

Figure 12.1 Wason's (1968) Four-Card Task

"If a card has a vowel on one side, then it has an even number on the other side."
If we can only turn over two cards, how can we test the validity of this statement?



Figure 12.2 Solution to Wason's (1968) Four-Card Task

"If a card has a vowel on one side, then it has an even number on the other side."
If we can only turn over two cards, how can we test the validity of this statement?

Assume p = a card has a vowel on one side

Assume q = a card has an even number on the other side

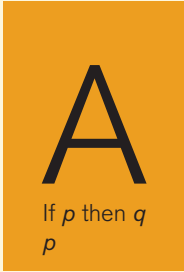



 <p>A</p> <p>If p then q p</p>	 <p>D</p> <p>If p then q Not p</p>	 <p>4</p> <p>If p then q q</p>	 <p>7</p> <p>If p then q Not q</p>
valid	fallacy	fallacy	valid

Figure 12.3 Travel Version of Wason's Four-Card Task

"Every time I go to Chicago, I take the train"

If we can only turn over two cards, how can we test the validity of this statement?



Chicago



New York City



Train



Plane

Photos: *Chicago*: Digital Vision/Photodisc/Thinkstock; *New York*: Creatas Images/Creatas/Thinkstock; *train*: Stockbyte/Stockbyte/Thinkstock; *plane*: Jupiterimages/Photos.com/Thinkstock

Figure 12.4 Contextualized Version of Wason's Four-Card Task

"If a person is drinking a beer, then the person must be over 21 years of age."
If we can only turn over two cards, how can we test the validity of this statement?



22 years of age



16 years of age

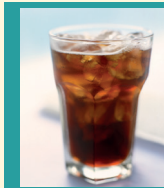


Figure 12.5 Solution to the Contextualized Version of Wason's Four-Card Task

"If a person is drinking a beer, then the person must be over 21 years of age."
If we can only turn over two cards, how can we test the validity of this statement?

Assume p = a person is drinking a beer

Assume q = a person must be over 21 years of age



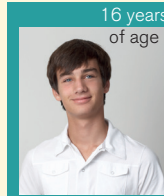
If p then q
Not p

fallacy



If p then q
 q

fallacy



If p then q
Not q

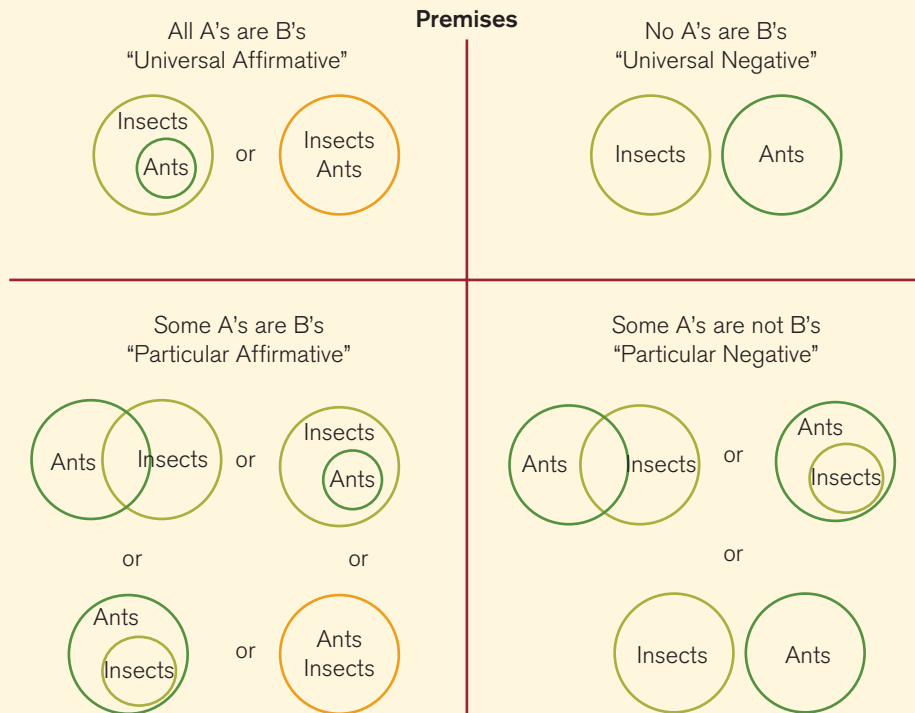
valid



If p then q
 p

valid

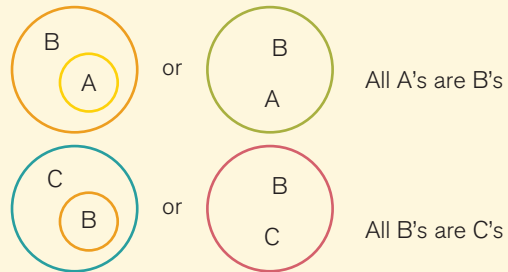
Figure 12.6 Mental Model Representations of Possible Premises With the Quantifiers *All*, *No*, *Some*, and *Some Are Not*



The labeled circles represent the set of ants and set of insects.

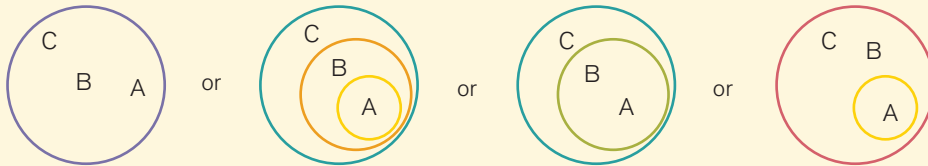
Figure 12.7 Mental Models of the Combination of the Premises “All Ants Are Insects” and “All Insects Are Animals” and the Logical Conclusion “All Ants Are Insects”

Stage 1: Model Construction



Stage 2: Conclusion-Formulation

Combining these two premises, and the four possibilities give us:



Stage 3: Conclusion-Validation

So to evaluate "All A's are C's" we can remove the B's and we get:

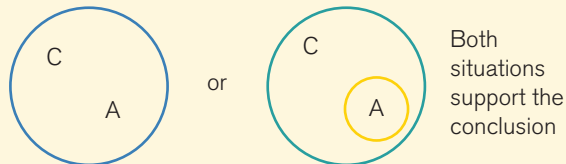


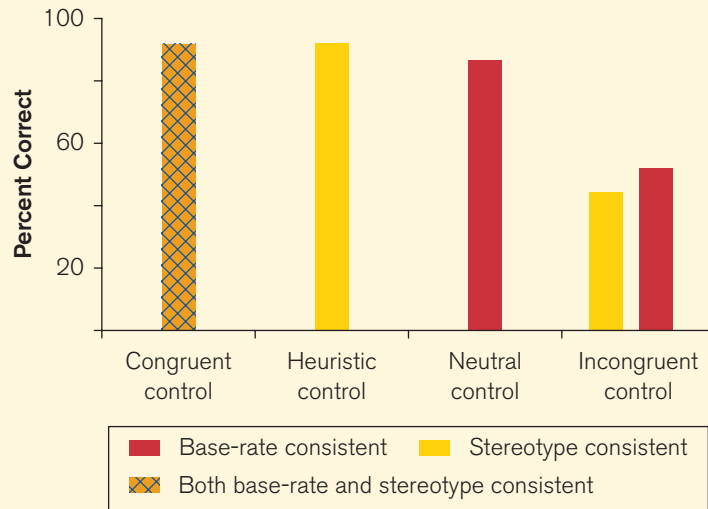


Figure 12.8 Making a Decision About Which Computer to Buy

		Computer Options			
		Laptops		Desktops	
Criteria	Importance				
Portability	4	High (1)	High (1)	Low (3)	Low (3)
Computation power	3	2.8 GHz (3)	2.4 GHz (4)	3.2 GHz (1)	3.1 GHz (2)
Hard disk space	5	250 GB (2)	150 GB (3)	500 GB (1)	500 GB (1)
Work potential	2	High (1)	High (1)	High (1)	High (1)
Gaming potential	7	Okay (2)	Okay (2)	High (1)	High (1)
"Coolness"	8	High (1)	Low (3)	Okay (2)	Okay (2)
Price	1	\$1,200 (4)	\$950 (1)	\$1,100 (3)	\$999 (2)
Screen size	6	17"(3)	15"(4)	27"(1)	19" (2)
		69	93	54	62

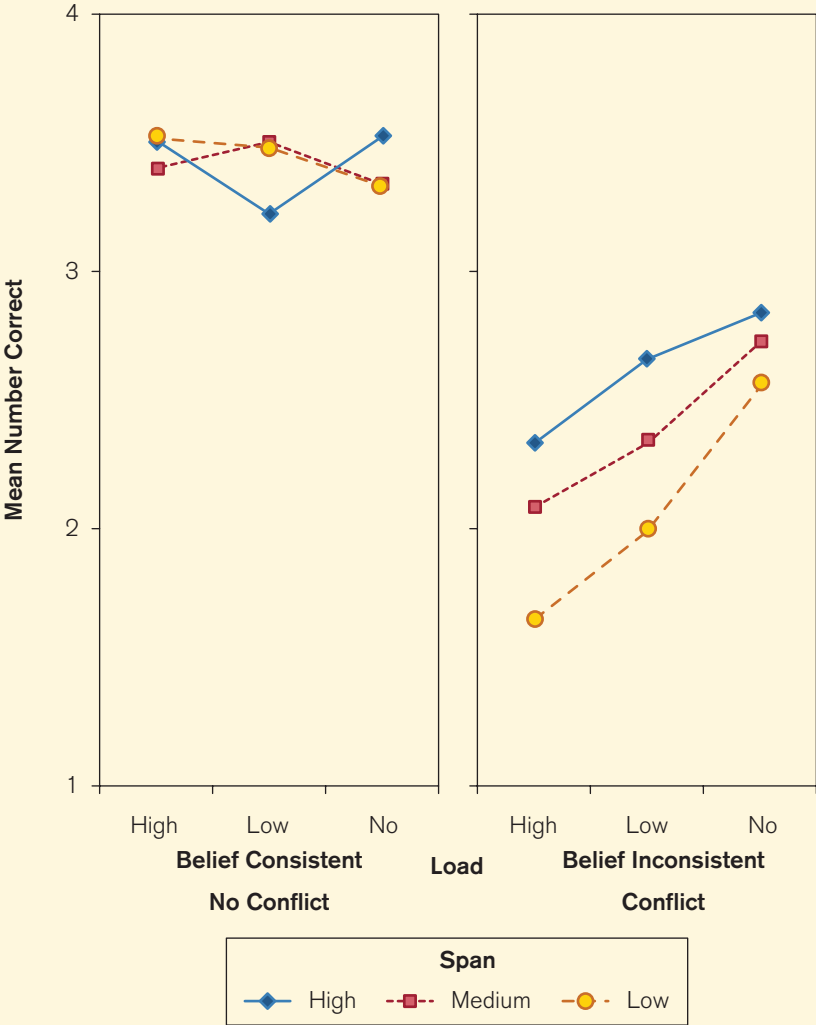
Importance is ranked from 1 to 8, representing the weighting of the different criteria. The numbers in parentheses represent a quantitative value for how each computer ranks on each criterion. The numbers at the bottom of the table are the combined scores computed by multiplying the scores by the weighting and then adding these numbers together. The highlighted number is the lowest combined score, so it is the computer of choice.

Figure 12.9 The Behavioral Results of the Decisions Made in the De Neys et al. (2008) Study



For the congruent control condition, correct answers were consistent with both base-rate and stereotypic cues. For the heuristic control condition, correct answers were consistent with stereotypic cues. For the neutral control condition, correct answers were consistent with base-rate consistent information. For the incongruent conditions, both answers were considered correct—one reflected the stereotypic cues, the other the base-rate cues.

Figure 12.10 Results of the DeNeys (2006) Study. Reasoning Performance for High-, Medium-, and Low-Span Participants as a Function of Cognitive Load and Belief Consistency



SOURCE: Figure 2, De Neys, W. (2006). Dual processing in reasoning: Two systems but one reasoner. *Psychological Science*, 17(5), 428–433.



Photo 12.2 Causal reasoning: If you get a cold after your friend sneezes on you, do you blame your friend?



© iStockphoto.com/PeopleImages

Photo 12.3 Which type of butter makes the better-tasting cookies? Experimenting with different brands tests the causal relationship between butter types and cookie taste.



Photo 12.4 The decoy effect: If we are given the choice of a small for \$3, medium for \$5, and large for \$6, we will select the large more often than if the medium size was not an option.

Table 12.1 For Each Syllogism, Try to Determine Whether the Logical Conclusion Is Valid

- (a) All beagles are dogs.
All beagles are mammals.
All dogs are mammals.
- (b) All beagles are dogs.
All beagles are mammals.
Some mammals are dogs.
- (c) No elephants are insects.
All insects are animals.
Some animals are not elephants.

Table 12.2 For Each of the Conditional Arguments, Try to Determine Whether the Logical Conclusion Is Valid

(a) If it is sunny outside, then I will walk to class.

It is sunny outside.

I will walk to class.

(b) If it is sunny outside, then I will walk to class.

I will not walk to class.

It is not sunny outside.

(c) If it is sunny outside, then I will walk to class.

It is not sunny outside.

I will not walk to class.

(d) If it is sunny outside, then I will walk to class.

I will walk to class.

It is sunny outside.

Table 12.3 Generally Accepted Characteristics of Dual-Process Theories of Cognition

SYSTEM 1	SYSTEM 2
Unconscious, preconscious	Conscious
Rapid	Slow
Automatic	Controlled
Low effort	High effort
High capacity	Low capacity
Associative	Rule based
Intuitive	Deliberative
Contextualized	Abstract
Cognitive biases	Normative reasoning
Independent of cognitive capacity	Correlated with individual differences

SOURCE: Evans, J. St. B. T. (2012). Questions and challenges to the new psychology of reasoning. *Thinking & Reasoning*, 18(1), 5–31.

Table 12.4 Differences Between Formal and Everyday Reasoning

FORMAL LABORATORY REASONING TASKS	EVERYDAY REASONING TASKS
All premises are supplied.	Some premises are implicit, and some are not supplied at all.
Problems are self-contained.	Problems are not self-contained.
There is typically one correct answer.	There are typically several possible answers that vary in quality.
Established methods of inference that apply to the problem often exist.	There are rarely established procedures for solving the problem.
It is typically unambiguous when the problem is solved.	It is often unclear whether the current “best” solution is good enough.
The content of the problem is often of limited academic interest.	The content of the problem has potentially personal relevance.
Problems are solved for their own sake.	Problems are often solved as a means of achieving other goals.

SOURCE: Galotti, K. M. (1989). Approaches to studying formal and everyday reasoning. *Psychological Bulletin*, 105, 331–351.

Table 12.5 Examples of Stimuli Used in the De Neys et al. (2008) Study

Incongruent

Study with 5 engineers and 995 lawyers.

Jack is 45 and has four children. He shows no interest in political and social issues and is generally conservative. He likes sailing and mathematical puzzles.

What is most likely?

- a. Jack is an engineer. (stereotype cued)
- b. Jack is a lawyer. (base-rate cued)

Congruent Control

Study with 5 Swedish people and 995 Italians

Marco is 16. He loves to play soccer with his friends, after which they all go out for pizza or to someone's house for homemade pasta.

What is most likely?

- a. Marco is Swedish.
- b. Marco is Italian. (base-rate and stereotype cued)

Neutral Control

Study with 5 people who campaigned for Bush and 995 who campaigned for Kerry.

Jim is 5 foot 8 inches tall, has black hair, and is the father of two young girls. He drives a yellow van that is completely covered with posters.

What is most likely?

- a. Jim campaigned for Bush.
- b. Jim campaigned for Kerry. (base-rate cued)

Heuristic Control

Study with 500 forty-year-olds and 500 seventeen-year-olds.

Rylan lives in Buffalo. He hangs out with his buddies every day and likes watching MTV. He is a big Korn fan and is saving to buy his own car.

What is most likely?

- a. Rylan is forty.
- b. Rylan is seventeen. (stereotype cued)