The Philosophical Structure of Story Comprehension: A Study on Human Cognitive System Based on Analysis of Logical Proposition

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Abstract

This paper suggests that, a story perceived to our mind (especially in the form of fables – short yet meaningful) are initially just images. The images are computed by the mind contrasting the different elements of the story (or images) to find the essential part of the story. Such contrast establish "meaning" in our mind which enable us to express the story in its shorter form either in the form of words or logical proposition. In this paper, we will look at how the logical propositions of the stories (may) be constructed. The hypothesis is derived from the idea that the logical proposition that we write on paper is *a posteriori* to what is established in the mind. If the hypothesis is true, then we have a glimpse of what could be the system of the human mind, thus the system of human nature too in respect to its moral origin and the proper educational method.

Keywords: logical analysis, philosophy of mind, cognitive science, innate knowledge, philosophy of linguistics, moral theory, philosophy of education

1. Introduction

This article covers a wide range of topics, but essentially, it is about the possibility of how the mind may compute a story to extract its meaning. By "meaning" here, we do not mean a monotonous meaning. Instead, we are referring to "meaning" which is meaningful. For example, an answer to the question "what is the moral of the story?" Therefore, this article uses stories in the form of fables as study objects.

The importance of fables, according to a quote attributed to Joseph Addison as quoted by the American educationist Kate Douglas Wiggin in her introduction to her book, *The Talking Beast: A Book of Fable Wisdom* (1922), is expressed as

> "Among all the different ways of giving counsel I think the finest and that
> which pleases the most universally is fable, in whatever shape it appears"[1]

In that same introduction, the educationist (Wiggin) stated that

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[1] See the introduction to *The Talking Beast: A Book of Fable Wisdom* (1922) edited by Kate Douglas Wiggin and Nora Archibald Smith (Online e-book) Available at: www.gutenberg.org/cache/epub/13815/pg13815.html

> "There is a deal of preaching in all these fables – that cannot be denied – but it is concealed as well as possible. It is so disagreeable for people to listen while their faults and follies, their foibles and failings, are enumerated, that the fable-maker told his truths in story form and thereby increased his audience. Preaching from the mouths of animals is not nearly so trying as when it comes from the pulpit, or from the lips of your own family and friends!
>
> Whether or not our Grecian and Indian, African and Russian fable-makers have not saddled the animals with a few more faults than they possess – just to bolster up our pride in human nature – I sometimes wonder, but the result has been beneficial. The human rascals and rogues see themselves clearly reflected in the doings of the jackals, foxes, and wolves and may get some little distaste for lying, deceit and trickery."[2]

From the quotes above we can see very much of the characteristic of human nature. Through the use of language (in the form of storytelling) moral lessons can be delivered in a very subtle way. It is so subtle that it is the most effective – simply by eliminating the factors such of human pride and shame.

"Very subtle yet effective" of language use brings us to our philosophy of language. On "language", there are two views, and the distinction of these views is important on our understanding of human nature. One view is held by the empiricist analytic philosophers such as Ludwig Wittgenstein, H.V. Quine and Donald Davidson. Empiricist philosophers (together with behaviourist psychologists and externalist linguists) believe that "language" is a social construction. The other side of the camp, rationalist philosophers and essentialist linguists, such as (chiefly) Noam Chomsky, believe that "language" is not a social construction, but simply an innate biological faculty for humans. Therefore "languages" have been studied under two categories of sciences, one is "social science" as studied by the empiricist philosophers and externalist linguists, and the other is "natural science"[3] as studied by rationalist philosophers and essentialist linguists (see McGilvary, 2013). The author in this paper will approach the science of language in the tradition of the latter.

In this article, before we start look at the fables, we will briefly review the philosophy of mind from the rationalist perspective. In this particular case, mostly it would be the philosophy of Noam Chomsky (see Chomsky: 2006; 2009; 2015 and McGalvray: 2013). Also, we will review briefly on the philosophy of logic in relation to the world by revisiting some ideas made by Bertrand Russell (see 2009). Hopefully after the reviews, it would be clear enough to the readers why we adopt our particular method to reach such a conclusion.

To assist readers, as the closing to this *introduction* section; I may point out that, natural language works in a mechanism known as *internal merge*. It suggests to us that, there is an internal merge of meaning which resulted the elimination of the word when the semantic is expressed in language use. For example, you lay out a sentence with a meaning you understood well. Take note of the verbs, nouns and so on. After that, you draw out the "linguistic diagram tree" to lay out how the words are arranged grammatically in our mind, also, what is our

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[2] Ibid.

[3] To be more precise, it would be under "biology" as envisaged by Chomsky. See (McGilvray, 2013 and Chomsky, 2015)

"mental picture" of the sentence. You would notice that, in the expressed semantic of the sentence and by referring it to the diagram tree you have drawn, a word or two are missing in the expression, yet the meaning is still contained. In other words, those words are *suppressed* – yet not eliminated, in the human mind – for both of the speaker and the hearer. Such discovery tells you that, humans use language in a minimal way possible by merging some of the syntactical atoms whilst maintaining the semantics as a speaker and a hearer, by which the hearer adopt the same mechanism in a reverse way from the speaker. Such mechanism is possible due to the unique system of the human mind.

If a sentence works in that way, that means, storytelling (or story) works in a similar fashion too. I would not say it as "same" for a "sentence" and a "story" is clearly different. I said "similar fashion" because the mechanism of suppressing some elements of a story is essential to bring the meaning out of the story. Again, the mechanism of the supressing an element (without eliminating it) is the work of the mind. The suppressed elements in storytelling is not "words" like how it is in a sentence. But rather, within the story, there are "emphasized elements" which carry the story and "suppressed elements" of the story which has lesser functioning role in the story, yet are parts of the story that make the story. In the next section, we ought to show how such mechanism is possible.

2. Initial Hypothesis and Philosophical Doctrine in Method

There are two important elements that we will be looking at regarding our understanding of the mechanism of our mind – they are language and logic. In fact, these two things almost inseparable when one studying one or the other. Studies which link the use of language and the human mind are well known, chiefly by Chomsky and his followers. However, not much is heard of (or maybe not at all) the study of logic used to understand the human mind. However, if the study of language can be used to study the human mind, then the study of logic too can be used. In this paper however, we are not studying how the study of logic is used to study the mind – instead, we are using "logic" as mean or tool to study the system of the human mind. The two subjects are close, but different nevertheless, because the object in this study is not "logic" itself, but rather, "story comprehension", from the perspective of the hearer, and "storytelling" from the perspective of the teller.

Before we review on "logic", we will revisit what we mean by "language".

"Language" is a biological faculty and like other human organs, the "language" faculty is developing as the child is growing up. As "language faculty" is an innate faculty, it is the product of the system of the human mind. The reason a hearer can understand the speaker is because they share the same system (which is the human mind) for them to convey and comprehend a language. Therefore, when one using a language, a computation is occurring in one's mind and the result is understood by the hearer. Such computation which enable human to convey meaning is not a simple process which one can take such computation for granted. Suppose we come from the empiricist or behaviourist tradition, we cannot deny the computation that occurring in our mind. For example, look at this picture below:
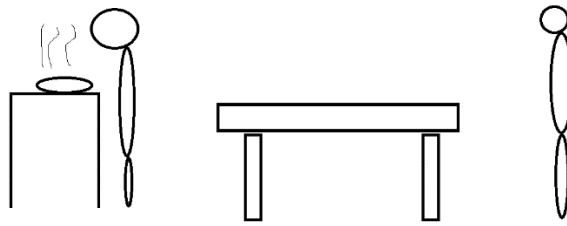
Image (i): John and Paul in the kitchen

As you look at the image above and consider the following details:

    (i)   John and Paul are in the kitchen
    (ii)   John is cooking spaghetti
    (iii)   Paul is waiting for the spaghetti, and
    (iv)   John and Paul are having dinner together.

Now after you consider these four points, which derived from the image above, if I about to ask you what is the image about, most probably you would say (after you look at the image) "they are going to have dinner together". In other words, instead of you going to points (i) to (iv) one by one, you simplified what you saw and know to a simplified way of expression which is sufficient and efficient for any normal 'capable adults' communication.[4]

In other words, when you were looking at the image and considering the points given about the image, a "tree diagram" that may reflect your mental picture of the event as follow:

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[4] It is not worth to counter argue the example in many unnecessary ways which are only hindrances to any discussions.

Diagram 1 (tree):

NP₁
— N₁: John
— P₁: in the kitchen

VP₁
— VP₁
  — V₁: cooking
  — O₁: spaghetti
— VP₂
  — V₂: to have dinner
  — A₁: with Paul

NP₂: Paul

P₂: in the kitchen

VP₂
— VP₃
  — V₃: waiting
  — O₁: spaghetti
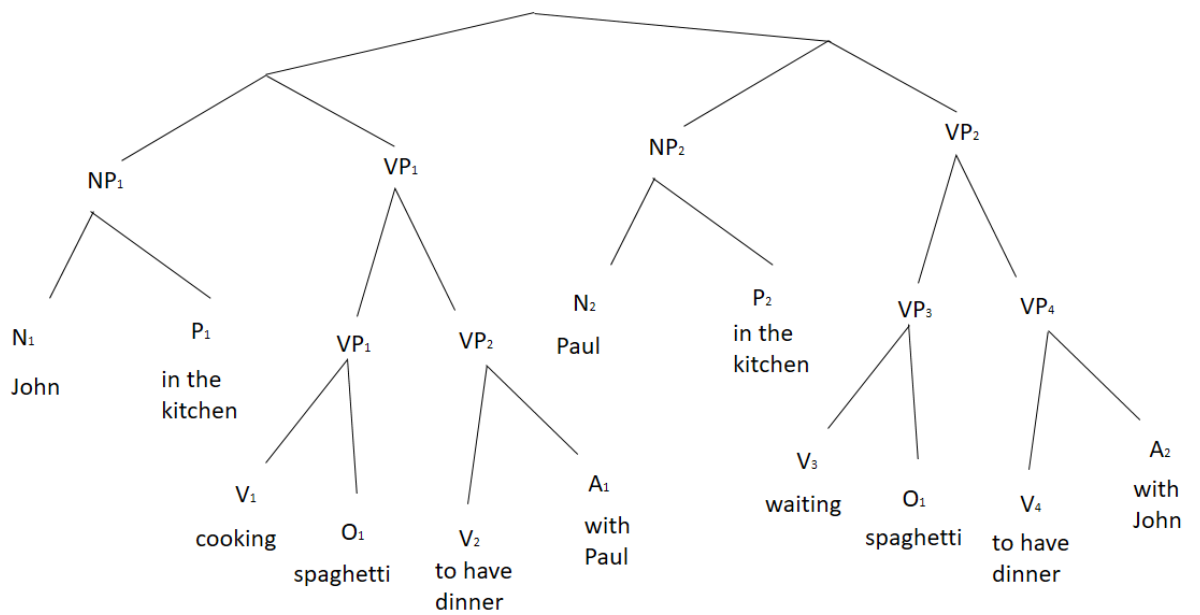— VP₄
  — V₄: to have dinner
  — A₂: with John

Diagram (i): Mental image of "John and Paul in the kitchen"

However, once you expressed it in language use in its simple, sufficient and efficient form, the grammar construction of that expression in relate to the mental image is as follow (with "e" signifies "empty trace"):
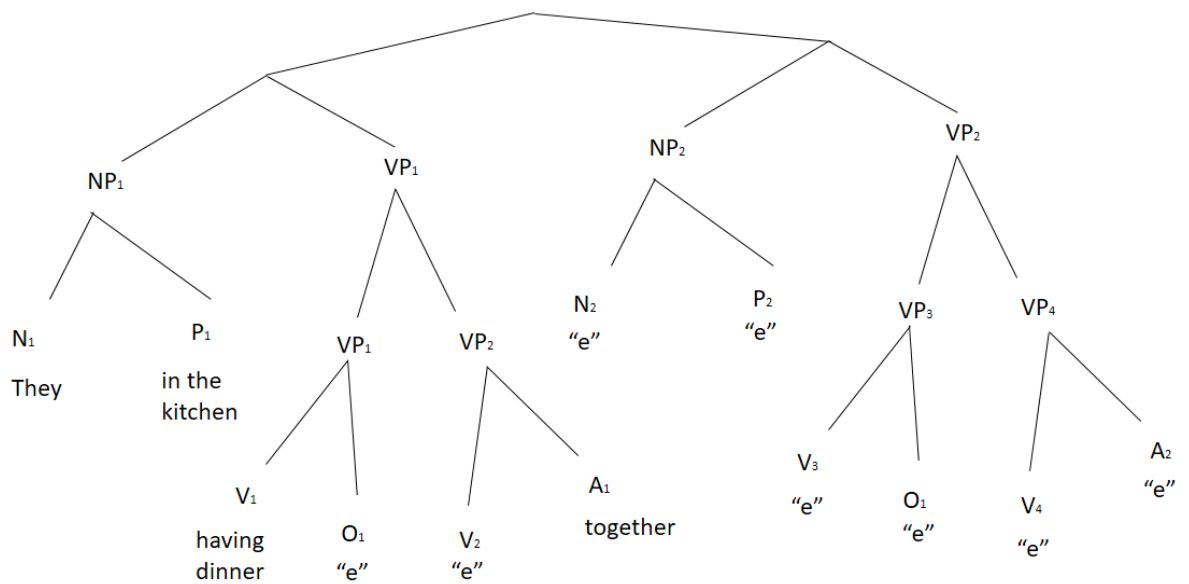
Diagram 2 (tree):

NP₁
— N₁: They
— P₁: in the kitchen

VP₁
— VP₁
  — V₁: having dinner
  — O₁: "e"
— VP₂
  — V₂: "e"
  — A₁: together

NP₂
— N₂: "e"
— P₂: "e"

VP₂
— VP₃
  — V₃: "e"
  — O₁: "e"
— VP₄
  — V₄: "e"
  — A₂: "e"

Diagram (ii): Grammar construction of language use in relate to mental image of "John and Paul in kitchen"

Take note of the "e"s in the diagram above. In relate to diagram (i), they are not expressed words in the language use, however they do present in the mental as suggested in diagram (i). In other words, the mechanism that occur from diagram (i) to diagram (ii) is as follow:

Based on diagram (ii) by referring to diagram (i), elements of N_1 and N_2 merged together; P_1 and P_2 merged; V_1, V_2, V_3 and V_4 merged; O_1 and O_2 merged together to be parts of VP but not expressed; A_1 and A_2 merged together. In other words, all elements from the mental image do present in the language use, but not all of them are explicitly expressed. In other words, this how the system of the mind works. "Meaning" are created by emerging some elements and supressing some of them without eliminating them in the consciousness. Such computation occur, after the mind perceived images and other information (when applicable).

What we have discussed is a work on "sentence". How about "story"? Common sense would tell us the system or the computation would be more complex, but the similarity is there, nevertheless.
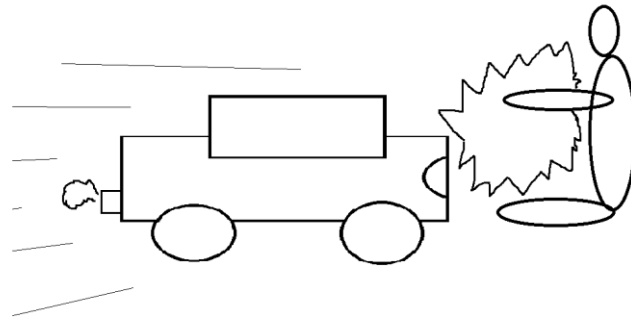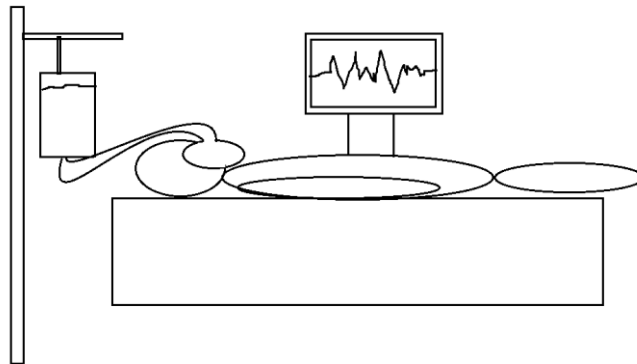
Now look at the pictures below;
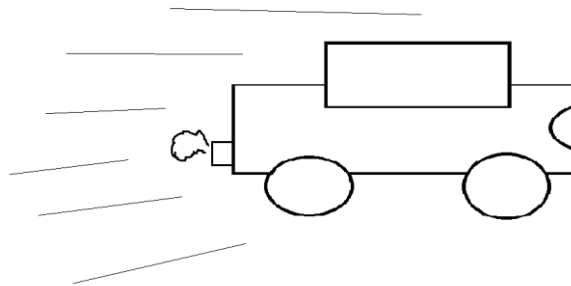
Frame (i)
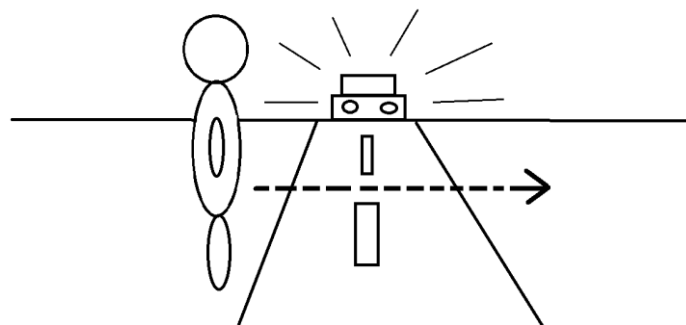
Frame (ii)

Frame (iii)

Frame (iv)

By looking at the pictures alone you would know what the story is about, without me telling you. Frame by frame, you would know that

Frame (i): a car is moving fast

Frame (ii): a man is about to cross the street which that fast moving car is on

Frame (iii): the car hits the man

Frame (iv): the man is hospitalized.

If I am to ask you, what is the story-line about, you would say "a man was hospitalized after a car accident" or in any other forms without you going through the frames one by one.

Now, from each frames, you can draw a tree diagram like we did on *image (i)*, but the final work to bring it all together would be tedious. Imagine, for each frame, the number of branches and the length would be different. If you try to contrast which elements are supressed, merged and so on will take a lot of space – but it is doable. Therefore, on this case, what is the alternative to observe the work of the human mind? – this what we are try to come up with.

Paraphrasing Russell, mental images can be translated into logical atoms or symbols in forming the formula of the proposition. However, logical proposition, according to the English philosopher, is not something that is outside of our mind like an independent tool. You must

have instinct for logic, argued Russell. Indeed, logical proposition is the expression of our mind or thought of the language we use (2009: 18, 19, 47). In other words before we write the logical propositions down on paper with ink, we are writing down what is in our mind. For example, when we look at a sentence, we already have its constructed logical proposition in our mind without us seeing the logical proposition on paper. This signifies to us that, the logical proposition that we put down on paper is the reflection of the computation in our mind when we are understanding the language in use. Therefore, by studying the structure of the logical proposition (which includes the truth value of 1 or 0) we may be able to see the mechanism of the mind.

When we construct a logical proposition deliberately on a paper – the logical proposition of the event we have in mind – all the logical atoms which represent the mental images we have in our mind of the story, are "true" or "1" in their truth value. To do in such way is natural for it would be too complicated if we assign "false" or "0" on some logical atoms. Thus the logical proposition that we put down on paper, naturally will be a "true" proposition. But how can we understand meaning is constructed from this?

Recall, the logical proposition that you put down on paper, is a "reflection" of what you already have in mind. Nonetheless, because story that is perceived in your mind are images, it is natural when you put down the logical atoms on the paper, all of them to have a value of "1" or "true". However, if you look at the "logical proposition" itself through the "logic tree", and without any truth values are attached to each atoms in prior, you may find that not all atoms (from the perspective of the proposition alone without any interference from your cognition) share the same truth value. The hypothesis is, the reason your logical proposition of your understanding appeared as it is, is because the mind contrasted some truth values amongst the logical atoms which represent the mental image of the story in order to bring out the "meaning" of the story. Thus, the logical atoms with value "1" are the essential elements of the story and logical atoms with value "0" are the supporting elements. The contrast of values "1" and "0" is the construction of meaning in our cognition. In logic tree, we negate the logical proposition and branch it out the logical possibilities. An "open" branch allows us to interpret the logical proposition. On each "open" branches, a logical atom of "p" (for example) is "1" when p is "p", and "0" when it is "¬ p". If an atom is not shown in an open branch, then any value of "1" or "0" can be assigned (Priest, 2008: 8).

Recall frames (i) until (iv). Each frame can be represented by a logical atom. If the story of the frames (i) to (iv) to be a logical proposition, we will get (with (frame n) as an atom)

$$\{ [(\text{frame i}) \wedge (\text{frame ii})] \rightarrow (\text{frame iii}) \} \rightarrow (\text{frame iv})$$

The logical proposition above reflects what you understood after you observe the chronology of frame (i) until (iv). It is the reflection of the computation of your mind once you understood the meaning of the chronology of frame (i) to (iv).
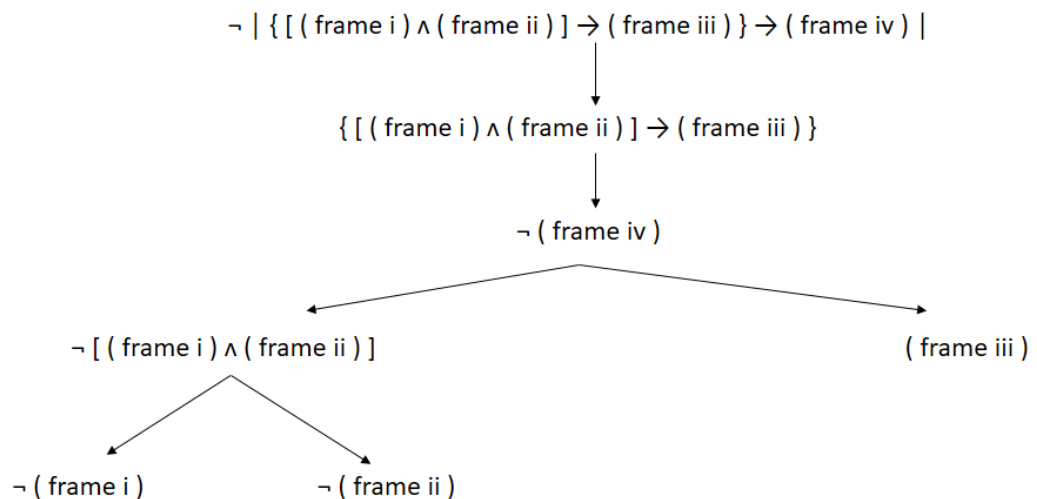
There are two perspective that we have to consider here. Firstly, after we understood the story of frame (i) to (iv), we write down the logical proposition reflecting the story. In doing so, it is natural that we assign each logical atom (which represent each frame) with value "1" to construct a flow of valid and logical argument since each frames are in our mind as we are constructing our understanding of the story. Thus, when we assign "1" on each logical atom in the proposition above, we will get the result "1" or "True".

However – and this is the second perspective – take note that the logical proposition we write on paper is already in our mind once we understood the story. On paper is a reflection of what we already have in our mind. Therefore how did the mind compute the story as we were perceiving it? We do not know. However, we do can have an idea what kind of computation that happened.

Thus we lay out the logical proposition and apply logic tree on the proposition. The purpose of a logic tree is to prove that the proposition is valid. We negate the conclusion or the proposition itself and branch it out to its true possibilities (which will be either one or more branches). A branch will be closed when in the branch there is opposite values of the same atom. For example, "p" and "¬ p" are found in one branch. When all the branches are closed, it shows that the proposition or argument is valid. This is because we started with a negation and ended with a contradiction.

However, in some cases, there are open branches – branches that are not closed. In such case, the proposition is open for interpretation. However, the interpretation is dependable on the value of available atoms on the open branches. Nonetheless, it is not our aim in this paper to interpret the proposition. Instead, our aim is to find the atoms with assigned value "1" without any conflicts in other branches. This is because, such atoms are given attention by the mind in the construction of the logical proposition priory. Such is the work of the system of the mind. We will discuss this further in the *hypothesis* section.

The logic tree for frame (i) to (iv) is

¬ | { [(frame i) ∧ (frame ii)] → (frame iii) } → (frame iv) |

{ [(frame i) ∧ (frame ii)] → (frame iii) }

¬ (frame iv)

¬ [(frame i) ∧ (frame ii)]   (frame iii)

¬ (frame i)   ¬ (frame ii)

From the logic tree above, we can see only "(frame iii)" that has the value of "1" whereas other atoms have value of "0". This shows that frame (iii) is given attention by the mind in the

process of understanding the story. Looking back at the frames (i – iv), we can see (if readers agree) frame iii is the essential part of the story. Without it, the story will collapse.
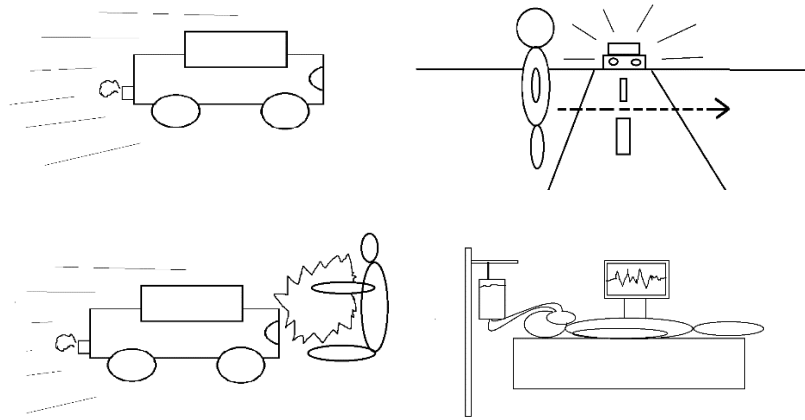
"from left to right; upper row: frame (i), frame (ii)
lower row: frame (iii), frame (iv)"

For example, if frame (iii) is absent, then we can interpret the event such as "a car was moving fast, and the man is crossing the road. He made it. However, he fell terrible ill and transferred to hospital for emergency." Compare,

if frame (i) is missing: "a man is crossing the road, and he was hit by a car. He was so injured that he is hospitalised."

if frame (ii) is missing: " a car is moving fast and hit a man. The mas was so badly injured and hospitalized."

if frame (iv) is missing: "a car is moving fast and a man is crossing the road. The car hit the man."

As you can see, when either frames (i), (ii) or (iii) is missing, the whole story from the remaining frames in each cases is almost identical. However, if frame (iii) is missing, the whole story can be completely different as you can interpret the story in many ways. However, with the presence of frame (iii), your interpretation became limited because of constrain due to frame (iii). Hence, frame (iii) is the essence, or the essential element of the story.

Interesting enough, as we understand the storyline of frames (i) to (iv), the logical proposition that we put down in paper was computed in a way that it assign the value "1" on the essential element of the story (or frame) without our interference (after we negate the proposition however. Further explanation will be on the *hypothesis* section of this paper). This gives us a glimpse on the mechanism of the human mind.

In the coming section, we will do the examples (and analyzation) from the fables. Fables are good examples for us to use. The reason is, fables are not long stories, yet they contain important and deep meanings. To test our hypothesis, there are steps. I chose three fables for our analyzation. I will first briefly review the fables, gives the messages and moral meanings. After that, we will look at each fables and construct a tree diagram for each and give

commentaries. Later on, I will make up a 'meaningless' story and we will hope that our hypothesis will not be applicable to it.

3. Logical Analysis on Fables

Three fables are chosen, from Wiggin's *Talking Beast*. Each of the short stories has an important moral messages. The first fable we will look at is "The Lion and the Mouse" – an Aesop's classic that has been retold in different forms of animals across different cultures. A mouse was caught by a lion but begged the lion to release it. The lion did and one day, the lion itself was in trouble, and the mouse remembered the kindness of the lion and returned the favour by rescuing the lion out of trouble.

The second fable is called "The Sunling" as told in India. It is about a silly man who was told that a certain object was a divine object – but in reality, it was just a candle. So the silly person hid the item (the candle) and the result was, a whole building was destroyed by fire – caused by the candle of course. It is an important story that tells us not to joke with someone who may take it seriously.

The third fable is from Malaya (now known as Malaysia) and it is called "The Tiger and the Shadow". A version of the story but the animal was a lion is famous in Persian and Turkish literature. It is about a greedy Tiger who was fooled by a mousedeer to believe that there is another tiger, which would be the Tiger's competitor in getting the foods in the jungle. The Tiger was fooled to believe that the other tiger was living in the water. The Tiger jumped into the river in order to fight the other tiger, but ended up drowning because there was never a tiger in the water but the Tiger's own shadow.

These three fables are simple yet they carry important moral messages. Fables is an effective tool to be used to educate children. When we listen to or read the fables, our imaginations play out the storyline with images in our mind. Interestingly enough, we able to extract the moral lessons once we understood the story. When we expressed what we understood as logical proposition on the paper, each logical atoms share the same value of "1". However, we have to remember that, the logical proposition that we write on paper was already computerized beforehand – which is in our mind the moment we understood the story. When we let the logic tree do its own work (on the negated proposition), we will find out that not all logical atoms share the same value. Some are assigned as "1" and some are assign as "0" and some are assigned either "1" or "0" in different branches. Take note of the logical atoms with value "1" (in other words, no negation "¬" assigned to it) with no contradicting value on other branches (meaning the same logical atom with value "0" or the negation sign "¬" assigned to it). We will find that logical atoms with value "1" are elements of the story which is essential to the story. This shows that, the mind assign value "1" on those atoms as necessaries the moment the story is understood.

3.1. Fable I

From the fables of Aesop,

"**The Lion and the Mouse**

A Lion, tired with the chase, lay sleeping at full length under a shady tree. Some Mice, scrambling over him while he slept, awoke him. Laying his paw upon one of them, he was about to crush him, but the Mouse implored his mercy in such moving terms that he let him go.

Now it happened that sometime afterward the Lion was caught in a net laid by some hunters, and, unable to free himself, made the forest resound with his roars. The Mouse, recognizing the voice of his preserver, ran to the spot, and with his little sharp teeth gnawed the ropes asunder and set the Lion free."

The fable above, if we may, can be summarized (in order) in the following points:

i. The lion caught a mouse
ii. The mouse begged the lion
iii. The lion let go of the mouse
iv. The lion was trapped
v. The lion called for help
vi. The mouse helped the lion
vii. The lion got freed

Respectively, with assigned atoms of "[lion = l; mouse = m; to catch = C; to be trapped = T; to call for help = S; to help = H; to beg = B; to be free = F]", we will get

i. ∃l ∃m (Clm)
ii. ∃m ∃l (Bml)
iii. ∃m (Fm)
iv. ∃l Tl
v. ∃l Sl
vi. ∃m ∃l (Hml)
vii. ∃l Fl

All the logical atoms above in a proposition that summarize the fable would be:

∃l ∃m │ [(Clm ∧ Bml) → Fm] → { [(Tl ∧ Sl) → Hml] → Fl } │

To ease our analyzation, we assign each atoms in symbols of "(for) Clm = (the symbol is) A; Bml = B; Fm = C; Tl = D; Sl = E; Hml = F; Fl = G" and the proposition will be written as:

[(A ∧ B) → C] → { [(D ∧ E) → F] → G }

Thus, the "logic tree" diagram would be as follow:

$$\neg\,|\,[\,(\,A \wedge B\,) \rightarrow C\,] \rightarrow \{\,[\,(\,D \wedge E\,) \rightarrow F\,] \rightarrow G\,\}\,|$$

$$[\,(\,A \wedge B\,) \rightarrow C\,]$$

$$\neg\,\{\,[\,(\,D \wedge E\,) \rightarrow F\,] \rightarrow G\,\}$$

$$[\,(\,D \wedge E\,) \rightarrow F\,]$$

$$G$$
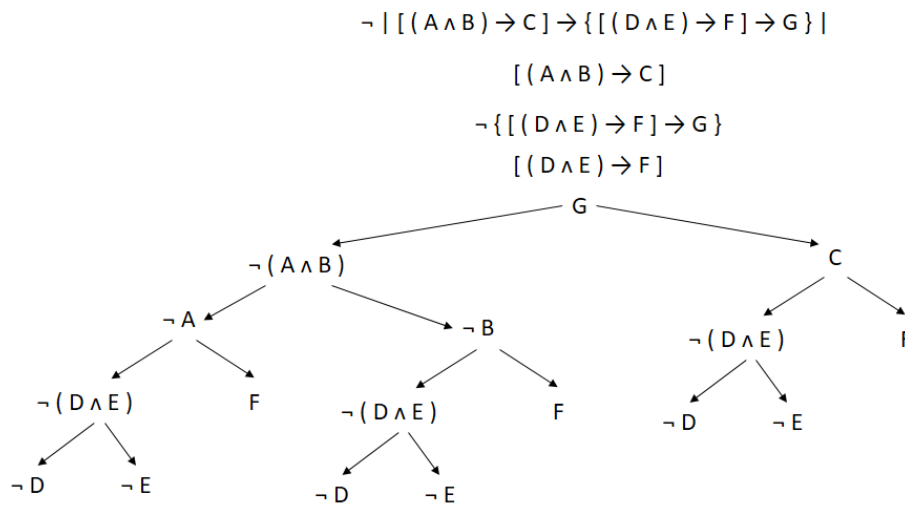
From the logic tree above, there are three common logical atoms that have the value of "1" from each branches, and they are C, F and G. In other words, logical atoms of Fm, Hml and Fl have values of "1" each and do not have contradictions on other branches. These atoms stand for "the lion released the mouse", "the mouse help the lion" and "the lion escaped" respectively. These three atoms or elements of the story are the essential ones and carry the story. If one of them is missing, then the story will be hanged (or incomplete). Other elements, if are missing, the story may be less dramatic, but the message is carried, simply from the essential ones. The essential ones, simply spells out "goodness will be returned with goodness", as the lion helped the mouse, and the mouse helped the lion in return.

3.2. Fable II

Fable from India

"The Sunling[5]

In the good old days a Clown in the East, on a visit to a city kinsman, while at dinner pointed to a burning candle and asked what it was. The city man said, in jest, it was a Sunling, or one of the children of the sun.

The Clown thought that it was something rare; so he waited for an opportunity, and hid it in a chest of drawers close by. Soon the chest caught fire, then the curtains by its side, then the room, then the whole house.

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[5] I could not find information about "Sunling" but based on the fable, "Sunling" must be something or someone of a religious divinity.

After the flames had been put down, the city man and the Clown went into the burnt building to see what remained. The Clown turned over the embers of the chest of drawers. The city man asked what he was seeking for. The Clown said: "It is in this chest that I hid the bright Sunling; I wish to know if he has survived the flames."

"Alas," said the city man, who now found out the cause of all the mischief, "*Never jest with fools!*"

From the fable above, we can summarize it through these points in order;

i.   The Clown fascinated with a candle
ii.   The city man said to the clown that the candle is Suling or "one of the children of the Sun"
iii.   The Clown kept the candle in a chest
iv.   The candle caused the chest fire and consequently burned the whole building
v.   The Clown explained he is looking for the
vi.   The city man regretted with his jest

Respectively, with logical atoms symbolize [the Clown = c; the city man = m; Suling = s; candle = x; chest = y; building = b; to say = S; to be regret = R; to be fascinated = F; to look for = L; to keep = K, to burn = B], we will get

i.   ∃c ∃x (Fcx)
ii.   ∃m ∃x ∃s [Smx ∧ (x ↔ s)]
iii.   ∃c ∃x ∃y [Kcx ↔ (x ∧ y)]
iv.   ∃x ∃y ∃b (Bxy → Bb)
v.   ∃c ∃s (Lcs)
vi.   ∃m Rm

The story then can be presented in logical propositions as follow:

∃x ∃m ∃s ∃y ∃b ({ [│ { (Fcx) ∧ [Smx ∧ (x ↔ s)] } → [Kcx ↔ (x ∧ y)] │ → (Bxy → Bb)] ∧ Lcs } → Rm)

To ease our work, we use [Fcx = A; Smx = B; C = x; D = s; E = Kcx; F = y; G = Bxy; H = Bb; I = Lcs; J = Rm] to get,

({ [│ { (A) ∧ [B ∧ (C ↔ D)] } → [E ↔ (C ∧ F)] │ → (G → H)] ∧ I } → J)

The logic tree of the proposition above would be as;

$$\neg\,|\,(\{[\,|\,\{(A)\wedge[B\wedge(C\leftrightarrow D)]\}\rightarrow[E\leftrightarrow(C\wedge F)]\,|\,\rightarrow(G\rightarrow H)]\wedge I\}\rightarrow J)\,|$$

$$\{[\,|\,\{(A)\wedge[B\wedge(C\leftrightarrow D)]\}\rightarrow[E\leftrightarrow(C\wedge F)]\,|\,\rightarrow(G\rightarrow H)]\wedge I\}$$

$$\neg\,J$$

$$[\,|\,\{(A)\wedge[B\wedge(C\leftrightarrow D)]\}\rightarrow[E\leftrightarrow(C\wedge F)]\,|\,\rightarrow(G\rightarrow H)]$$
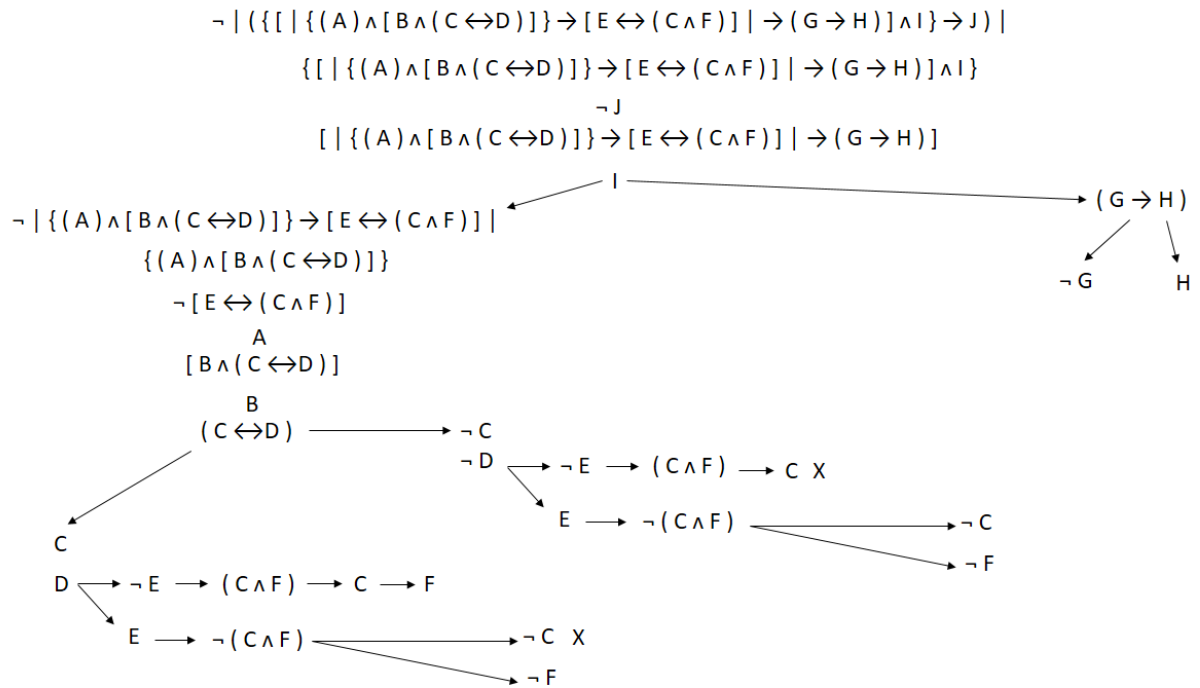
The only logical atoms with value of "1" without conflicting values in different branches are A, B, H and I; in other terms, Fcx, Smx, Bb and Lcs. This means that, the elements of the story are "the Clown's curiosity with the candle", "the city man's jest towards the Clown", "the building burnt down" and "the Clown was looking for the Sunling (candle)". In other words, if these elements are absent, the story will collapse.

One may ask, how about the element of "the city man's regret"? Well, if we pay attention closely, if we remove the sentence *""Alas," said the city man, who now found out the cause of all the mischief, "Never jest with fools!""* which indicates the city man's regret, the story still stands. The city man's regret is the moral lesson of the story which we can derive from the four main elements we mentioned above without the need of the sentence that we just quoted.

3.3. Fable III

From the fables of Malayan,

"**The Tiger and the Shadow**

There was a "salt-lick" in the jungle to which all the beasts of the forest resorted, but they were greatly afraid by reason of an old Tiger which killed one of them every day. At length, therefore, P'lando' the Mouse-deer said to the Tiger, "Why not permit me to bring you a beast every day, to save you from hunting for your food?" The Tiger consented and P'lando' went off to make arrangement with the beasts. But he could not persuade any of them to go, and after three days he set off, taking nobody with him but Kuwis the smallest of the Flying Squirrels.

On their arrival P'lando' said to the Tiger: "I could not bring you any of the other beasts because the way was blocked by a fat old Tiger with a Flying Squirrel sitting astride its muzzle." On hearing this the Tiger exclaimed, "Let us go and find it and drive it away." The three therefore set out, the Flying Squirrel perched upon the Tiger's muzzle and the Mouse-deer sitting astride upon its hind quarters. On reaching the river, the Mouse-deer pointed to the Tiger's likeness in the water and exclaimed, "Look there! That is the fat old Tiger that I saw." On hearing this, the Tiger sprang into the river to attack his own shadow, and was drowned immediately."

The fable above can be summarized in the following order;

i. Tiger eats beast everyday
ii. P'lando' the mousedeer offer Tiger that he would bring him a beast everyday
iii. The P'lando' could not bring any beast with (but a flying squirrel)
iv. The P'lando' said to Tiger that there is another tiger blocking the way so no other beast could come
v. The P'lando' brings the Tiger to meet the other tiger
vi. Tiger saw the other tiger in the river water
vii. The other tiger was Tiger's own shadow
viii. Tiger sprang into the river and drowned

Translating each into logical proposition using [Tiger = t; P'lando' = p; beasts = b; water/river = w; other tiger = o; shadow = S; to drown = D; to sprang = J; to see/meet = L; to eat = E; to offer = O; to bring = B], we will get

i. $\exists t\ \exists b\ (\ Etb\ )$
ii. $\exists p\ \exists t\ \exists b\ (\ Opt \wedge Bptb\ )$
iii. $\exists p\ \exists t\ \exists b\ [\ \neg\ (\ Bptb\ )\ ]$
iv. $\exists o\ \exists p\ \exists t\ \exists b\ [\ o \rightarrow \neg\ (\ Bptb\ )\ ]$
v. $\exists p\ \exists t\ \exists o\ (\ Bpto \rightarrow Lto\ )$
vi. $\exists t\ \exists o\ (\ Lto \wedge w\ )$
vii. $\exists o\ \exists t\ (\ o \leftrightarrow St\ )$
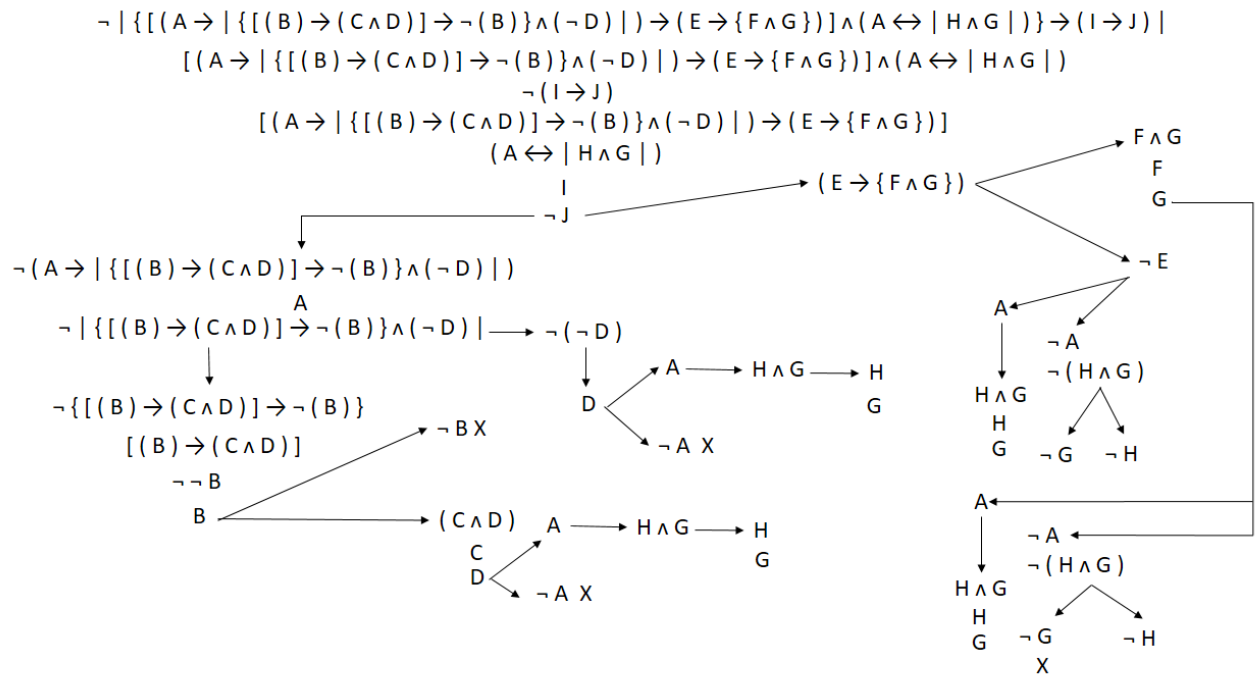viii. $\exists t\ \exists w\ (\ Jtw \rightarrow Dt\ )$

Which means, the logical proposition of the fable would be

$\exists t\ \exists b\ \exists o\ \exists p\ \exists w\ \big|\ \{\ [\ (\ o \rightarrow\ \big|\ \{\ [\ (\ Etb\ ) \rightarrow (\ Opt \wedge Bptb\ )\ ] \rightarrow \neg\ (\ Etb\ )\ \} \wedge (\ \neg\ Bptb\ )\ \big|\ ) \rightarrow (\ Bpto \rightarrow \{\ Lto \wedge w\ \}\ )\ ] \wedge (o \leftrightarrow\ \big|\ St \wedge w\ \big|\ )\ \} \rightarrow (\ Jtw \rightarrow Dt\ )\ \big|$

Associating each logical atoms with a letter such as [o = A; Etb = B; Opt = C; Bptb = D; Bpto = E; Lto = F; w = G; St = H; Jtw = I; Dt = J], we will get the following form:

$\{\ [\ (\ A \rightarrow\ \big|\ \{\ [\ (\ B\ ) \rightarrow (\ C \wedge D\ )\ ] \rightarrow \neg\ (\ B\ )\ \} \wedge (\ \neg\ D\ )\ \big|\ ) \rightarrow (\ E \rightarrow \{\ F \wedge G\ \}\ )\ ] \wedge (\ A \leftrightarrow\ \big|\ H \wedge G\ \big|\ )\ \} \rightarrow (\ I \rightarrow J\ )$

The "logic tree" for it would be

¬│{[(A→│{[(B)→(C∧D)]→¬(B)}∧(¬D)│)→(E→{F∧G})]∧(A↔│H∧G│)}→(I→J)│

[(A→│{[(B)→(C∧D)]→¬(B)}∧(¬D)│)→(E→{F∧G})]∧(A↔│H∧G│)

¬(I→J)

[(A→│{[(B)→(C∧D)]→¬(B)}∧(¬D)│)→(E→{F∧G})]

(A↔│H∧G│)

I

¬J

(E→{F∧G})

F∧G
F
G

¬E

¬(A→│{[(B)→(C∧D)]→¬(B)}∧(¬D)│)

A

¬│{[(B)→(C∧D)]→¬(B)}∧(¬D)│ ⟶ ¬(¬D)

¬{[(B)→(C∧D)]→¬(B)}

[(B)→(C∧D)]

¬¬B

B

¬B X

A ⟶ H∧G ⟶ H
G

D

¬A X

(C∧D)
C
D

¬A X

A ⟶ H∧G ⟶ H
G

A

¬A

¬(H∧G)

H∧G
H
G

¬G   ¬H

A

¬A

¬(H∧G)

H∧G
H
G

¬G   ¬H

X

From the logic tree, we can see that, I, F, D and B are the only logical atoms with value "1" without any contradiction on other branches. B, D, F and T respectively are; Etb, Bptb, Lto and Jtw, which means respectively; "Tiger eats beasts", "P'lando' to bring food to Tiger", "Tiger meets the other tiger" and "Tiger jumps into water". Without these four elements, the story will collapse. In fact, with these four alone, one can derive the moral story of the fable. For example, "Tiger eats beasts" reflect greediness; "P'lando' to bring food to Tiger" is the turning point event which lead to the end of the Tiger's fate; "Tiger meets the other tiger" is the decisive moment; and "Tiger jumps into water" shows the foolishness of being greedy and its negative implication. In addition to that, from the last two elements, we can simply deduce that the "other tiger" is just its reflection on the "water".

4. Counter example

What we reflected so far shows that our initial hypothesis is in place. Nonetheless, it is reasonable now for us to be in the step to justify our hypothesis. In this section, I will create a story which I deliberately make it as meaningless as possible. After that, we will logically analysis it to give support to our hypothesis.

The meaningless story to be is as follow;

> "I went to the shop to buy ice cream. And then I went to the restaurant next door to eat pizza. Across of me, a beautiful lady was siting. My phone rang; my mother called me and she told me that my brother is coming."

From that story (or is it?), in its chronological order can be summarized as

i.   I went to shop to buy ice cream
ii.   I went to restaurant next door to eat pizza

    iii.   A beautiful lady sitting across
    iv.   My phone rang
    v.   Mother called
    vi.   Mother said brother is coming

Assigning [me = i; shop = s; restaurant = r; phone = f; mother = m; brother = b; lady = l; ice cream = c; pizza = p; to go = G; to buy = S; to call = P; to tell/say = T; beautiful = B; to come = C], we will get in respectively

    i.   ∃i ∃s ∃c (Gis ∧ Sic)
    ii.   ∃i ∃r ∃p (Gir ∧ Sip)
    iii.   ∃l Bl
    iv.   ∃f
    v.   ∃m Pm
    vi.   ∃m ∃b (Tm ∧ Cb)

Thus, the logical proposition for the story would be as follow

∃i ∃s ∃c ∃p ∃l ∃f ∃m ∃b [(Gis ∧ Sic) ∧ (Gir ∧ Sip) ∧ f ∧ Bl ∧ Pm ∧ (Tm ∧ Cb)]

Which accordingly to the logical atoms, we can simplify it as follow with alphabets accordingly

[(A ∧ B) ∧ (C ∧ D) ∧ E ∧ F ∧ G ∧ (H ∧ I)]

We divide the continuous conjunctions into a conjunction of two premises

[(A ∧ B) ∧ (C ∧ D) ∧ E] ∧ [F ∧ G ∧ (H ∧ I)]

Therefore, the logic tree would be
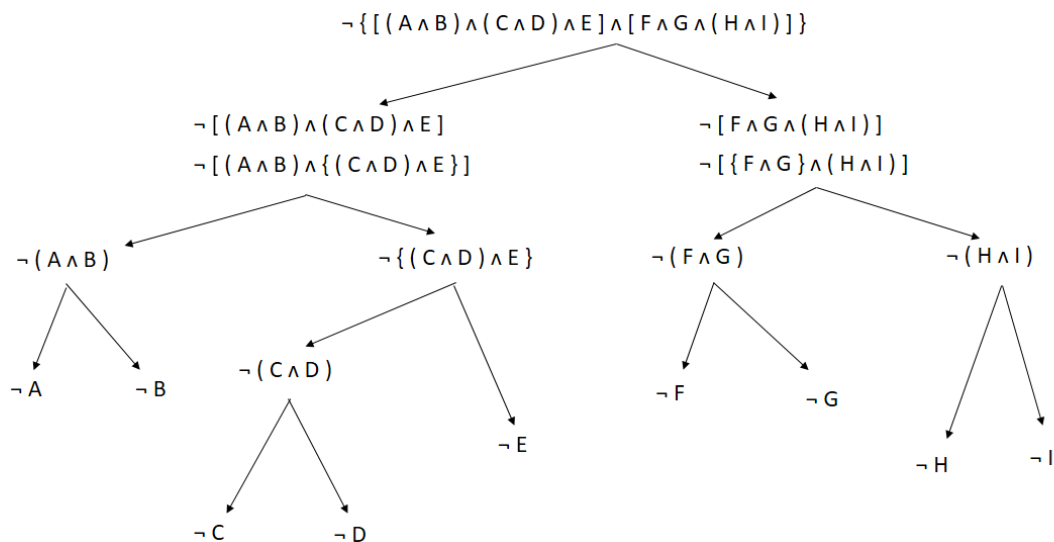
From the "tree diagram" above, we can see that there are no logical atoms with the value "1". All atoms are assigned with value "0". Therefore there are no elements which are computed to bring contrasts in value to give "meaning" to the story. It is a meaningless story.

5. Hypothesis

It is important to note that why we start with a negated proposition on the top of logic tree. In classical logic, the purpose is to find a contradicting atoms in the branches so the branches are closed. When all the branches are closed, it shows that the proposition is valid. In other words, a false conclusion with contradicting logical flow is a valid argument. But for the case in our paper here, we do not limit our understanding to that purpose. Rather we are seeing it on how we break down the logical proposition to find the essence of the logical proposition. From there on, "working backward" (which I will show shortly) we may be able to catch a glimpse on how the mind works to understand the story.

Before we infer what the process may occurred in the mind, we may discuss why we negate the proposition at first.

Take note that, when we negate something, the answer to it is more than one. What I mean by this is that, if we negate "A", meaning that "x" is "not A", means that "x" could be "B", "C", "D" or "E". This means that, a negation of something is very broad in comparison to an equivalent of something, in terms of their possibilities. I think this is common sense, unless a definition is given to restrict this claim.

To find the "essence" of a proposition, the method of negation is applicable.

For example, let's say we have $A \vdash (p \wedge q)$. From that, if I say "$\neg A$", it can mean $(c \wedge d)$ or $(e \wedge f)$ and so on. But, I want to make sense of $\neg (p \wedge q)$ as part of $\neg A$. Therefore, it is important that I find the "essence" of A so I can make sense of "$A \vdash (p \wedge q)$" without being "distracted" by the equally valid of "$A \vdash \neg (c \wedge d)$" and "$A \vdash \neg (e \wedge f)$" respectively. Thus, when we negate a proposition, we are given possibilities for its negations. Again, as we just mentioned, a negation of something is very broad for it can be anything than what it is negated. If such pattern is continuous, then we may lose the original proposition in our cognition. For example, look at the diagram below in the case of we negate "A"
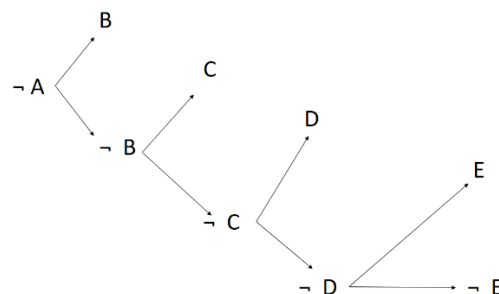
From the diagram above, we can see how "A" is out of our cognitive map, because "$\neg A$" simply could mean either "B", "C", "D" or "E". If we want to retain "A" in our cognitive map, an element of A (thus the "essence" of A) must survive the negation. Hence if A is a proposition

in a logic tree, one of more of its logical atoms need to survive the negation. In other words, when the proposition is negated, the atom(s) are not negated. Such atom(s) is/are the essence of proposition A which carry the value "1" on the logic tree without any contradicting values on other branches. Examples are many, which are we already discussed.

Therefore, we can find the "essence" of a proposition by negate it. The essence of the proposition, survives the "annihilation" by carrying the value "1" in the logic tree, without conflicting value in other branches of the same tree.

But how do the mind computes the story? As we already mentioned, we do not know how the mind computed it. But after seeing that the "essence" of the proposition carries the story, we can in a way estimate what went through in the mind.

Recall "frames (i) to (iv)" that we have seen in the *Initial Hypothesis and Philosophical Doctrine in Method* section. We discussed that "frame (iii)" is the essence of the story, and without frame (iii) the story will collapse. In fact, from the storyline with the absence of either frame (i), (ii), or (iv), the stories told in each cases are similar – however, not so when frame (iii) is absent. Thus, the computation of the mind during our comprehension of the story frame (i) to (iv) can be represented as below

Input:

Logical Atom	Frame (i)	Frame (ii)	Frame (iii)	Frame (iv)
Value	1	1	1	1

Internal Computation:

Frame (i)	Frame (ii)	Frame (iii)	Frame (iv)	Outcome
0	1	1	1	X
1	0	1	1	X
1	1	0	1	Y
1	1	1	0	X

Unusual outcome

Led to

Element extraction:

Frame (i)	Frame (ii)	Frame (iii)	Frame (iv)
0	0	1	0

Logically arranged as

Internal comprehension:

$$\{ [(\text{Frame i}) \wedge (\text{Frame ii})] \rightarrow (\text{Frame iii}) \} \rightarrow (\text{Frame iv})$$

The same model system as above applied in our mind when we understands the fables we read in this work. Therefore, this model represents of what happen in our mind as we are understanding a story.

6. Conclusion

What we have learnt so far is that, the mind computes images to produce meaning. Such computation is the work of the mind – it is the reflection of the system of the mind. This system suggests to us what we can know of human nature.

Take note that fables are short stories – with simple story line. Yet, underneath it, we can extract its moral lessons. Since we agree that it is the innate computation of the mind that extract the meaning of the story of the perceived story, then we can agree that it is innate system of the mind too that extract the moral lesson from the fable. This naturally tells us that human moral is an innate system which part of the system of the human mind.

Given such conclusion, we can see why fables are important educational tools for children. By telling them stories, they use their imaginative faculty to perceive the story. Thus, whilst images of the story are in their mind, they are encouraged to exercise the computing faculty of their mind to extract the meaning or moral lesson from the story.

Our philosophy of mind from this work suggests to us that, the story we perceive are just images. It was our intellect capability through the system of our mind which we compute the images to form a meaning. The computation occur by contrasting the different possibilities of the changes in certain values of the images of the perceived story. Difference in values suggest a change in outcome, which it is obvious when the essential image(s) is/are altered. Therefore, the mind would detect the essential image(s) and emphasized it/them. Such contrast given to the images produce meaning in our mind. In other words, we comprehend the story at that moment. After the meaning established in our mind, or after we comprehended the story, we able to express it again via written words in form of expression, or logical propositions.

The computation of our mind reflects the system of our mind. It able to subtract elements into parts and compare them to detect the main element(s) of the whole that constituted of the parts. Such abstraction produces meaning and such abstraction is the effect or product of the system of the mind. Therefore, if our mind is limited in its capacity, the computation of our mind is also limited. Hence, there are things that are unintelligible to our mind. What is intelligible to us then, reflects what is in our nature. Thus, if abstracting moral lesson from fables is a property or characteristic of human nature – then this means, morality is part of human nature. Therefore, proper education is to encourage the growth of the computation capability in children, and this include their sense of moral too. In other words, if what we concluding here is true, then we can say that morality is not a social construction, and education must not be a system of indoctrination.

7. Declaration

i.   Fables are taken from *The Talking Beast: A Book of Fable Wisdom*, edited by Kate Douglas Wiggin and Nora Archibald Smith published in 1922, now is in public domain. A copy of it can be accessed via Project Gutenberg (online) at www.gutenberg.org/cache/epub/13815/pg13815.html

ii.   All illustrations in this article are drawn by the author.

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