An Introduction To Reasoning

Propositional & Categorical Reasoning

The Big 8 Method

A star (*) indicates that there are exercises covering this section and previous unmarked sections.

This piece in relation to others: The piece is a chapter covering 8 of the most familiar inference patterns in propositional logic. These 8 forms are included in the chapter on Derivation and so it is possible to skip this chapter in favor of that one.

The Big 8 Method

1 Standard Form

1. The Big 8 method can be used to determine the validity or invalidity of some inferences. The propositions involved must be in logically structured English (which we saw in chapter 1) and the inference must be laid out in standard form.

2. *Standard form* is a way of separating the premises from the conclusion and is sufficient for simple inferences. (More complex structures are better handled with a diagram.)

In standard form, the premises and the conclusion are set out as follows:

1. <premise-1>
2. <premise-2>
.
.
.
n. <premise-n>
---
n+1. <conclusion>

The premises are numbered and listed. "<premise-1>" is a place-holder for the first premise; it is numbered (1) and written on the first line; and so on. Then, the premises are separated from the conclusion by a horizontal line. Finally, the conclusion is numbered and written below the line.

Consider the following passage:

> Potatoes are vegetables. Vegetables are good for you. And so, potatoes are good for you.

In standard form, the passage looks like this:

1. Potatoes are vegetables.
2. Vegetables are good for you.
---
3. Potatoes are good for you.

Here is another example:

> Research has confirmed that employers do not review black job applications as thoroughly as applications from whites, causing black people to invest less in education and training, which in turn reinforces the prejudice of employers.

> Affirmative action counteracts this vicious cycle by acting as an incentive for African-Americans to invest in education. So, we (Acme Inc.) should have an affirmative action policy.

In standard form, this passage would be written as follows:

1. Research has confirmed that employers do not review black job applications as thoroughly as applications from whites, causing black people to invest less in education and training, which in turn reinforces the prejudice of employers.
2. Affirmative action counteracts the vicious cycle (described in (1)) by acting as an incentive for African-Americans to invest in education.

   ---

3. Acme Inc. should have an affirmative action policy.

Note that in standard form the conclusion always appears on the last line. This is not always the case in the original passage. Although in an inference the conclusion is supposed to "follow from" the premises, this does not mean that the conclusion will appear after ("following") the premises. In everyday English the conclusion can be found at any point of the passage, at the beginning, at the end, or anywhere in between. A reasoner will often put the conclusion first, as this is the most important claim that he wants the audience to hear or read.

2 The Big 8 Method

1. The Big 8 method for checking for validity goes like this.

First, make a translation key for the propositions in the passage, using a single, lower-case letter for each *simple* proposition. A simple proposition is one that does not involve any if-thens, nots, ors, or ands. For example "If it is seven o'clock, the cafeteria is closed." involves two simple propositions "It is seven o'clock." and "The cafeteria is closed.". The proposition "Jack is on base or Jack is in the field." involves two simple propositions "Jack is on base." and "Jack is in the field.". Finally, "The cat is not on the mat." involves one simple proposition "The cat is on the mat.".

Second, insert the letters into the passage.

Third, put the inference in standard form relative to the translation key.

Fourth, compare it with the 8 inference patterns described in 2.3-2.9 below (MA, MC, CC, CA, Chain, CD, DD, Elim.). If it matches the pattern MA, CC, Chain, CD, DD or Elim., then it is valid. If, instead, it matches the pattern MC or CA, then it is invalid.

3 Matching The Antecedent

1. Consider the following inference:

> If Jack is at the office, then the cat is on the mat. Jack is at the office. So, the cat is on the mat.

Is this inference valid? Step 1 of the Big 8 method is to make a translation key. The first English sentence is an if-then proposition, and involves two simple propositions. Let "o" stand for the proposition "Jack is at the office.", and let "m" stand for "The cat is on the mat.". Step 2 is to replace the propositions in the passage with the letters. We get:

> If o, m. o. So, m.

The third step is to put the passage in standard form. Always include the "then" in the conditional, even if it was missing from the original passage.

1. If o, then m.
2. o.
   ---
3. m.

This pattern of reasoning is called *matching the antecedent* (MA): one premise is a conditional, the other asserts the antecedent, and the conclusion asserts the consequent. The Big 8 Method works by matching the standard form of the passage to various patterns of inference, one of which is MA.

2. The general version of MA is:

1. If S, then T.
2. S.
   ---
3. T.

Note that it would not matter if premises (1) and (2) appeared or were written in reverse order.

"S" and "T" stand for any proposition. They can stand for complex propositions, including (somewhat confusingly) negations. Thus, the following are all instances of MA:

1. If not a, then b.
2. Not a.

---

3. b.

1. If not a, then not b.
2. Not a.
   ---
3. Not b.

1. If (a and b), then c.
2. a and b.
   ---
3. c.

1. If a, then (b or c).
2. a.
   ---
3. b or c.

1. If (if a then b), then c.
2. If a then b
   ---
3. c

In every case, one premise (premise (2) in each case, though the order of premises (1) and (2) does not matter) asserts the antecedent and the conclusion is the consequent of the conditional, *no matter how complex the antecedent and consequent might be*.

3. MA is a valid inference form, and thus an inference is valid if it is an instance of MA. The inference about Jack and the cat, therefore, is valid.

4. MA is also known as *affirming the antecedent* or *modus ponens*.

4 Matching The Consequent

1. Now consider an inference following a slightly different pattern:

> If it is raining, then the ground outside is wet. And the ground outside is wet. Thus, it's raining.

This is an instance of *matching the consequent* (hereafter "MC"), which has the following general form:

1. If S, then T.
2. T.
   ---
3. S.

With "r" standing for "It is raining.", "w" standing for "The ground outside is wet.", and with the letters in place of the propositions, the passage looks like this:

If r, then w. And w. Thus, r.

In standard form, it looks like this:

1. If r, then w.
2. w.
   ---
3. r.

This is an instance of the pattern MC: the first premise is a conditional, the second premise asserts the consequent, and the conclusion asserts the antecedent.

2. In contrast to MA, MC is an invalid inference pattern. This means that the conclusion does *not* follow securely from the premises and it is possible some instances of it have true premises and a false conclusion. For example, it is possible that the ground outside is wet because a sprinkler has been spraying water onto the ground. If we imagine this possibility, you can see how it would be possible to make premise (1) and (2) true, but the conclusion would be false.

3. As with MA, the premises can be written in reverse order. And again, be aware that "S" and "T" stand for any proposition, simple or complex.

5 Contradicting The Consequent

1. We turn now to *contradicting the consequent* (hereafter "CC"):

1. If S, then T.
2. Not T.
   ---
3. Not S.

Instead of asserting the antecedent, as in MA, the second premise contradicts the consequent; and instead of asserting the consequent, as in MC, the conclusion contradicts the antecedent.

The following inference, for example, is an instance of CC:

If the President is in Ohio, he's talking about jobs being outsourced. He's not talking about jobs being outsourced, and so he's not in Ohio.

With "o" standing for "The President is in Ohio." and "t" standing for "The President is talking about jobs being outsourced.", and with the letters in place of the propositions, the inference looks thus:

If o, then t. not t and so not o.

This, in turn, looks as follows in standard form using logically structured English:

1. If o, then t.
2. Not t.
   ---
3. Not o.

This is identical in form to CC: the first premise is a conditional, the second premise contradicts the consequent, and the conclusion contradicts the antecedent.

2. CC is a valid inference pattern, and hence the inference about the President's whereabouts is valid.

3. As with MA and MC, the premises might be reversed. And again, be aware that "S" and "T" stand for any proposition, simple or complex. In particular, "T" can be a negation. Thus, the following is an instance of CC:

1. If a then not b.
2. Not not b.
   ---
3. Not a.

4. Note: CC is also known by the names *denying the consequent* and *modus tollens*.

6 Contradicting The Antecedent*

1. In *contradicting the antecedent* (CA), instead of contradicting the consequent (as in CC), the second premise contradicts the antecedent; and instead of contradicting the antecedent (as in CC), the conclusion contradicts the consequent. The general pattern is:

1. If S, then T.
2. Not S.
   ---

3. Not T.

Here is an example:

> If Smith knows that Jones owns a Ford, then he believes it and has a good reason for believing it. However, he doesn't know that Jones owns a Ford and, thus, he can't both believe it and have a good reason for believing it.

With "k" standing for "Smith knows that Jones owns a Ford.", with "b" standing for "Smith believes that Jones owns a Ford.", with "g" standing for "Smith has a good reason for believing that Jones owns a Ford.", and with the letters in place of the propositions, the passage looks like this:

> If k, then b and g. However, not b and, thus, not (b and g).

In standard form using logically structured English, this, in turn, is translated into:

1. If k, then (b and g).
2. Not k.
   ---
3. Not (b and g).

This, notice, is identical in form to CA: the first premise is a conditional, the second premise contradicts the antecedent, and the conclusion contradicts the consequent.

2. CA, like MC and unlike MA and CC, is an invalid inference pattern.

3. As with MA, MC and CC, the premises can be reversed. And again, be aware that S and T stand for any proposition, simple or complex.

4. The trick to distinguishing between MA, MC, CC, and CA is to compare the premise that is not a conditional with the premise that is a conditional. If the former asserts the antecedent as it appears in the conditional then the inference is an instance of MA, if it asserts the consequent then the inference is an instance of MC, if it contradicts the consequent then the inference is an instance of CC, and if it contradicts the antecedent then it is an instance of CA.

Exercise Set (1) on 4 of the Big 8

Part 1. Identify the form of each inference and say whether or not it is valid.

Sample

1. If (p and q) then r.
2. r.
   ---
3. p and q

MA MC CC CA Valid Not Valid

(1)

1. p.
2. If p, then (r or s).
   ---
3. r or s.

MA MC CC CA Valid Not Valid

(2)

1. If (a or not b), then (g or q).
2. Not (g or q).
   ---
3. Not (a or not b).

MA MC CC CA Valid Not Valid

(3)

1. If (if a, then b), then k.
2. Not (if a, then b).
   ---
3. Not k.

MA MC CC CA Valid Not Valid

(4)

1. If k, then p or d.

2. Not k.
   ---
3. Not (p or d).

MA MC CC CA Valid Not Valid

Part 2. For each inference (i) make a translation key for each simple proposition, (ii) relative to the key, put the inference in standard form using logically structured English, (iii) relative to what you have in standard form, say whether the inference is an instance of MA, MC, CC or CA, (iv) relative to your answer to (iii), say whether or not it is valid.

Sample
The fan will run only if the light is switched on. The light is not switched on. Therefore, the fan will not run.

r = The fan will run.
s = The light is switched on.

1. If r then s.
2. not s
   ---
3. not r

MA MC CC CA Valid Not Valid

(5) If watching TV is genuinely relaxing, it enhances the quality of life. But watching TV isn't genuinely relaxing. So, it doesn't enhance the quality of life.

MA MC CC CA Valid Not Valid

(6) If Jack is between Gill and Henry then he's nervous. He isn't between Gill and Henry. So, Jack isn't nervous.

MA MC CC CA Valid Not Valid

(7) Provided that Smith is not beaten by more than 10 points in Ohio, Smith will win the nomination. But Smith will not win the nomination. So, it's not the case that he will not be beaten by more than 10 points in Ohio.

MA MC CC CA Valid Not Valid

(8) Only if the pool boy removed all the leaves, will he get paid. He removed all the leaves. So, he'll get paid.

MA MC CC CA Valid Not Valid

(9) We don't have both a leash and a pooper-scooper for Jim. Unless we have both, he can't go to the park. So, Jim can't go to the park.

MA MC CC CA Valid Not Valid

Answers to Exercise Set (1) on 4 of the Big 8 - Even Numbers

(2)

1. If (a or not b), then (g or q).
2. Not (g or q).
   ---
3. Not (a or not b).

MA MC CC CA Valid Not Valid

(4)

1. If k, then p or d.
2. Not k.
   ---
3. Not (p or d).

MA MC CC CA Valid Not Valid

Part 2. For each inference (i) make a translation key for each simple proposition, (ii) relative to the key, put the inference in standard form using logically structured English, (iii) relative to what you have in standard form, say whether the inference is an instance of MA, MC, CC or CA, (iv) relative to your answer to (iii), say whether or not it is valid.

(6) Clearly, Jack isn't nervous. After all, if Jack is between Gill and Henry then he's nervous, and he isn't between Gill and Henry.

1. If b, then n.
2. Not b
   ---
3. not n

MA MC CC CA Valid Not Valid

(8) Only if the pool boy removed all the leaves, will he get paid. Hence, since he removed all the leaves, he'll get paid.

1. If p, then r.
2. r.
   ---
3. p

MA MC CC CA Valid Not Valid

Exercise Set (2) on 4 of the Big 8

Part 1. Identify the form of each inference and say whether or not it is valid.

(1)

1. Not p.
2. If not p, then (r and s).
   ---
3. r or s.

MA MC CC CA Valid Not Valid

(2)

1. If (a or not b), then (g or q).
2. g or q.
   ---
3. a or not b.

MA MC CC CA Valid Not Valid

(3)

1. Not p.
2. If p, then b.
   ---
3. Not b.

MA MC CC CA Valid Not Valid

(4)

1. k or g.
2. If k or g, then (p or d).
   ---
3. p or d.

MA MC CC CA Valid Not Valid

(5)

1. If k, then g.

2. If k or g, then (if k, then g).
   ---
3. k or g.

MA MC CC CA Valid Not Valid

Part 2. For each inference (i) make a translation key for each simple proposition, (ii) relative to the key, put the inference in standard form using logically structured English, (iii) relative to what you have in standard form, say whether the inference is an instance of MA, MC, CC or CA, (iv) relative to your answer to (iii), say whether or not it is valid.

(6) Jack will come camping this weekend provided that either Smith or Jones comes. However, it's not the case that either Smith or Jones can go this weekend. So, Jack won't be coming either.

MA MC CC CA Valid Not Valid

(7) Coherentism is not false. Why? Because sensory experiences can serve as good reasons only if coherentism is false, and sensory experiences can't serve as good reasons.

MA MC CC CA Valid Not Valid

(8) If life is always better than death then no one commits suicide. It's not the case that no one commits suicide. So, life isn't always better than death.

MA MC CC CA Valid Not Valid

(9) Henry will graduate this June only if he passes Introduction to Formal Logic this term. He won't graduate this June. Hence, he won't pass Introduction to Formal Logic this term.

MA MC CC CA Valid Not Valid

(10) If Smith has a lot of campaign funds, he has a good shot at the nomination. He doesn't have a lot of funds. So, he doesn't have a good shot at the nomination.

MA MC CC CA Valid Not Valid

7 Chain Inference

1. Two conditionals can be used as premises to form a *chain inference*. Hereafter "Chain".

The general form of Chain is:

1. If S, then T.
2. If T, then U.
   ---
3. If S, then U.

2. Chain is valid.

3. As with the other patterns, the premises might be reversed. And again, be aware that S and T stand for any proposition, simple or complex.

4. Chain is also known as *hypothetical syllogism*.

8 Constructive Dilemma, Destructive Dilemma

1. Here are two additional somewhat familiar forms:

1. If S, then T.
2. If U, then V.
3. S or U.
   ---
4. T or V.

1. If S, then T.
2. If U, then V.
3. Not T or not V.
   ---
4. Not S or not U.

The first one is *constructive dilemma* (hereafter "CD"), the second is *destructive dilemma* (hereafter "DD"). They both involve, as premises, two conditional propositions and then an "or" proposition. In CD, the disjunction involves the antecedents of the two conditionals, and the conclusion involves the two consequents. In DD, the disjunction involves the negation ("not") of the two consequents and the conclusion involves the negation of the two antecedents.

CD can be thought of as *tentatively* (disjunctively) performing MA twice, while DD can be thought of as tentatively performing CC twice.

Note that, of the eight patterns of the Big 8, CD and DD are the only ones with three premises.

2. CD, and DD are valid inference patterns.

3. As with the other patterns, the premises can be written in any order. And again, be aware that S and T stand for any proposition, simple or complex.

9 Elimination Inference

1. The first seven forms all involve conditionals. The eighth form does not. It involves a disjunction and is called *elimination inference* (Elim.).

2. The general form of Elim. is:

1. S or T.
2. Not S.
   ----
3. T.

3. Elim. is a valid inference pattern.

4. As with the other forms, the premises can be written in reverse order. And again, be aware that S and T stand for any proposition, simple or complex.

5. Elim. is also commonly known as *disjunctive syllogism*.

10 Summary*

1. To repeat, the *Big 8 method* for checking for validity goes like this. First, make a translation key for the propositions in the passage, using a single, lower-case letter for each simple proposition. Second, replace the simple propositions in the passage with the letters you have chosen and translate into logically structured English. Third, put the inference in standard form. Third, compare it with the eight inference patterns described above (MA, MC, CC, CA, Chain, CD, DD, Elim.). If it is identical in form to MA, CC, Chain, CD, DD or Elim., then it is valid. If it is identical to MC or CA, it is invalid.

2. Consider one final example:

> If Smith burnt down the house he will be in huge trouble with his wife. Smith did not burn it down. So, he is not in huge trouble with his wife.

The Big 8 method gives the right result. Using obvious translation letters, in standard form using logically structured English, this passage comes to the following:

1. If b, then t.
2. Not b.
   ----
3. Not t.

This is an instance of CA and, thus, is invalid.

Exercise Set (1) on the Big 8

Part 1. Identify the form of each inference and say whether or not it is valid.

Sample

1. p or (q and r).
2. not p.

   ----

3. q and r.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(1)

1. not p or (q and r).
2. not not p.

   ----

3. q and r

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(2)

1. If p, then q.
2. If r, then p.

   ----

3. If r, then p.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(3)

1. If d, then g.
2. d or (not p or b).
3. If not p or b, then l.

   ----

4. g or l.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(4)

1. If not p, then r.
2. not r.

   ----

3. not not p.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

Part 2. For each passage (i) make a translation key, (ii) relative to the key, put the inference in standard form using logically structured English, (iii) relative to what you have in standard form, say whether the inference is an instance of MA, MC, CC, CA, Chain, Elim., CD or DD, (iv) relative to your answer to (iii), say whether or not it is valid.

Sample

Either wealth increases subjective well-being, or it is not the case that money can buy happiness. Given this and given that it is not the case that wealth increases subjective well-being, it is not the case that money can buy happiness.

i = Wealth increases subjective well-being.
b = Money can buy happiness.

1. i or not b
2. not i

   ----

3. not b

MA MC CC CA Chain <u>Elim.</u> CD DD <u>Valid</u> Not Valid

(5) If atheists can be moral, then there is no need for gods. Further, all our good works are in vain if there is no need for gods. We can thus conclude that all our good works are in vain provided that atheists can be moral.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(6) Either no actions are free or some events don't have a cause. Given this and given that it's not the case that no actions are free, it follows that some events don't have a cause.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(7) Jim's being a dog is sufficient for Jim's being an animal, and Jim's being an animal is sufficient for Jim's not being a television. Jim's being a dog, therefore, is sufficient for Jim's not being a television.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(8) If Jim can't go to the park, he will not be able to chase squirrels or catch the frisbee. If, on the other hand, he does go to the park, he will miss barking at the mailman. But of course, Jim either will go to the park or he won't. Hence, either he will not be able to chase squirrels or catch the frisbee, or he will miss barking at the mailman

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(9) If what the Congressional Report says is true, then there never were any WMDs in Iraq and the war was poorly motivated. If the President is telling the truth, on the other hand, Iraq had a complete nuclear weapons program. One of them is right. So, we can conclude that either there never were any WMDs in Iraq and the war was poorly motivated or Iraq has a complete nuclear weapons program.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

Answers to Exercise Set (1) on the Big 8 - Even Numbers

(2)

1. If p, then q.
2. If r, then p.
   ---
3. If r, then p.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(4)

1. If not p, then r.
2. not r.
   ---
3. not not p.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

Part 2.

(6) Either no actions are free or some events don't have a cause. Given this and given that it's not the case that no actions are free, it follows that some events don't have a cause.

1. Not f or not c
2. Not not f
   ---
3. not c

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(8) If Jim can't go to the park, he will not be able to chase squirrels or catch the frisbee. If, on the other hand, he does go to the park, he will miss barking at the mailman. But of course, Jim either will go to the park or he won't. Hence, either he will not be able to chase squirrels or catch the frisbee, or he will miss barking at the mailman

b = Jim will bark at the mailman.

1. If not g, then not c or f.
2. If g, then not b.

3. g or not g.
   ---
4. (not c or f) or (not b)

MA MC CC CA Chain Elim. CD DD Valid Not Valid

Exercise Set (2) on the Big 8

Part 1. Identify the form of each inference and say whether or not it is valid.

(1)

1. If a and b, then c.
2. not (a and b).

   ---

3. Not c.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(2)

1. If q and g, then r or z.
2. If r or z, then k.

   ---

3. If q and g, then k.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(3)

1. Not d or not p.
2. If d, then p.
3. If p or b, then d.

   ---

4. Not d or not (p or b).

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(4)

1. t or (j and e).
2. not t.

   ---

3. not not p.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(5)

1. If not p, then not r.
2. not r.

   ---

3. not p.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

Part 2. For each passage (i) make a translation key, (ii) relative to the key, put the inference in standard form using logically structured English, (iii) relative to what you have in standard form, say whether the inference is an instance of MA, MC, CC, CA, Chain, Elim., CD or DD, (iv) relative to your answer to (iii), say whether or not it is valid.

(6) Teenage pregnancy can be reduced only if the schools dispense birth control to students. But if they dispense birth control, they encourage underage sex. So, schools will encourage underage sex if they reduce teenage pregnancies.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(7) If an argument is good it is sound. And if an argument is sound it is logically correct. So, if an argument is good, it is logically correct.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(8) State will go to the Rose Bowl provided that it wins against Tech this week. It'll go to the Sugar Bowl if it loses to Tech this week. And, of course, either it'll win or lose against Tech. So necessarily, it'll go to either the Rose Bowl or the Sugar Bowl.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(9) If the Marlins and the Raiders both lose, the Bears make the play-offs. The Bears did not make the play-offs. So, it's not the case that the Marlins and Raiders both lost.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

(10) If Gill stays in tonight, she'll get up tomorrow morning at six. If she doesn't stay in tonight, she won't get up tomorrow morning until nine. Given that she'll either stay in tonight or not, we can conclude that she'll either get up tomorrow morning at six or not get up until nine.

MA MC CC CA Chain Elim. CD DD Valid Not Valid

11. A Summary Of Inference Patterns—The Big 8

Capital "S" and "T" stand for any proposition, whether simple or complex.

The following six patterns are valid:

Matching the Antecedent (MA)

1. If S then T.
2. S.
   ---
3. T.

Chain Inference (Chain)

1. If S then T.
2. If T then U.
   ---
3. If S then U.

Constructive Dilemma (CD)

1. If S then T.
2. If U then V.
3. S or U.
   ---
4. T or V.

Contradicting the Consequent (CC)

1. If S then T.
2. Not T.
   ---
3. not S.

Elimination Inference (Elim.)

1. S or T.
2. Not S.
   ---
3. T.

Destructive Dilemma (DD)

1. If S then T.

2. If U then V.
3. Not T or not V.
   ---
4. Not S or not U.

The following two patterns are invalid:

Matching the Consequent (MC)

1. If S then T.
2. T.
   ---
3. S.

Contradicting the Antecedent (CA)

1. If S then T.
2. Not S.
   ---
3. Not T.