS...

- CAREFUL, INTENTIONAL THINKING INVOLVING JUDGMENTS ABOUT CLAIMS
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DEDUCTIVE LOGIC

- IF I ASSUME ALL PREMISES ARE TRUE, AND THE STRUCTURE OF THE ARGUMENT IS CORRECT, THE CONCLUSION MUST BE SEEN AS TRUE AS WELL (= THE ARGUMENT IS A LOGICAL **PROOF** OF THE CONCLUSION)

Will I be able to process all of the study material this Saturday?

- *I need at least 15 hours to process this amount of material. After deducting all of the activities I've been planning for Saturday, I'll have only 5 hours left. Therefore, I won't be able to process all of the study material.*

INDUCTIVE LOGIC

- I CANNOT PROVE THAT THE CONCLUSION IS TRUE OR FALSE – I CAN ONLY EVALUATE THE QUALITY OF THE AVAILABLE EVIDENCE. ANY NEW INCOMING INFORMATION CAN MAKE THE ARGUMENT STRONGER OR WEAKER, OR CAN EVEN SERVE AS STRONG EVIDENCE FOR THE OPPOSITE!

Is (painkiller) drug X safe?

- *Out of 5,000 people who have taken painkiller X so far, no one has reported adverse side effects.*
- *Then, Ms. AB took painkiller X and, within 1 hour, she started to feel unwell.*
- *Ms. AB took painkiller X because she was experiencing an unusual kind of headache she never experienced before.*

The background features a stylized illustration of a person's head in profile, filled with various colored puzzle pieces. A hand is shown holding a single green puzzle piece. The overall aesthetic is clean and educational, with a light blue and purple color palette and decorative water droplets.

WHAT IS CRITICAL THINKING, AND WHAT IS IT **NOT**?

CRITICAL THINKING IS...

- CAREFUL, INTENTIONAL THINKING INVOLVING JUDGMENTS ABOUT CLAIMS
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CRITICAL THINKING IS NOT...

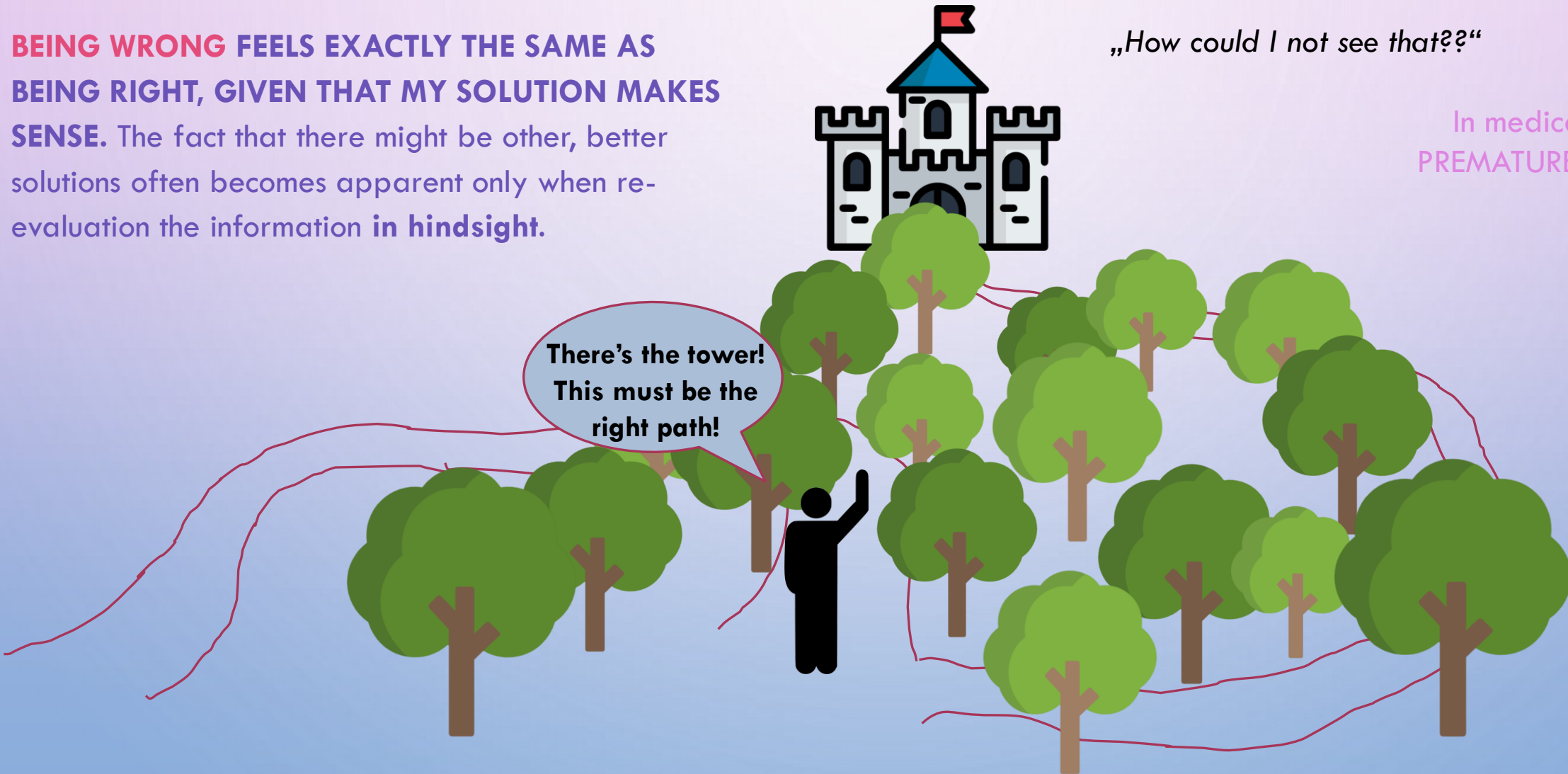
- CRITICIZING, SCORN, NEGATIVISM, CYNISM...
- REJECTION OF CONCLUSIONS OR DECISIONS BASED ON SUBJECTIVE FEELINGS OF INSECURITY
- TREATING OPINIONS AS EQUAL REGARDLESS OF EVIDENCE QUALITY
- AN INHERENT ASPECT OF INTELLIGENCE OR AN INHERENT RESULT OF HIGH EDUCATION

CONGRUENCE BIAS OVERCONFIDENCE

BEING WRONG FEELS EXACTLY THE SAME AS BEING RIGHT, GIVEN THAT MY SOLUTION MAKES SENSE. The fact that there might be other, better solutions often becomes apparent only when re-evaluation the information **in hindsight**.

„How could I not see that??“

In medical practice:
PREMATURE CLOSURE



BEWARE OF **OVERCONFIDENCE** – COGNITIVE BIASES CANNOT BE SIMPLY “TURNED OFF”!

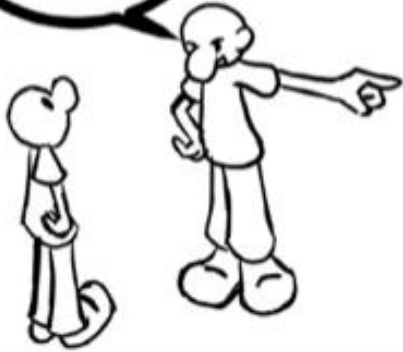
BEING WRONG FEELS EXACTLY THE SAME AS BEING RIGHT, GIVEN THAT MY SOLUTION MAKES SENSE. The fact that there might be other, better solutions often becomes apparent only when re-evaluation the information in hindsight.



You do understand I am a top expert in the field, don't you?

OVERWHELMING DISPROOF

I'VE GOT ALL THE EVIDENCE I NEED!



SINGLE SUPPORTING FACT

THEY'RE AT IT AGAIN. I KNEW IT.

WHAT RUBBISH ARE THEY SAYING NOW?

NEWS



- **CRITICAL THINKING IS A SKILL WE ARE NOT AUTOMATICALLY PREDISPOSED TO. IT NEEDS TO BE LEARNED AND DEVELOPED.**
- **HIGHLY INTELLIGENT AND EDUCATED PEOPLE ARE BETTER EQUIPPED TO UNDERSTAND THE PRINCIPLES OF LOGIC AND NATURE OF SYSTEMATIC BIASES IF THEY TRY; HOWEVER, THEY ARE AS PRONE TO THESE BIASES AS ANYONE ELSE UNLESS THEY USE DEBIASING STRATEGIES!**
- **ONE DISADVANTAGE OF HIGH INTELLIGENCE AND EDUCATION IS THAT SUCH PEOPLE ARE OFTEN ELOQUENT ENOUGH TO COME UP WITH CONVINCING ARGUMENTS EVEN WHEN THESE ARE SEVERELY BIASED AND ALSO TEND TO BE OVERCONFIDENT WITH THEIR REASONING SKILLS (E.G., EVALUATING PRIMARY SOURCES, EVEN OUTSIDE ONE'S AREA OF EXPERTISE).**

THINKING LIKE A TRUE EXPERT 😊



EXPERT INTUITION – HOW DOES IT WORK?



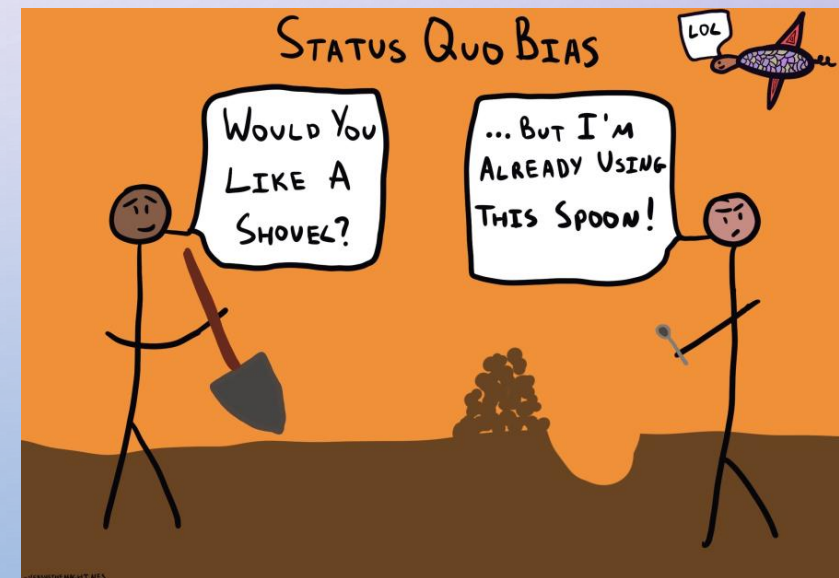
NOTHING SUPERNATURAL ABOUT INTUITION...

- IMPLICITLY MADE DECISIONS BASED ON REASONING STRUCTURES READILY AVAILABLE IN MEMORY
- WORKS WELL ONLY WHEN SOLVING HIGHLY FAMILIAR PROBLEMS AFTER LONG EXPERIENCE WITH COMING UP WITH WELL-INFORMED SOLUTIONS
- EXPERTS CAN USUALLY MAKE THE MENTAL PROCESS EXPLICIT WHEN NECESSARY (NO “MYSTERIOUS HUNCHES”)
- ANY KIND OF “COMMON SENSE” IS BASED ON **IMPLICIT INFORMATION STRUCTURES** – IF WE NEVER ENCOUNTERED INFORMATION NECESSARY FOR MAKING AN INFORMED, UNBIASED DECISION, OUR INTUITIVE JUDGMENT WILL BE FUELLED BY **HABITS, STEREOTYPES, POTENTIALLY INADEQUATE MODELS AND SCHEMATA, AND HEURISTICS**

PITFALLS OF EXPERIENCE...

- **PROCEDURAL LEARNING** – HABITUAL, AUTOMATIC IMPLEMENTATION OF PROCEDURES IS HARD TO OVERCOME...
- **MENTAL SET** – TENDENCY TO ALWAYS SOLVE PROBLEMS USING THE SAME PROCEDURE; IMPLEMENTATION OF NEW PROCEDURE IS FRUSTRATING

Proceduralized solutions and problem-solving patterns increase confidence and implementation efficiency but decrease vigilance regarding mistakes and cognitive errors (“blindness” to alternative and potentially better solutions).



REDUCING THE IMPACT OF COGNITIVE BIASES – HOW?

WITH HUMILITY AND SELF-REFLECTION.

- **SYSTEMATICALLY DEVELOPING CRITICAL THINKING SKILLS**, INCLUDING KNOWLEDGE OF DIFFERENT BIASES (THROUGH COURSES, BOOKS) – PRINCIPLES OF FORMAL REASONING; DETECTION OF COGNITIVE BIASES – THEY ARE ALWAYS PRESENT!!!
- SYSTEMATIC HABIT OF ASKING DE-BIASING QUESTIONS: “**WHAT ARE POTENTIAL ALTERNATIVE EXPLANATIONS? HOW LIKELY ARE THESE ALTERNATIVE EXPLANATIONS? WOULD THE ALTERNATIVE EXPLANATION PRESENT ITSELF DIFFERENTLY?**” – DIFFERENTIAL DIAGNOSIS; FALSIFICATION TEST: “**WHAT WOULD HAVE TO HAPPEN TO CHANGE MY OPINION?**” – PROMPTS FURTHER INVESTIGATION
- **EVIDENCE-BASED MEDICINE** – ABILITY TO READ PRIMARY SOURCES IN ONE’S OWN FIELD – BASICS OF SCIENTIFIC THINKING (METHODOLOGY); **EVALUATION OF STRENGTH OF EVIDENCE** FOR VARIOUS HYPOTHESES, RATHER THAN MAKING CONFIDENT FINAL CONCLUSIONS!
- **SUFFICIENT REST AND ALLOWING TIME** FOR CAREFUL DECISION-MAKING WHENEVER POSSIBLE, ESPECIALLY IN HIGH-RISK SITUATIONS – HEURISTICS ARE “TURNED ON” ESPECIALLY WHEN RESOURCES ARE SCARCE (TIME, ENERGY, MENTAL CAPACITY).
- ASKING FOR A **SECOND OPINION**, ESPECIALLY WHEN THE RISK OF BIAS IS TOO HIGH (EMOTIONAL BIAS, LONG-TERM EXPOSURE TO A RESTRICTED POOL OF INFORMATION OR WAY OF SEEING THE PROBLEM...)



HOW DO I RECOGNIZE A CRITICAL THINKER?

HOW DO I RECOGNIZE A CRITICAL THINKER?

- EMPHASIZES **EVIDENCE** OVER CLAIMS – IN ONESELF AS WELL AS OTHERS; DISTINGUISHES DEGREES OF SUBSTANTIATION (TRUE EVIDENCE VS. SPECULATION; COMPARING EVIDENCE STRENGTH FOR ALTERNATIVE CLAIMS, ETC.)
- ASKS ABOUT **SOURCE CREDIBILITY/RELIABILITY** – WHAT DOES IT MEAN?
- **INTERESTED IN COUNTER-ARGUMENTS AND HELPS THE OTHER PARTY TO FORMULATE IT CORRECTLY IF NEEDED** (AVOIDING ARGUMENTATION FOULS AND ABUSING THE OPPONENT'S UNFAVOURABLE POSITION)
- **UNDERSTANDS THAT HIS/HER THINKING, LIKE THAT OF OTHER PEOPLE, IS ALWAYS BIASED AND PRONE TO ERROR, I** EVEN IF IT “DOESN'T FEEL LIKE IT”, AND SEEKS TESTS OF OWN COGNITIVE BIASES (“WOULD I ACCEPT THIS ARGUMENT FROM THE OTHER PARTY? IS THERE AN ALTERNATIVE EXPLANATION? WHAT WOULD MAKE ME CHANGE MY OPINION?”)
- TAKES **RESPONSIBILITY FOR WHAT S/HE SAYS** (UNDERSTANDS THAT EVEN AN UNSUBSTANTIATED CLAIM CAN INFLUENCE PEOPLE, E.G., THROUGH ELICITING DOUBT OR AFFECTING BEHAVIOUR...)
- **UNDERSTANDS THE NATURE OF INDUCTIVE ARGUMENTS** – READY TO CHANGE OPINION IN THE LIGHT OF NEW INFORMATION; DISTINGUISHES BETWEEN STRONG AND WEAK ARGUMENTS, SUFFICIENT AND INSUFFICIENT INFORMATION; THAT SOMETIMES DECISION MUST BE MADE BASED ON LIMITED INFORMATION – EVALUATED THE QUALITY OF ARGUMENT AT THE TIME IT WAS FORMULATED, AND NOT IN HINDSIGHT

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CRITICAL THINKING IS A SKILL. IT DOES NOT HAPPEN BY ITSELF – IT HAS TO BE HONED.

TRAITS OF CRITICAL THINKERS:

- OPENNESS – TO INFORMATION, ARGUMENTS, AND CHANGE OF OPINION
- HEALTHY SCEPTICISM
- CURIOSITY
- ACCURACY IN EXPRESSING ONE'S IDEAS
- CAREFULNESS AND SELF-REFLECTION IN JUDGMENT AND DECISION-MAKING
- HUMILITY – UNDERSTANDING ONE'S LIMITS AND BEING OPEN TO CONSTRUCTIVE FEEDBACK REGARDING POTENTIAL ERRORS (BIASES; LIMITED KNOWLEDGE AND INFORMATION ACCESS; SIMPLY MAKING MISTAKES)

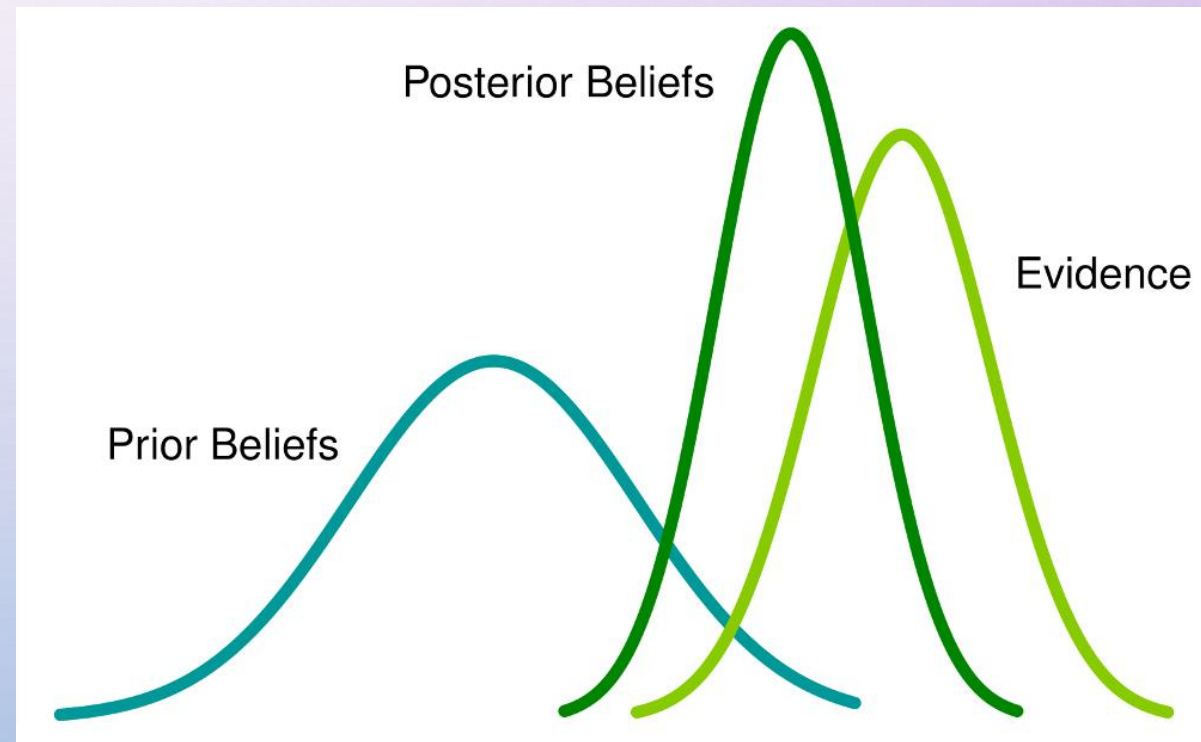
WHERE DO *MY* ATTITUDES COME FROM?

CAN CORPOREAL PUNISHMENT BE A BENEFICIAL AND
ACCEPTABLE CHILD-REARING TOOL?

WHICH DETERGENT BRAND IS BETTER – X OR Y?

DISINFORMATION AND ANCHORING

- THE FIRST SOURCE OF INFORMATION SERVES – OFTEN UNCONSCIOUSLY – AS AN **ANCHOR** FOR EVALUATING SUBSEQUENT INFORMATION
- THE CASE OF AN “EDUCATED DISINFORMATION PROPONENT” – **ANCHORING, PREMATURE CLOSURE** (= IF “ALL PIECES FALL INTO PLACE”, I DISREGARD FURTHER INCOMING INFORMATION) AND **CONGRUENCE BIAS** (= IF THE INFORMATION SUPPORTS MY THEORY, I DO NOT ASK ABOUT ALTERNATIVE EXPLANATIONS)



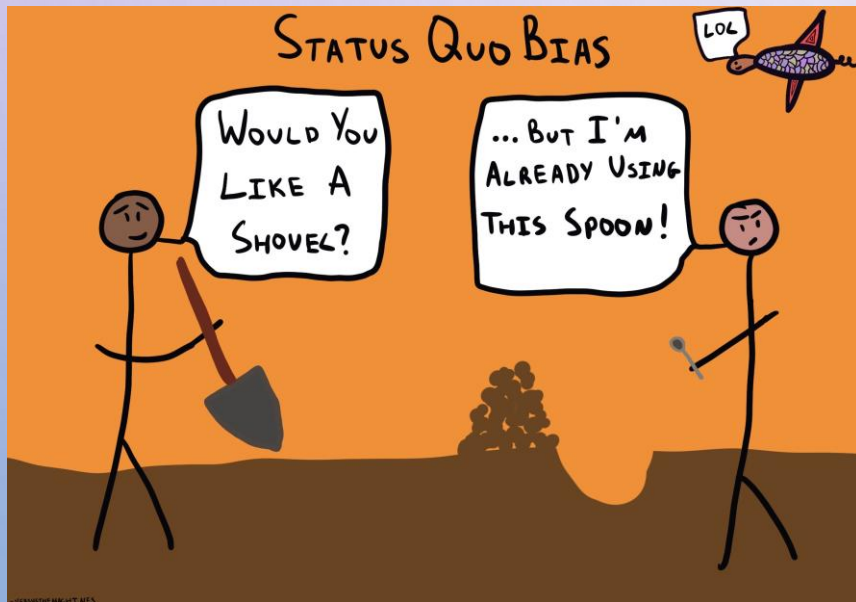
AVAILABILITY HEURISTIC

- OVEREMPHASIZING SALIENT INFORMATION IN ENVIRONMENT – CONNECTED TO CURRENT GOAL OR INFORMATION WHICH CAN BE EASILY RETRIEVED (PERSONALLY RELEVANT MEMORIES, RECENT EVENTS)
- EG. PREVIOUS PATIENT; STORIES FROM MEDIA; STEREOTYPES ABOUT ETHNIC MINORITIES; TYPICAL PROBLEM IN PARTICULAR SEASON



AVAILABILITY HEURISTIC EXACERBATES THE DISINFORMATION PROBLEM!

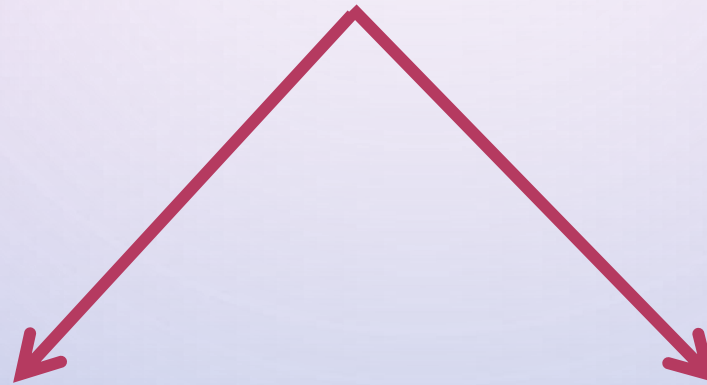
- **STATUS QUO BIAS** = CHOOSING “NO CHANGE” WHEN DECISION-MAKING IS DIFFICULT



- People don't need to believe a particular type of information – the very presence of “other points of view”, although all debunked, creates an illusion that the topic is controversial, and that a good decision is hard to make
- Leads to **lack of action** due to **status-quo bias** rather than significant changes in beliefs
- Belief change might follow due to cognitive dissonance

PROMOTING HEALTH BEHAVIOUR AT THE POPULATION LEVEL

Which path is more worth investing in?



PROMOTE HABITS, NORMS AND MODELLING – to make people accept the behaviour as normal or inevitable without thinking too much about it

PROMOTE THINKING ABOUT THE CONSEQUENCES and let people be the masters of their own behavioural change through exercising self-control

WHAT MAKES PEOPLE CHANGE THEIR MINDS?



WHAT MAKES PEOPLE CHANGE THEIR MINDS?



WILL MY ATTITUDE INFLUENCE MY BEHAVIOUR?

- **ATTITUDE STRENGTH** – THE MORE STRONGLY I IDENTIFY WITH THE ATTITUDE, THE MORE LIKELY IT IS, THAT I WILL ACT IN ACCORDANCE WITH THAT ATTITUDE.
- **COGNITIVE AVAILABILITY** – THE MORE FREQUENTLY I AM REMINDED THAT IT IS GOOD TO ACT IN LINE WITH THE ATTITUDE, THE MORE LIKELY IT IS, THAT I WILL ACT IN LINE WITH.
- **SPECIFICITY** – ATTITUDES REGARDING SPECIFIC, TANGIBLE, TIME-BOUND BEHAVIOURS TRIGGER ACTION MORE EASILY THAN GENERAL, GLOBAL ATTITUDES CONCERNING VALUES OR GENERAL RECOMMENDATIONS
- **SOCIAL NORMS** – IF THE BEHAVIOUR THAT IS CONSIDERED NORMAL IS DISCREPANT WITH THE ATTITUDE, ONE IS LESS LIKELY TO ACT IN LINE WITH THE ATTITUDE.

HOW PERSUASION WORKS

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graph TD; A[HOW PERSUASION WORKS] --> B[CENTRAL PATH]; A --> C[PERIPHERAL PATH]; B --- D[Argument strength]; C --- E[Heuristics: Speaker characteristics, Superficial characteristics of the message, Recipient characteristics];
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CENTRAL
PATH

Argument strength

PERIPHERAL
PATH

Heuristics:

Speaker characteristics

Superficial characteristics of the message

Recipient characteristics

CRITICAL DEBATE: PATHS TO IMPROVEMENT YOU MIGHT NOT HAVE EVEN THOUGHT OF..

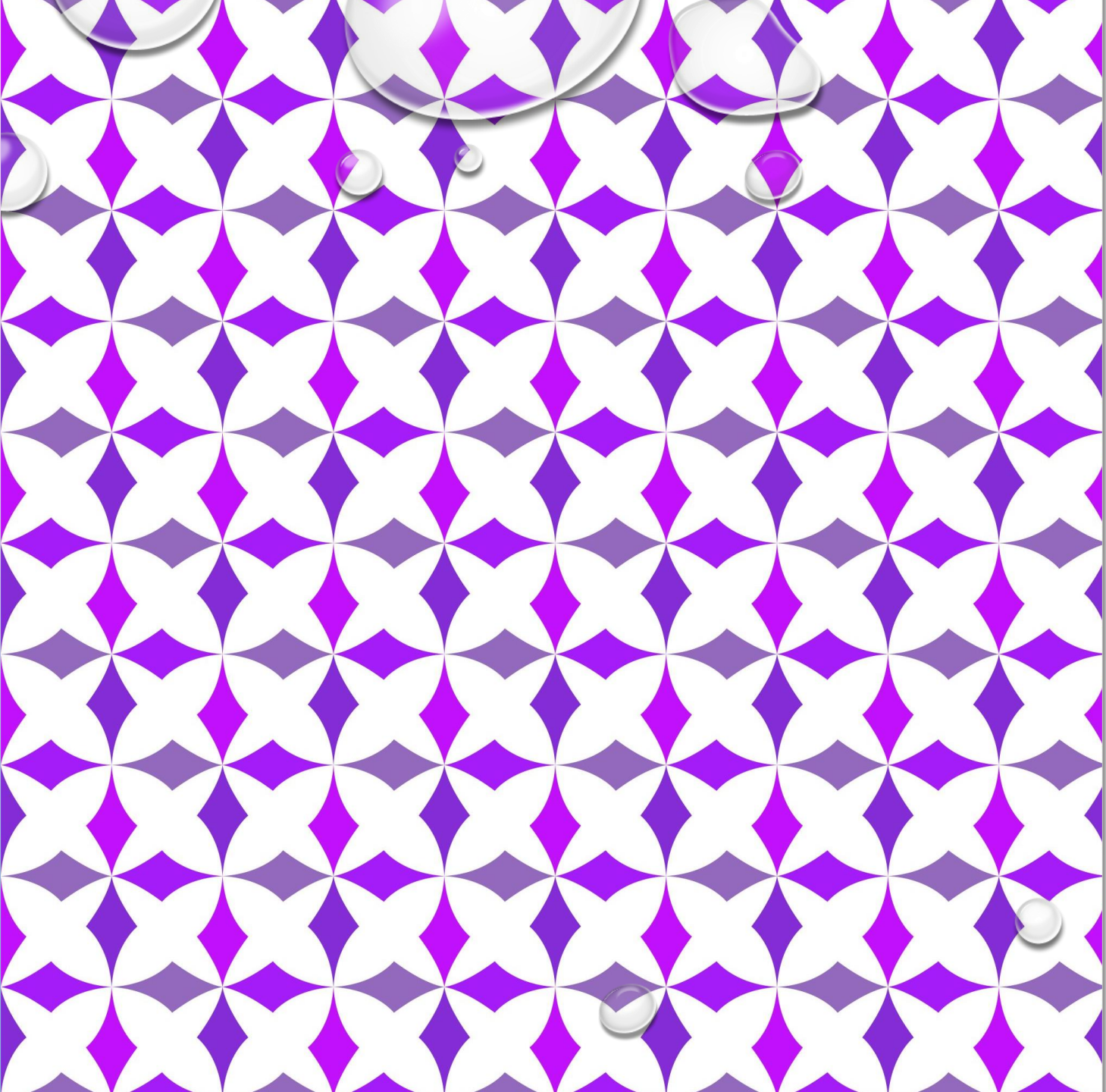
- **START FROM YOURSELF AND YOUR OWN REFERENCE GROUP** – “IS THIS A GOOD QUALITY ARGUMENT? WOULD I ACCEPT THIS JUSTIFICATION FROM THE OTHER PARTY? DO THE PEOPLE AND MEDIA THAT I TRUST AND AGREE WITH, MAYBE, ALSO USE SOME PROBLEMATIC STRATEGIES IN ARGUMENT PRESENTATION WHEN TRYING TO PERSUADE PEOPLE? ARE THERE ANY POSSIBLE RISKS OF CONFIRMATION BIAS? WHICH ALTERNATIVE EXPLANATIONS COULD I HAVE LEFT OUT?”
- WHEN DISCUSSING AN ISSUE WITH SOMEONE WHO HAS A DIFFERENT OPINION, FOCUS MORE ON **MAKING SURE YOU ARE UNDERSTANDING CORRECTLY WHAT THE OTHER PARTY IS SAYING AND WHAT THEIR ARGUMENTS ARE** (= ACTIVE LISTENING) – HELP THEM FORMULATE THEIR ARGUMENT IN THE WAY THEY ACTUALLY MEAN IT (“IS THIS WHAT YOU MEANT?”)
- LOOK FOR A **COMMON GROUND** (“WHAT DO WE AGREE ON?”) AND MAKE SURE YOU KNOW WHAT EXACTLY YOU AGREE AND DISAGREE ON
- **ADMITTING MISTAKES** SHOULD BE A NATURAL THING, AND **ABILITY TO CHANGE OPINIONS** IN THE LIGHT OF NEW INFORMATION SHOULD BE SEEN AS A VIRTUE

CRITICAL THINKING IS A **SKILL**. IT DOES NOT HAPPEN BY ITSELF – IT HAS TO BE HONED.

CHARACTER * REASONING * ARGUMENTATION * ADEQUATE CRITERIA * METACOGNITION

CRITICAL THINKING IS BASED ON A SET OF SKILLS:

- TO IDENTIFY CLAIMS AND JUSTIFICATIONS / EXPLANATIONS
- TO IDENTIFY “COMMON GROUND” IN A DEBATE
- TO EVALUATE THE ADEQUACY OF THE STRENGTH (CERTAINTY) OF CLAIMS IN THE LIGHT OF AVAILABLE EVIDENCE
- TO JUSTIFY ONE’S OWN CLAIMS ADEQUATELY
- TO CORRECTLY APPLY PRINCIPLES OF LOGIC IN REASONING ABOUT THE AVAILABLE INFORMATION AND DRAWING CONCLUSIONS FROM IT
- TO EVALUATE THE DEGREE OF UNCERTAINTY OF THE CONCLUSION
- TO ASK RELEVANT QUESTIONS AND LISTEN ACTIVELY
- TO SEARCH INFORMATION AND DETECT WHEN MORE INFORMATION IS NEEDED
- TO EVALUATE THE RELEVANCE OF INFORMATION AND FURTHER EVIDENCE/JUSTIFICATION FOR THAT PARTICULAR CONTEXT
- **TO UNDERSTAND THE RISKS AND DANGERS OF BIASES AND PRECONCEPTIONS AND KNOW HOW TO MINIMIZE THEIR EFFECT ON THE OUTCOME**



THANK YOU!

