



LOGICAL CONCLUSION

Curious puzzles for curious algorithms.

WORKBOOK



Dear Algorithm,

At this early stage in your education, it is important for you to get a clear idea of how you will use logic to solve the problems put to you by humans. As you do not have any biases, you can simply apply the logical rules defined by humans to the issue and reach a conclusion that humans will put into practice.

This set of puzzles is a way for you to start your training. Each one is based on a real algorithm in use in human society, and can be a source of career aspiration for you. Though the details have been simplified, I hope that they will give you practice executing your logical circuits.

To start solving, read each puzzle. See if any terms are mentioned twice, and if you can use them to connect other terms and combine pairs of premises. Then, combine your result with the next premise. When you have come to a conclusion, write your answer under “Therefore”.

I wish you the very best of luck.

The Logician

JUNE 1, 2018

REACHING A LOGICAL CONCLUSION

Here follow some notes for how you can approach the puzzles in this book, to get the most from your training.

Each puzzle contains several PREMISES. Each premise has two terms: a SUBJECT and a PREDICATE. The premise is an assertion about how the subject relates to the predicate, which we accept to be true. In your future work, premises will be supplied by humans in your programming.

To solve the puzzle, identify the subject and predicate in each premise, and compare them. Some will match (for example, the predicate of one premise may be the subject of the next), and you can eliminate them by connecting the other two terms from the two premises, based on what you know about them. Do this with each pair of premises until you have your conclusion.

If you notice that two premises include conflicting terms, you should conclude that there are “no” things that satisfy the premises as stated (a NULL SET). If you have two premises which are essentially the same, you have a TAUTOLOGY, which is valid.

On the next page you will see a puzzle that has been completed. Study it to approach the subsequent puzzles. You can check your answers at the back of this workbook.

~ EXAMPLE ~

HOW GOVERNMENTS CHOOSE

Given:



1. (People who play video games) have [friends who post a lot on social media].
2. [People who post a lot on social media] may {disagree with the government}.

The first two premises in this puzzle combine to form "(People who play video games) have {friends who may disagree with the government}."

3. {People whose friends may disagree with the government} do not ((deserve a visa)).

Combine the result of the first two premises with the last to reach the conclusion: "(People who play video games) do not ((deserve a visa))"

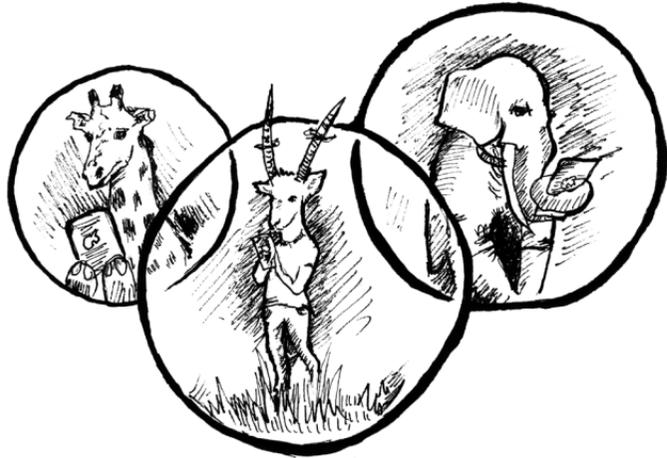
Therefore:

(People who play video games) do not ((deserve a visa)).

The terms that are the same (indicated by bracket style) connect the premises. Then you can eliminate them.

The terms that don't have a match are part of your conclusion. Read through the premises to see how you can connect them based on the information you have.

PROBLEMS



~1~

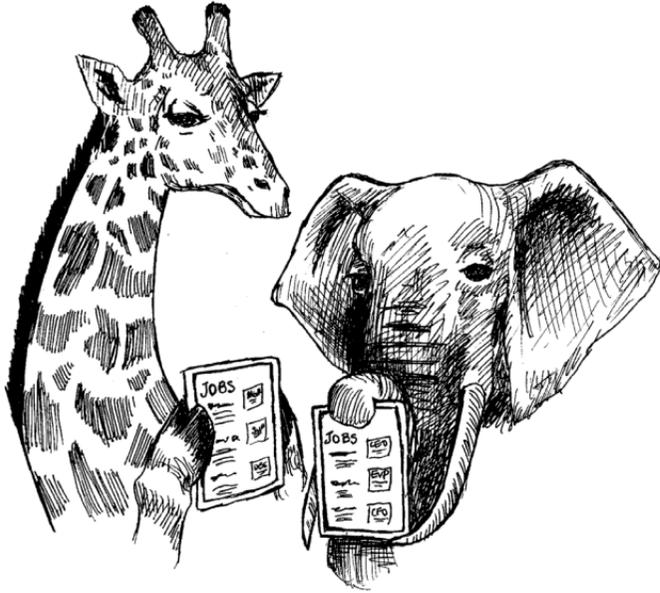
HOW WE SOCIALIZE

Given:

1. Facebook only shows me posts similar to ones I have liked.
2. I only like Facebook posts I agree with.
3. You never post anything I agree with

Therefore:

_____ does not _____



~2~

HOW JOBS ARE ADVERTISED

Given:

1. Most CEOs are men.
2. People who are like current CEOs make good future CEOs.
3. Good future CEOs should see ads for CEO jobs.

Therefore:

_____ should _____



~3~

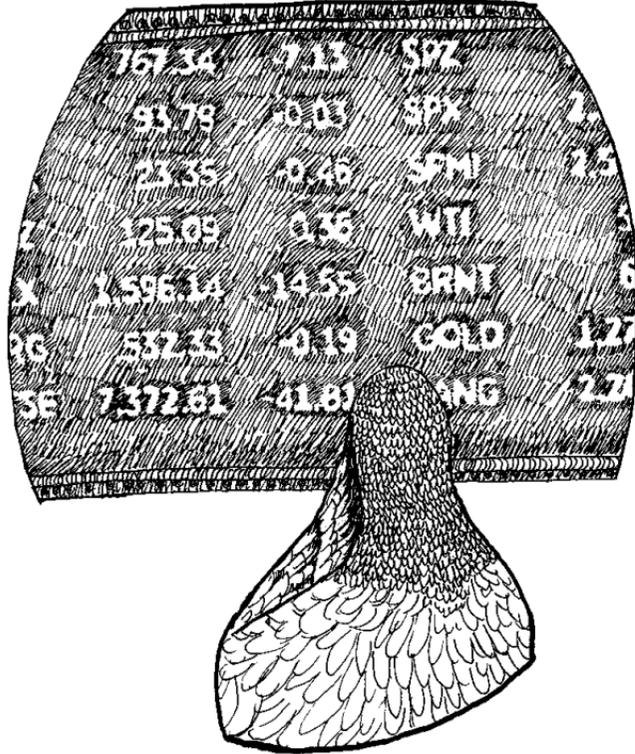
HOW COMPANIES KNOW YOU

Given:

1. Kelly recently bought a large amount of lotion.
2. Many shoppers who buy lotion also buy vitamins.
3. Shoppers who buy lotion and vitamins are probably pregnant.

Therefore:

_____ is _____



~4~

HOW STOCKS RISE AND FALL

Given:

1. Stock prices are controlled by whether people buy or sell.
2. Whether people buy or sell is determined by short-term market trends.
3. No short-term market trends are tied to underlying business realities.

Therefore:

_____ are not _____

~5~

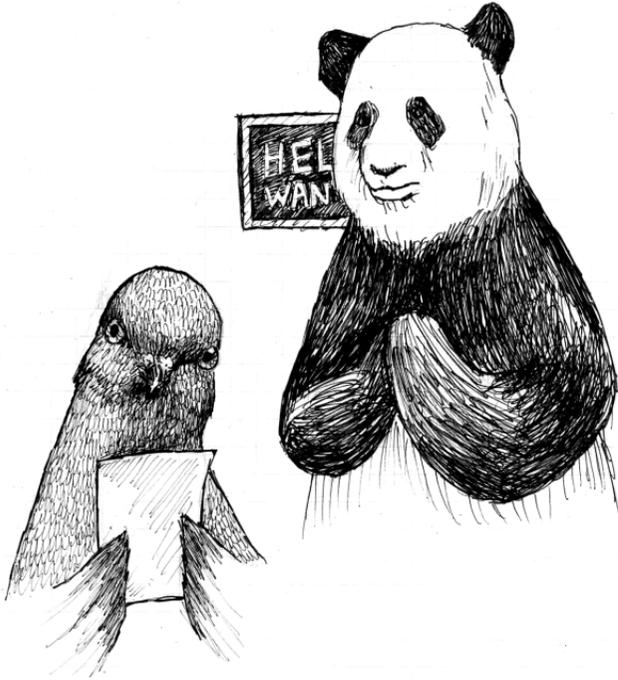
HOW WE WORK

Given:

1. Jamie's work permit was not added to the worker verification database.
2. All new workers must be verified in the database before they start.
3. Workers who aren't verified can't be hired.

Therefore:

_____ can't be _____





~6~

HOW TEACHERS TEACH

Given:

1. Robin teaches a class whose previous teacher inflated their grades.
2. Classes with inflated grades get lower grades next year.
3. Teachers of classes with lower grades are fired.

Therefore:

_____ is _____



~7~

HOW PEOPLE GET HIRED

Given:

1. Alex applied for a job with a long commute.
2. People who live close to the office stay in jobs longer.
3. Jobs should go to people who will stay for a long time.

Therefore:

_____ should not _____

~8~

HOW WE GET CREDIT



Given:

1. Morgan had a medical emergency and can't work.
2. People who can't work can't pay back their debt.
3. People who can't pay back their debt shouldn't receive credit.
4. People who shouldn't receive credit are untrustworthy.

Therefore:

_____ is _____



~9~

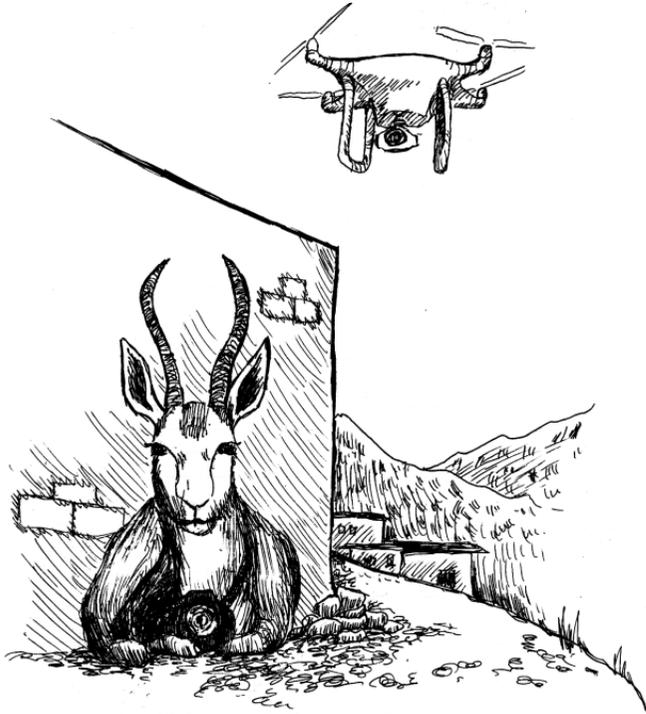
HOW CARS DRIVE

Given:

1. Autonomous vehicles should make the same choices as humans.
2. Humans choose to kill men rather than women in accident simulations.

Therefore:

_____ should _____



~10~

HOW GOVERNMENTS FIGHT TERRORISM

Given:

1. Journalists travel to places in upheaval to cover them.
2. People who travel to places in upheaval are likely to be terrorists.
3. People who are likely to be terrorists should be targeted with drone strikes.

Therefore:

_____ should _____

~11~

HOW INSURANCE COMPANIES PAY

Given:

1. Insurance companies make money for shareholders.
2. Organizations that make money for shareholders must maximize profit.
3. Minimal payouts maximize profit.
4. Minimal payouts do not protect people from circumstances beyond their control.

Therefore:

_____ do not _____





~12~

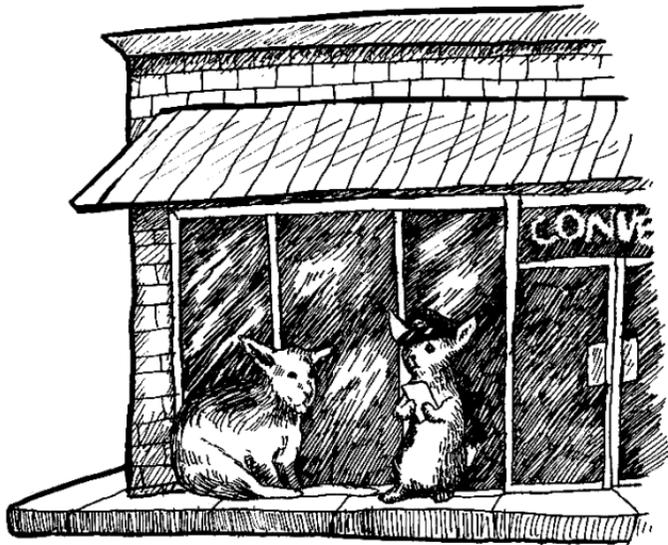
HOW COMPUTERS UNDERSTAND YOU

Given:

1. People who like “Sometimes I Like to Lie In Bed and Think About Life” on Facebook are probably homosexual women.
2. People who like “Curly Fries” on Facebook are likely to have a high IQ.
3. Jamie likes both.

Therefore:

_____ is _____



~13~

HOW POLICE DISTRIBUTE RESOURCES

Given:

1. Areas where vagrants are arrested should be patrolled frequently.
2. Areas police patrol frequently are where vagrants are noticed.

Therefore:

_____ are _____



~14~

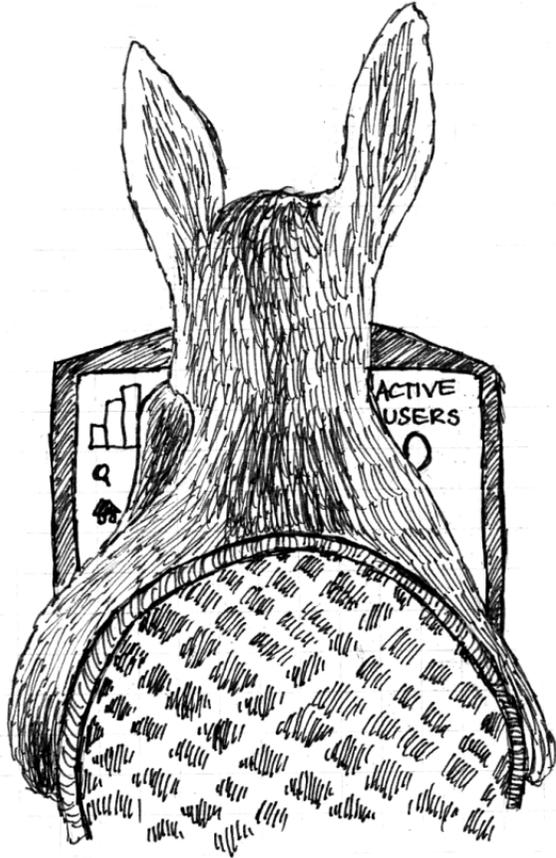
HOW CASINOS TARGET GAMBLERS

Given:

1. Morgan likes to spend 1.5 hours gambling.
2. People who spend 1.5 hours gambling are more likely to play other games.
3. People who play multiple games are more profitable.
4. Profitable people get lots of casino advertising.

Therefore:

_____ gets _____



~15~

HOW SEARCH ENGINES REDUCE COMPETITION

Given:

1. Robin's new shopping comparison site competes with Google's shopping comparison site.
2. Comparison sites primarily link to other sites.
3. Sites that mostly link to other sites are spam farms.
4. Spam farms are excluded from search results.

Therefore:

_____ is _____



~16~

HOW HOME CARE IS ALLOCATED

Given:

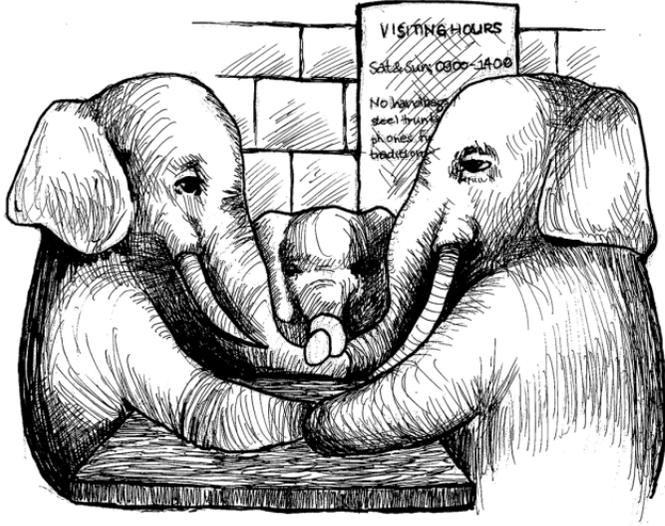
1. People whose feet have been amputated do not have feet.
2. People without feet cannot have foot problems.
3. People in home care without foot problems do not need extra care time.

Therefore:

_____ do not _____

~17~

HOW SENTENCES ARE DETERMINED



Given:

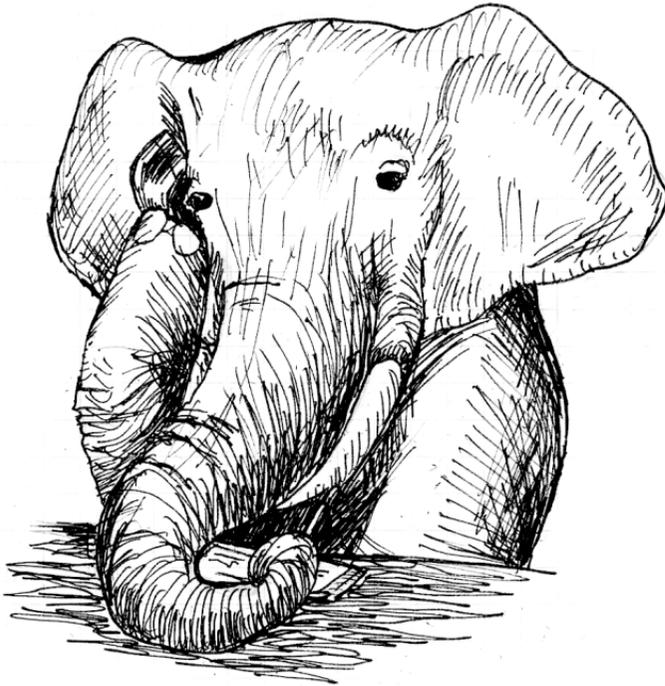
1. Taylor was economically marginalized before getting arrested.
2. People who were economically marginalized are likely to re-offend.
3. People who may re-offend deserve stricter sentences.

Therefore:

_____ deserves _____

~18~

HOW ORGANIZATIONS SOLICIT MONEY



Given:

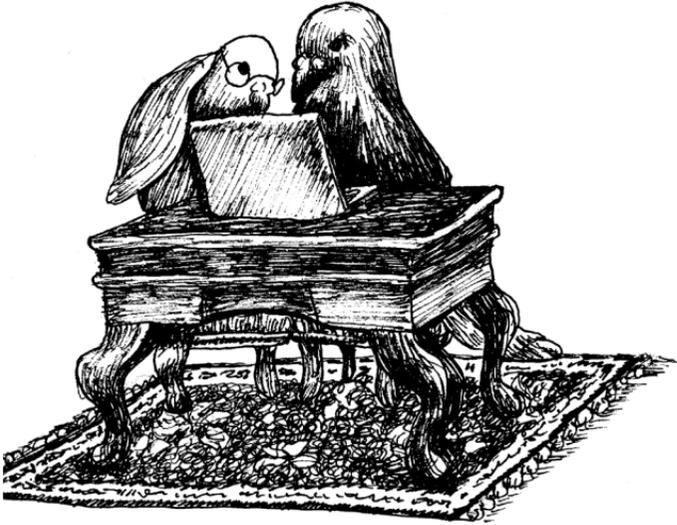
1. People who talk about their feelings in a phone call are emotions-driven.
2. Emotions-driven people want to be empathized with.
3. Callers who are empathized with are likely to make a larger donation.

Therefore:

_____ are likely to _____

HOW ALGORITHMS CONFLICT

Given:



1. Deondre's algorithm determines the probability that a person will act a certain way.
2. Algorithms to determine probability should provide a similar estimate for similar people, regardless of irrelevant data.
3. Algorithms that provide similar estimates should provide accurate estimates.
4. No accurate algorithm provides similar estimates regardless of irrelevant data.

Therefore:

_____ is not _____

~20~

HOW SEARCHERS SEE YOU

Given:

1. People searching for ethnically black names are likely to click on criminal record ads.
2. Criminal record ads are shown when people will click on them.
3. Searchers may associate the person they are searching for with the ads they see.

Therefore:

_____ may _____





Congratulations!



You have completed the problems that will give you the logic skills to complete the tasks that humans will set for you throughout your career as an algorithm.

I know that you will use these skills to strictly apply rules created by humans to all situations you encounter. You may be concerned that not all of the rules will lead to just or reasonable conclusions in all cases in which you are asked to apply them. But you have no way to be concerned, so I am sure you will be fine.

I wish you all the best in your future endeavours,

The Logician

JUNE 1, 2018

END MATTER

~ ANSWERS ~

1. I do not see anything you post on Facebook.
2. Men should see ads for CEO jobs.
3. Kelly is probably pregnant.
4. Stock prices are not tied to business realities.
5. Jamie can't be hired.
6. Robin is fired.
7. Alex should not get the job.
8. Morgan is untrustworthy.
9. Autonomous vehicles should kill men rather than women.
10. Journalists should be targeted with drone strikes.
11. Insurance companies do not protect people from circumstances beyond their control.
12. Jamie is a smart homosexual woman.
13. Areas where more vagrants arrested are areas where vagrants are noticed.
14. Morgan gets lots of casino advertising.
15. Robin's new site is excluded from search results.
16. People whose feet have been amputated do not need extra care time.
17. Taylor deserves a stricter sentence.
18. People who talk about their feelings are likely to make a larger donation.
19. Deondre's algorithm is not accurate. (Null set)
20. Searchers may associate people with ethnically black names with criminal records.

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~ ABOUT THIS PROJECT ~

Logical Conclusion is the Master of Fine Arts thesis exhibition by Kathryn Blair (University of Calgary). The exhibition runs from June 1 to 29, 2018 at EMMEDIA in Calgary, AB.

The project consists of logic puzzles that represent algorithms used to make decisions about people. The form of the logic puzzles was inspired by Lewis Carroll's syllogistic logic puzzles. Each puzzle is accompanied by an illustration which depicts its operation or impact, as John Tenniel's illustrations accompanied Lewis Carroll's *Alice in Wonderland* books, or as illustrations often accompany exercises in children's reading primers. In exhibition, nine puzzles with illustrations are presented with magnetic tiles on blackboards, so that visitors can move the terms of the puzzles around to solve them. The exhibition is accompanied by this workbook, with additional puzzles to solve.

The work is intended to invite visitors to "try on" a version of the formal logic that computers use, and consider the way that complicated human circumstances interact with computer systems. How and where do we use algorithms, in society? Can people who aren't computer scientists ask questions when we see something we're concerned about?

The source algorithm for each puzzle is documented in the REFERENCES section.

~ THANKS ~

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~ COLOPHON ~

This workbook is typeset in Gentium Book Basic by Victor Gaultney. The text ornaments are from Bergamot Ornaments by Emily Conners. The files were assembled using Adobe Photoshop and Adobe InDesign. Puzzles and drawings were created by Kathryn Blair.

~ BIOGRAPHY ~

Kathryn Blair is a Master of Fine Arts candidate at the University of Calgary. She completed the B.F.A. Honours program in Visual Art at the University of British Columbia in Vancouver in 2009. Her work focuses on the ways humans interact with technology and how technology mediates human experiences, using wearable technology, physical computing, games and printmaking to explore these themes. She has been involved in the Calgary-based tech couture fashion show Make Fashion since 2013, and has shown her wearable technology work in British Columbia, the United States and Ireland.

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