

20 July 2001  
Kfar-Save, Israel

Dear Jonah,

Few months ago my son, Rami, confronted me with a claim that the Transition Tree, as I designed it, suffers from severe logical mistakes. He also claimed that logically the structure of the TrT should be very different and much simpler. Needless to say that I tried to brush him off but after a whole night discussion he convinced me on ALL his points.

Since then I was pressing him to write it. At last he yielded and submitted his arguments in a clear article. I believe that it is important for every Jonah and therefore I sent it to you. Rami is giving you his permission to present this write-up to everybody that you think will benefit. Of course he would like to get some feedback. Especially on one crucial point: does the new structure elevate the biggest problem – does the new format of the TrT enables giving clear instructions from a distance. In other words, is a process written in the new TrT format enough to give clear instruction even in cases were the one who wrote it is not available to add verbal explanations.

Yours  
Eli Goldratt

## **Transition Tree – A Review / by Rami A. Goldratt**

Among all of the thinking tools the one that does not come even close to fulfilling its potential is the Transition Tree - both in terms of the value it should bring, and in terms of the number of people using it.

I don't think this is a subjective feeling, since I've reached this conclusion after examining many trees and after having conversations with quite a few people who use and even teach the tool.

Some time ago, I decided to analyze this matter in depth. After I understood the problems with the current structure of the tree, and after a sleepless night with the "Old man", a new structure of the Transition Tree evolved. This structure, I hope, does not suffer from the problems I identified in the current structure.

In this essay I intend to present it to you.

First, like a good Jonah, I shall present the analysis of the problems with the current structure; after which, I will put forward the new structure that I suggest as a candidate to replace the current one.

I'll illustrate the new structure using an example of a process we developed in TOC for education.

## The current structure of the transition tree

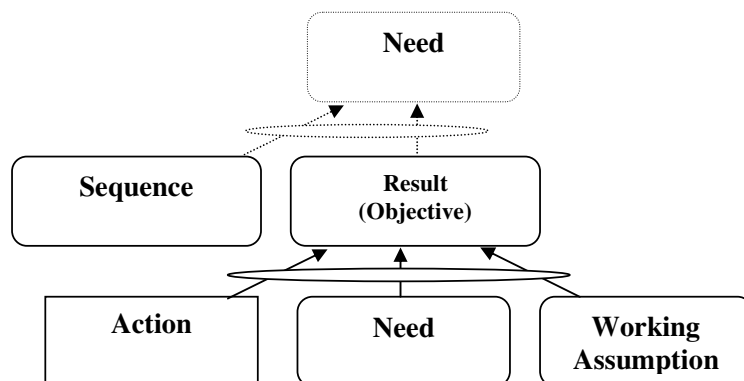
The Transition Tree is supposed to present the logic (reason) behind a certain sequence of actions aiming to achieve an objective (or several objectives).

The logic underlying each action (the “how”) presents the answers to the question “why”:

- Why perform this action?
  - What is the need for this action?
  - What is the objective of this action?
  - Why is it likely that this action will satisfy the need to the extent that it will achieve the objective?
- Why should we perform this action before the next action?

The following diagram presents one link out of the current structure of the Transition Tree. I gave a title in each box that will mark from now on each one of the entities:

- The “Need” entity: presents the need to perform this action.
- The “Working assumption entity: presents the explanation why the action satisfies the need to the extent that it will achieve the objective.
- The “Result” entity: presents the objective of the action.
- The “Sequence” entity: presents the explanation why this action should be performed before the next one (in other words: why the result of the previous action enables the treatment of the next need).



## **Problems with the current structure of the Transition Tree.**

There are two logical problems with the current structure of the TRT.

Problems that I think prevent the fulfilment of its potential.

- The first problem with the logic of the current structure of the tree stems from the question: “why should we perform the action?”

Well, one performs a certain action in order to satisfy a certain Need. If there is not a need one wouldn't take the action.

This means that the need for this action is a cause that leads one to take the action. If so, then we should expect to see a causal arrow leading from the “Need” entity to the “Action” entity. But in the current structure of the tree the “Need” entity is stated in parallel to the “Action” entity and not as a cause leading in to it.

I think this is a logical mistake. The “Action” entity is not an entry to the tree. It stems from the “Need” Entity.

The absence of the arrow connecting the two makes it harder to communicate and write the tree.

- The second problem is much more severe. In the current structure the “Need” appears (except for the first stage of the tree) as a result of the previously taken actions. This presents a big logical mistake, since we know that in the vast majority of the cases the need existed before any action is even contemplated.

What led to such a mistake?

The current structure gives us a clue. Judging from the position of the Need entity in the tree, it is apparent that the “Need” entity was intended to also fulfil another purpose, besides stating the need for the action. The “Need”

entity substantiates that the previous actions have set the stage, to the extent that now the situation is appropriate to deal with the next need.

The above means that the same entity was designated for two very different purposes:

1. Stating the Need.
2. Stating why conditions are now suitable to address the Need.

Both are necessary. Alas, only one slot is provided in the current structure.

Since people have much clearer intuition about the Need, no wonder that they usually use the slot to explicitly write the Need.

This leads to two undesirable effects:

The first is a logical break in the connectivity of the tree – the previous stage is not logically connected to the next stage.

The second undesirable effect is that rather than using the “Sequence” entity to state the reason for the stage being adequate to address the next need, people use that entity in order to explain the reason for the existence of the “Need”. And now there is no trace of an explanation for why we claim that a certain action has to be taken before the next one.

To prove my case, check how many times, the “Sequence” entity you’ve written could cause the “Need” entity by itself, which means the “Banana”, connecting it with the result of the previous action, has no meaning.

People intuitively feel it, and they complain about the difficulty to Verbalise the “Sequence” entity.

Therefore, in its current form, the TRT fails to fulfill one of its major objectives: explaining the reason for the sequence in which actions should/must be taken.

## **Implication of the problems we have identified**

Understanding the problems with the current structure of the tree may explain, in my opinion, the current practice of the tool.

The current practice shows that:

- The Transition Tree is useful to clarify a certain given process to the one who struggles to write the corresponding TRT. Once written it enhances the ability to communicate the logic of the process to others.
- The Transition Tree is useful when you make someone else build it in order to make sure s/he understands a process.

This is why we feel that the Transition Tree is a powerful tool for empowerment; for instructing someone to perform a certain process on his/her own.

Alas, our experience also shows that the Transition Tree is almost a total failure in the more common use of giving instructions.

This is when the instructor writes the tree expecting the reader to understand what s/he should do just by reading it.

The current practice shows that the strength of the Transition Tree as a means for empowerment is achieved through building it, not by reading it.

I think this may be the result of the problems with the logical structure of the tree I had presented so far.

When the tree is not logical, no wonder it does not work when we try to give instructions only by giving the tree to the student to read.

## A proposal for a revised structure of a transition tree.

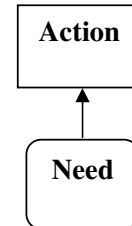
The analysis of the problems of the logical structure of the Transition tree and their implications on the current practice with the tool raises a need to examine a new structure of a Transition tree.

With the new structure we aim to overcome the problems discussed previously, and to make the construction of the tool much easier.

- One of the causes to take a certain Action is the Need to do so.

If there is no need for the action, then we would not take the action.

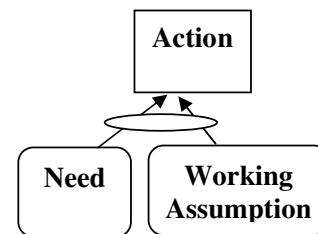
So, we may mark the “Need” entity as a cause for the “Action” entity.



- If we have a need, then we take a certain action, because...

Because we assume that the action we take will satisfy this need. We act based on a “Working assumption”, that this action will satisfy our need. If we do not have the “Working assumption”, then the fact that the need exists, would not be sufficient to make us take the action.

So, we may mark the “Need” entity and the “Working assumption” entity together in a “Banana” as causes for the “Action” entity.



- In addition to the “Need” and the “Working assumption”, there is another element that we must have for us to take a certain action as part of a process. This element is the acknowledgment that the appropriate conditions to take the action exist.

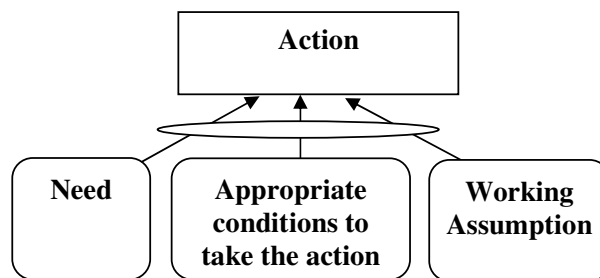
These conditions are of two kinds:

1. The assumption that we are able to take the action.
2. The assumption that the action will not lead to meaningful negative outcomes.

If we would have not assume that we are able to take the action, then the fact that the Need exists, and the fact that we have a Working assumption will not be sufficient for us to take the action.

If we would have not assume that the action will not lead to meaningful negative outcomes, then the fact that the Need exists, and the fact that we have a Working assumption will not be sufficient for us to take the action.

So, we may mark an entity describing that the appropriate conditions to take the action exist, together in a Banana with the Need entity and the “Working assumptions”, as three entities leading us to take the Action.



These are the 4 elements each link in a Transition tree must have.

In order to understand how we make the connection between the links, we need to answer the following question: Why do we claim that a certain action should be taken before the next action?

Well, there could be two general answers:

1. We claim that a certain action should be taken before the next action, because the first action enables us to take the second action. If we wouldn't have taken the first action, we couldn't perform the next action (First connect the hose to the faucet, then water the tree with the hose).

In other words, the first action overcomes an obstacle that would have prevented us from taking the next action.

2. We claim that a certain action should be taken before the next action, because, the first action prevent negative outcomes that otherwise would have been caused by taking the next action. If we don't take the first action, then we would suffer from negative outcomes caused by the next action. (First make sure the faucet is closed, then connect the hose to the faucet). Have you noticed?

We claim that action X should be taken before action Y, because action X **sets the appropriate conditions** to take action Y (by making it possible to take action Y, or by preventing negative outcomes that otherwise would have been caused by taking action Y).

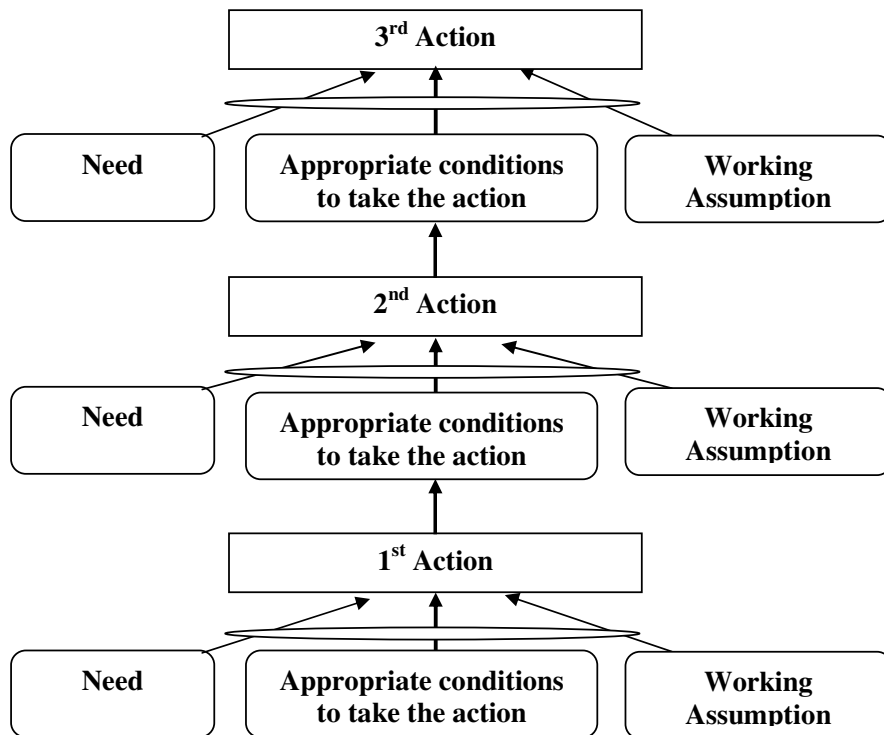
If this is right, then the logical sequence of the Transition Tree passes through the Action entities and the entities, which describe that the appropriate conditions exist to take the action:

If...[1<sup>st</sup> Action]...then...[Appropriate conditions exist to take 2<sup>nd</sup> action].

If...[Appropriate conditions exist to take action 2<sup>nd</sup>]...

(+ Need + Working assumption)...then...[2<sup>nd</sup> Action].

If...[2<sup>nd</sup> Action]...then...[Appropriate conditions exist to take 3<sup>rd</sup> action].



At this stage I shall present the process of constructing the Transition Tree according to a list of actions. Then I'll illustrate the process on an example taken from a process we have developed in TOC for Education.

Throughout the example you will come across some elements that are integrated to the Transition, even though I did not present them as parts of the Tree (i.e. Objective of the action, Reason for the Need...).

This is because they are optional elements of the Transition Tree.

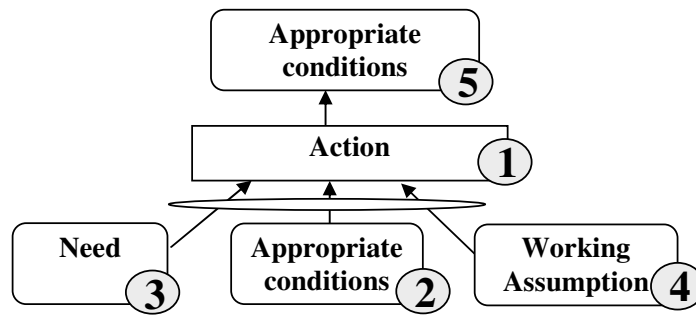
After the example I will discuss their role, and also present the process of constructing a Transition Tree according to a Prerequisite Tree.

## Constructing a T.R.T according to an action list:

Create a list of all the actions according to their order of execution (you'll probably modify it while constructing the T.R.T.).

For every Action construct the "logic link":

1. Verbalise the "**Action**" entity.
2. Verbalise the "**Appropriate conditions**" entity.  
(For the 2<sup>nd</sup> Action and on – Copy the "**Appropriate conditions**" entity caused by the previous Action.)
3. Verbalise the "**Need**" entity.
4. Verbalise the "**Working Assumption**" entity.
5. Examine the next Action and Verbalise the "**Appropriate conditions**" needed for its execution, which stems from the current Action.



To Verbalise the "**Appropriate conditions**" (#5) entity, answer the questions:

1. What negative effects will be caused by the next action unless I take this [\[1 first\]](#) action? Verbalise that they will not be created.
2. What new ability do you have after taking this action [\[1 first\]](#) that enables you to take the next action? Verbalise the new ability.

To Verbalise the **Need** entity (#3) entity, answer the questions:

1. What is the need to take this action?
2. Why is this action important? In order to...
3. Why take this action? In order to...

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To Verbalise the "**Working assumption**" (#4) entity, answer the questions:

1. Why does the Action satisfy the need?
2. What do you assume, when you claim that this action satisfies this need?

Now, let's examine an example:

□ The overall objective is:

“The youngster changes his negative behaviour.”

□ Story-line:

The situation is a youngster that behaves in a way that leads to meaningful negative effects. You, the authority, are interested that the youngster will change his behaviour. The problem is that you have the bad experience, that this youngster is aware of the negative consequences of his behaviour, and will continue to behave in a negative way even if s/he will be sanctioned.

This for two main reasons:

1. In order to maintain and show his independence.
2. In order to satisfy the original need, that led him act in this way to start with.

□ Now I shall follow the process of constructing a T.R.T. from a given list of actions.

## List of Actions:

**Action # 1:** I initiate a discussion with the youngster in a relaxed atmosphere, Without company that might provoke the youngster to show hes independence.

**Action # 2:**

- I mention to the youngster hes behaviour (or bring hem to mention it), and ask hem about it's outcomes:  
"What will happen then?"... "And then what might happen?"
- I continue to ask the youngster these kind of questions about every outcome s/he mentions, until we form a Negative branch, that starts with the youngster's behaviour and ends up with a meaningful outcome for the youngster. (If the conditions allow this, write the Negative branch).

**Action # 3:** I ask the youngster to examine the negative branch and think it over. I don't tell hem to change hes behaviour!

**Action # 4:** I examine the youngster future behaviour for signs that will tell me if s/he changes or not changed hes behaviour.

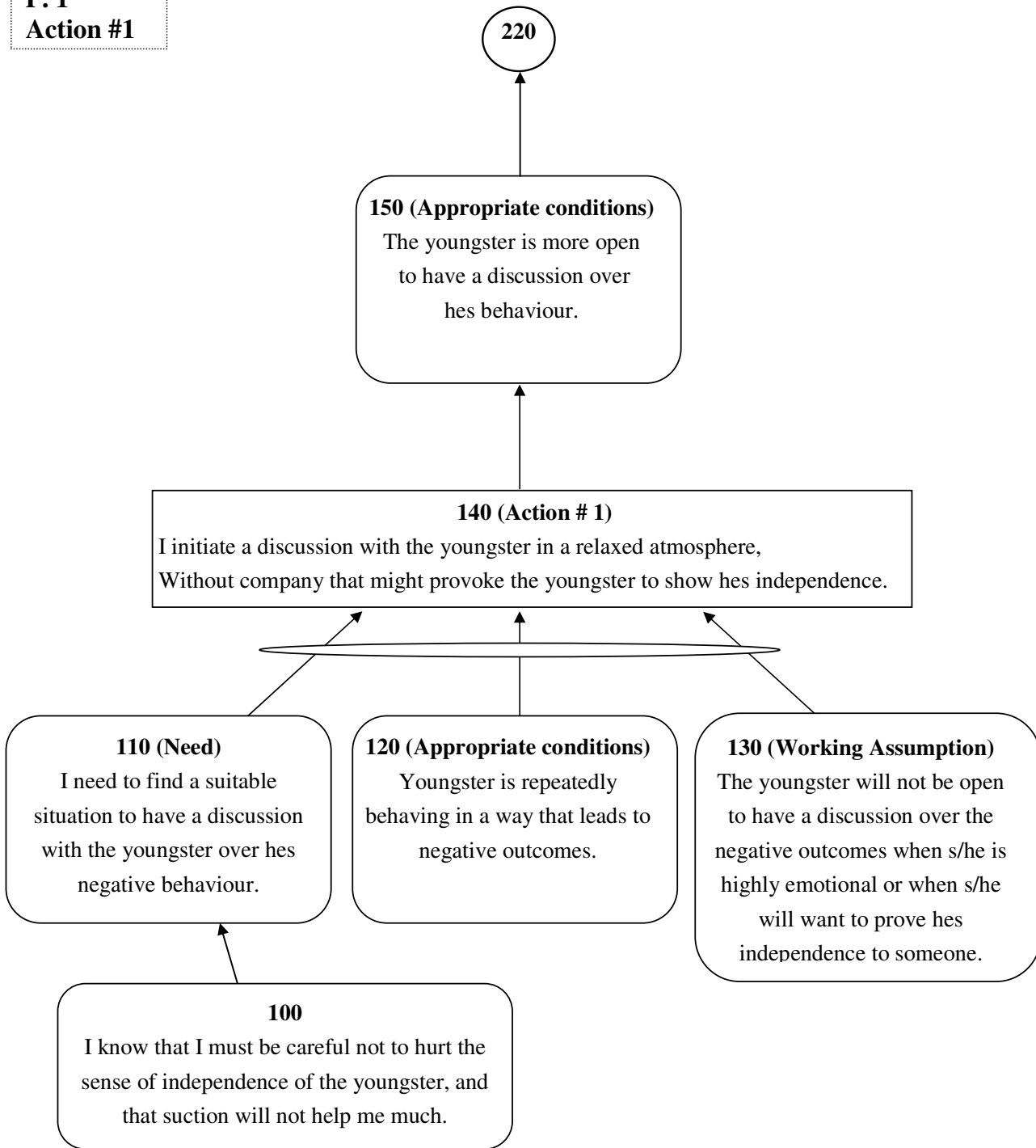
**Action # 5:** I figure out what is the youngster's original need, using questions like:

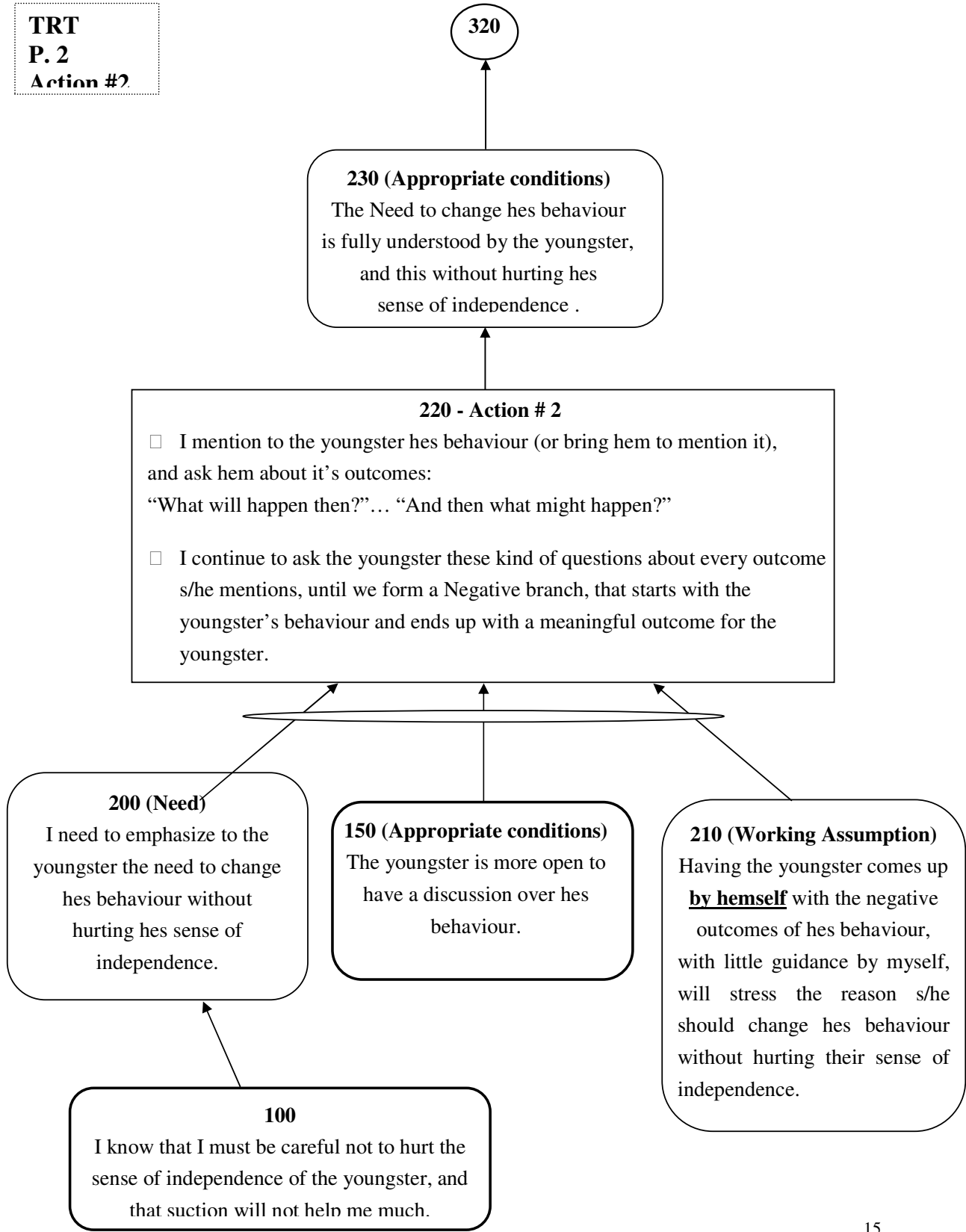
- Why are you behaving in this way? For what?
- What are you trying to achieve in this way of behaviour?
- What prevents you from changing this behaviour?

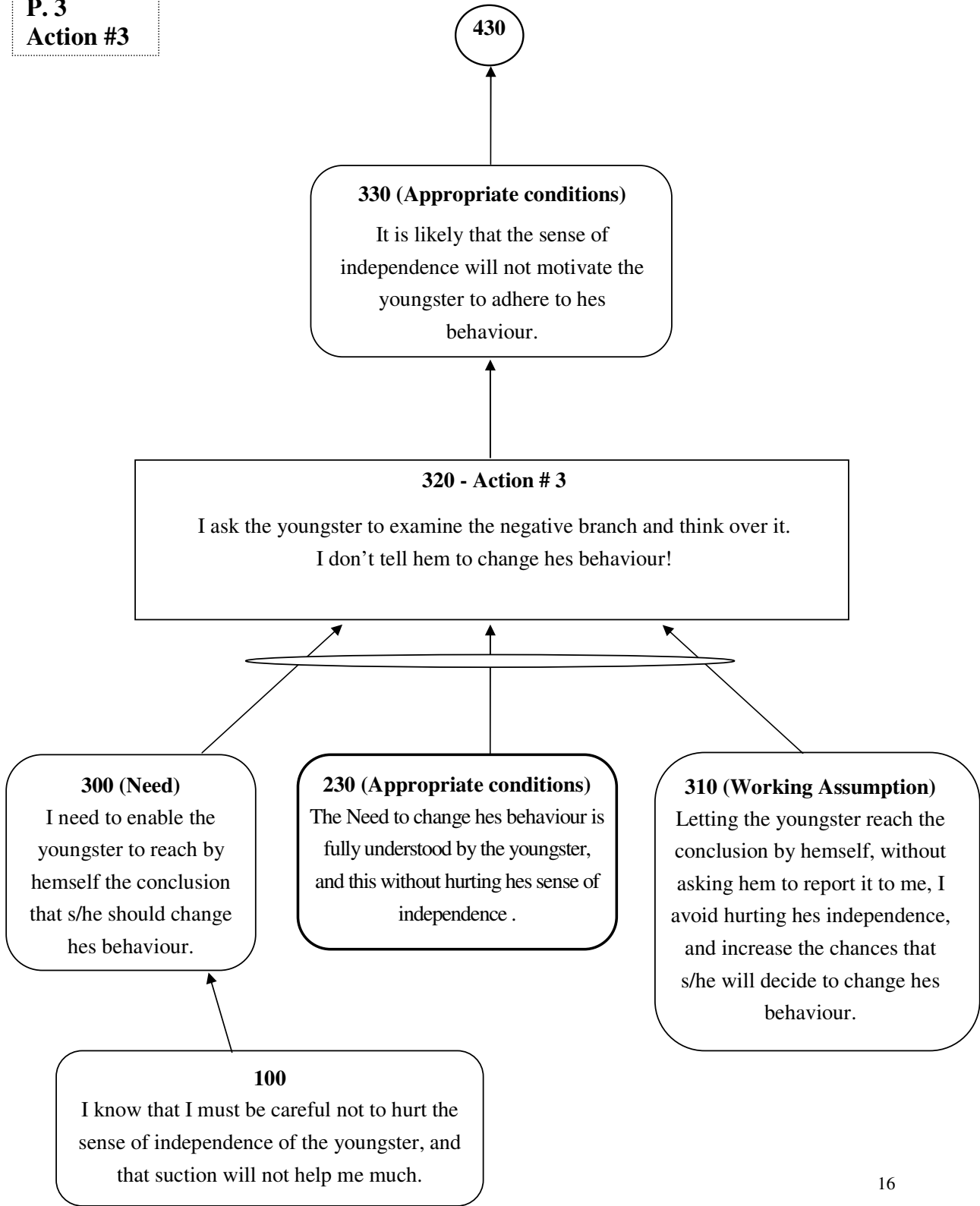
**Action # 6:** I direct the youngster to find an alternative way to satisfy hes need, using questions like:

- Can you achieve this in another way?
- can we do something else to achieve this?

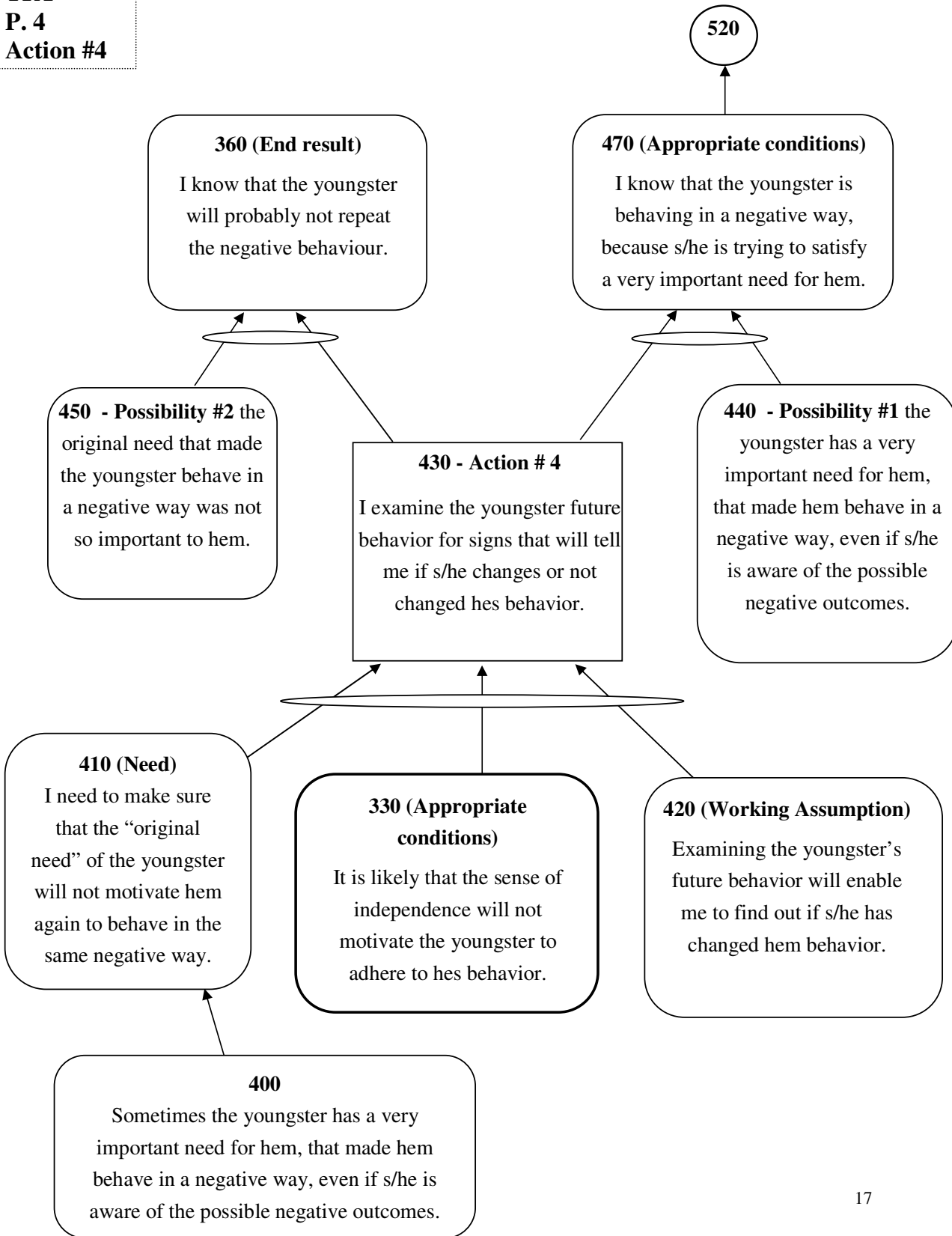
**TRT**  
**P. 1**  
**Action #1**



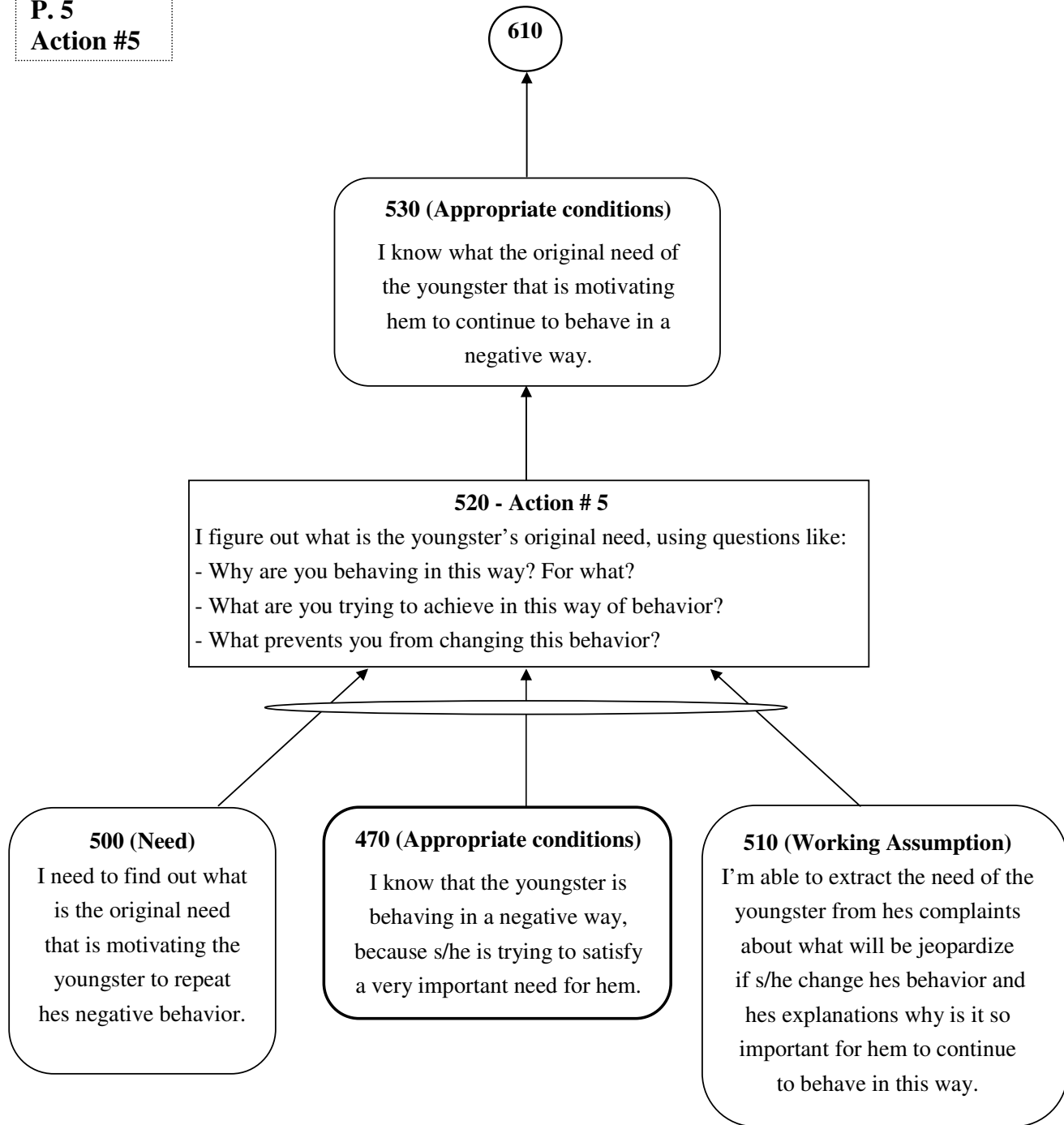




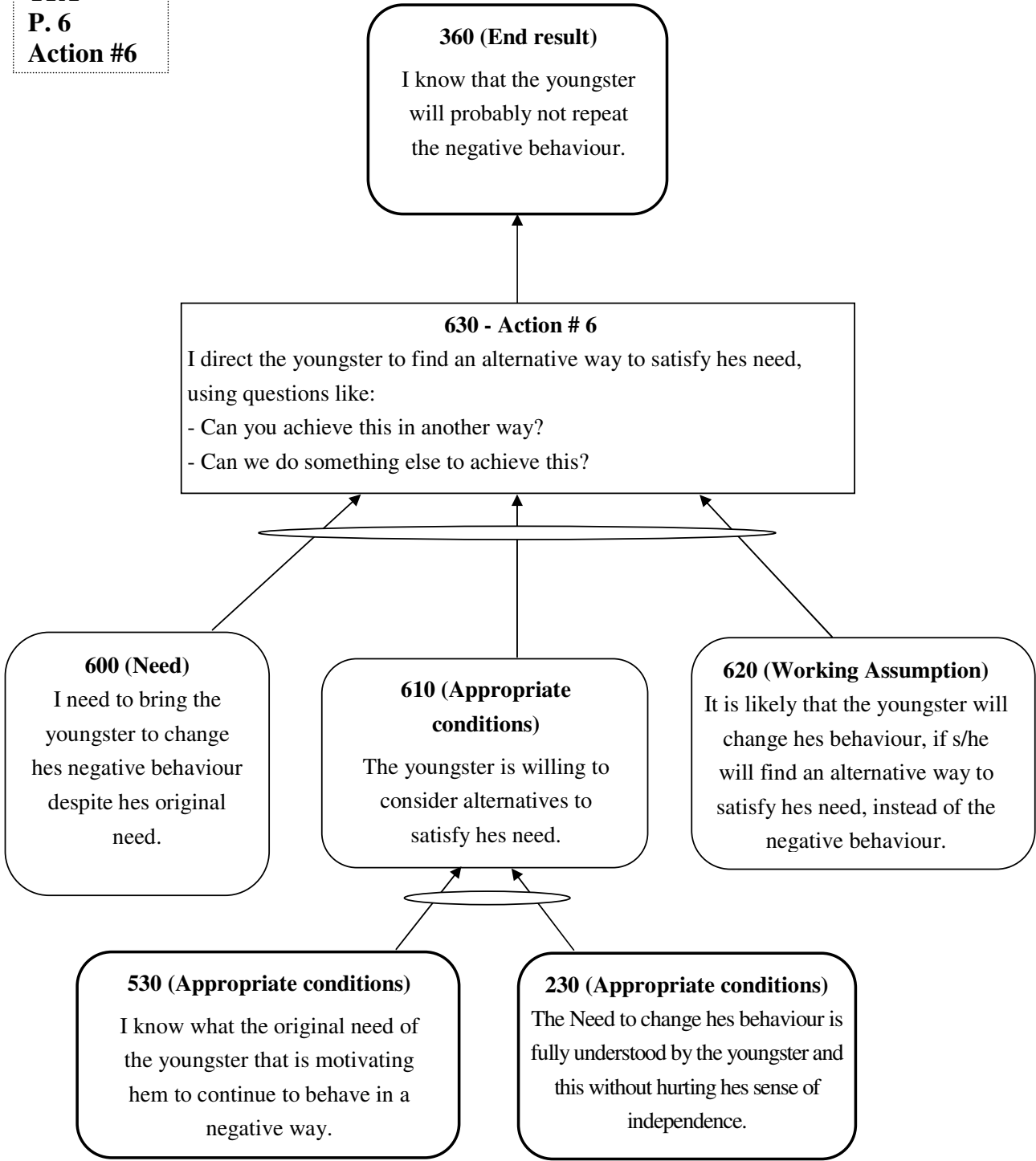
**TRT**  
**P. 4**  
**Action #4**



**TRT**  
**P. 5**  
**Action #5**



**TRT**  
**P. 6**  
**Action #6**



## Optional elements to be added to each link:

### □ **The Objective of the action:**

We take an action to achieve a certain objective.

So, we can mark an “Objective” entity as a result of the “Action” entity.

But since we take an action in order to satisfy a certain need, it means that many times the objective is stated as just “The need is satisfied”.

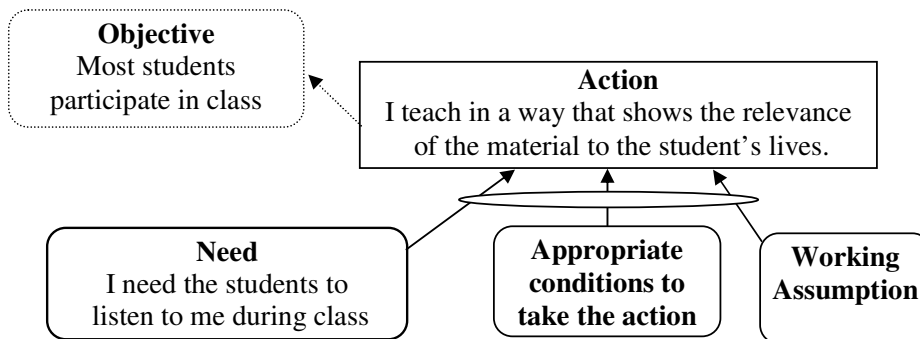
In these cases we get a repetition between the verbalizations of the “Need” entity and the “Objective” entity.

So, many times writing explicitly the “Objective” entity will not add any valuable data. This is why verbalizing the “Objective” entity is optional.

Despite this, there are several considerations why one might add an “Objective” entity:

1. We can Verbalise the “Objective” entity in a way that will not repeat the verbalization of the “Need” entity. This is done by verbalizing the “Objective” entity as a desired situation that we have after taking the action to satisfy the need. For example: If my need is "students listen to me during class", and the action I take is “To teach the material in a way that is relevant to their life”, then I can Verbalise the objective as:

“Most Students Participate in the class”.



The rule is that it is valuable to Verbalise the “Objective” entity when it does not repeat the verbalization of the “Need” entity (or the verbalization of the entity describing the “Appropriate conditions” of the next action).

2. Sometimes, it is valuable to Verbalise the “Objective” entity, even when it repeats the verbalization of the Need entity:

- Because reading: “If...[action]..., then...[Objective]...” is another check that we were right when we claimed that taking the action will satisfy the need.
- Because while performing the process, the “Objective” entity may be used as a checklist for whether or not we effectively took the action.

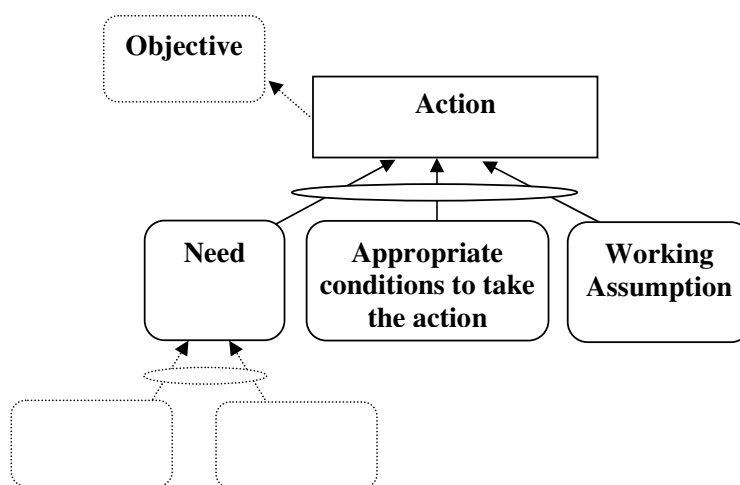
3. The third reason to Verbalise the “Objective” entity is when we translate a P.R.T to a Transition tree. See details further on.

□ Another element that we might add to the link is **the reason for the “Need”**. Sometimes, the existence of the Need is not trivial. In these cases We might feel it is valuable to Verbalise the reasons why the Need exists. For example, if...[“My audience may not take me seriously for I’m much younger than they are”]...

then...[“I **need** to show I bring them value right from the start”].

These explanations will be added as entities leading to the “Need” entity.

There is no fixed number of entities describing the reasons for the need.



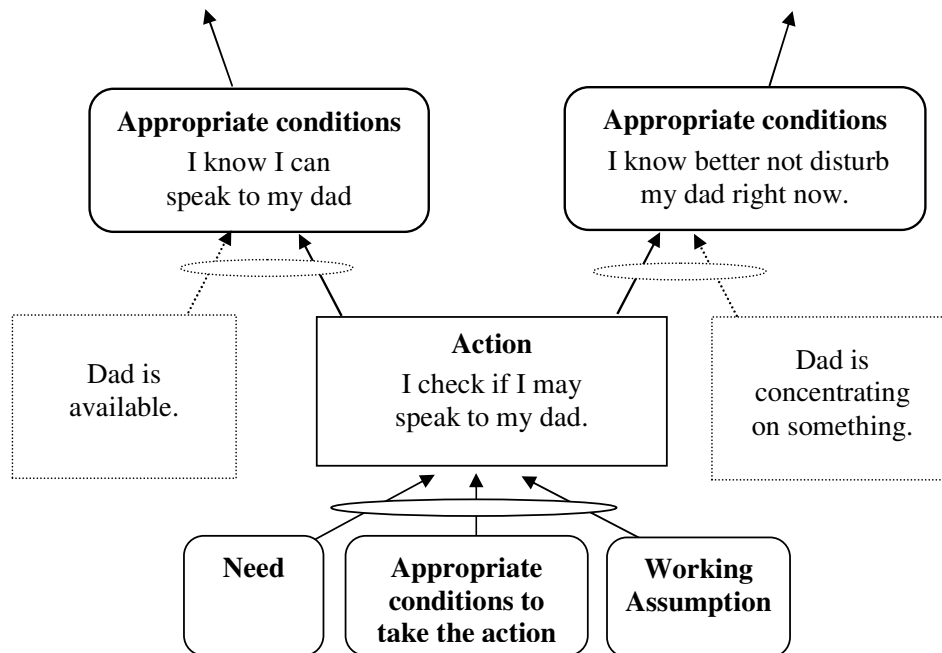
□ Sometimes we have a “split” in the Transition Tree.

This happens when as the result of taking a certain action there could be several optional results.

If we would like to mention more than one result, we need to create a split and explain under which conditions the action leads to each one of the results we have mentioned.

The optional entity that we shall add is the explanation that describes under which conditions the action leads to each one of the results.

For example:



□ A few more things:

I claimed that the connection between the links runs through the “Actions” and “Appropriate conditions” entities. This happens since the 1<sup>st</sup> Action leads to the “Appropriate conditions” to take the 2<sup>nd</sup> Action.

I also explained that there are two kinds of “Appropriate conditions”:

1. I have the ability to take the next action.

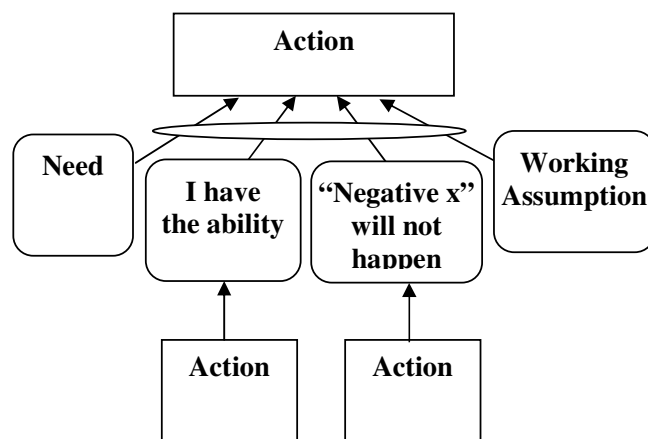
(“I make sure Dad is available” **before** “I start a discussion with Dad”).

2. The next action will not lead to serious negative effects.

(“I make sure that I have nothing important scheduled for the rest of the day” **before** “I start a discussion with Dad”).

Sometimes, both kinds of “Appropriate conditions” are important enough that we need to mention both.

This means you have to add to the “Banana” leading to the action, two entities each one explaining one kind of “Appropriate condition,” along with the Need and the Working assumption.



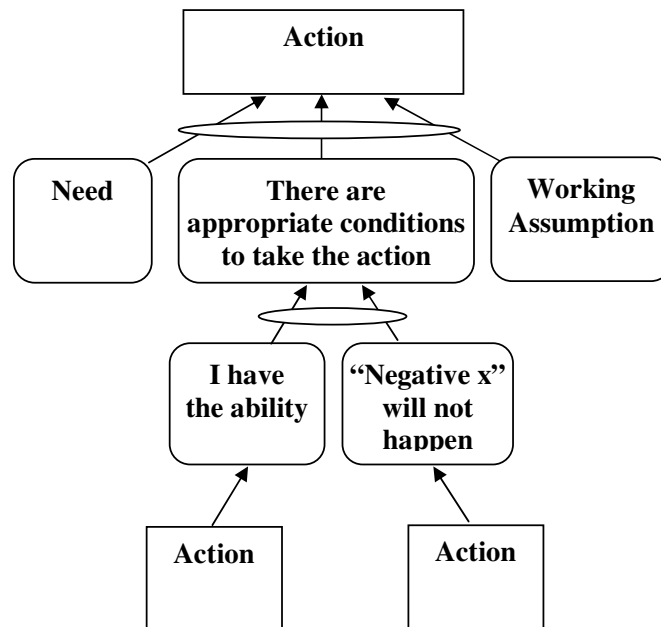
In these cases you will come up with 4 entities combined in a “Banana”, leading to the Action.

Any Jonah knows that 4 entities in a banana is a sure recipe for confusion. So, what should we do in those cases?

Any Jonah also knows how to overcome this difficulty.

We avoid having 4 entities in a banana by splitting the reasons to two levels. In the banana that leads to the action we will have an entity that is verbalised as “There are appropriate conditions to take the action”.

Leading to this entity will be the two (or more) entities that describe the different kinds of “Appropriate conditions”.



When we translate a P.R.T. into a T.R.T., this case will happen whenever we have convergence in the PRT (in other words, when there are several I.O's that should be achieved in parallel before a certain I.O.).

## **Constructing a T.R.T according to an action list:**

Create a list of all the actions according to their order of execution (you'll probably modify it while constructing the T.R.T.).

For every Action construct the "logic link":

6. Verbalise the "**Action**" entity.
7. Verbalise the "**Appropriate conditions**" entity.  
(For the 2<sup>nd</sup> Action and on – Copy the "**Appropriate conditions**" entity caused by the previous Action.)
8. Verbalise the "**Need**" entity.
9. Verbalise the "**Working Assumption**" entity.
10. Examine the next Action and Verbalise the "**Appropriate conditions**" needed for its execution, which stems from the current Action.

**To Verbalise the "Appropriate conditions" (#5) entity, answer the questions:**

3. What negative effects will be caused by the next action unless I take this action? Verbalise that they will not be created.
4. What new ability do you have after taking this action that enables you to take the next action? Verbalise the new ability.

**To Verbalise the Need entity (#3) entity, answer the questions:**

4. What is the need to take this action?
5. Why is this action important? In order to...
6. Why to take this action? In order to...

**To Verbalise the "Working assumption" (#4) entity, answer the questions:**

3. Why does the Action satisfy the need?
4. What do you assume, when you claim that this action satisfies this need?

## Constructing a T.R.T according to a P.R.T:

1. Write the Intermediate Objective in the “Objective” entity.

2. Write the Obstacle in the “Need entity”.

It may have the same verbalization of the Obstacle, or it may be Verbalised as “a need to overcome the Obstacle”.

3. Verbalise the “Action” entity. Answer questions like:

- “What should I do In order to achieve the objective?”
- In case the Need entity is Verbalised as a need and not as an obstacle:  
“What should I do In order to satisfy the Need?”
- In case the Need entity is Verbalised as an obstacle and not as a need:  
“What should I do In order to overcome the Obstacle?”

4. Verbalise the “Working assumption” entity. Answer questions like:

- “Why taking this Action achieves the Objective?”
- In case the Need entity is Verbalised as an obstacle and not as a need:  
“Why taking this Action overcomes the Obstacle?”
- In case the Need entity is Verbalised as a need and not as an obstacle:  
“Why does the Action satisfy the need?”

5. Write the next Action and Verbalise the “Appropriate conditions” needed for its execution, that stems from the current Action.

Answer questions like:

- What negative effects will be caused by the next action unless I take this action? Verbalise that they will not be created.
- What new ability do you have after taking this action that enables you to take the next action? Verbalise the new ability.

